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NATIONAL ADVISORY COMMITTEE FOR AERONAUTICS

REPORT No. 244

AERODYNAMIC CHARACTERISTICS OF AIRFOILS—IV

By

NATIONAL ADVISORY COMMITTEE
FOR AERONAUTICS

REPRINT OF REPORT No. 244, ORIGINALLY PUBLISHED SEPTEMBER 19 1926

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AERONAUTICAL SYMBOLS

1. FUNDAMENTAL AND DERIVED UNITS

	Symbol	Metric		English	
		Unit	Symbol	Unit	Symbol
Length	l	meter	m	foot (or mile)	ft. (or mi.)
Time	t	second	sec	second (or hour)	sec. (or hr.)
Force	F	weight of one kilogram	kg	weight of one pound	lb.
Power	P	kg/m/sec		horsepower	HP.
Speed		km/hr		mi./hr	M. P. H.
		m/sec		ft./sec	f. p. s.

2. GENERAL SYMBOLS, ETC.

W, Weight, $=mg$

g, Standard acceleration of gravity $=9.80665$ m/sec.^{2} $=32.1740$ ft./sec.^{2}

m, Mass, $=\frac{W}{g}$

ρ, Density (mass per unit volume).

Standard density of dry air, 0.12497 (kg-m^{-4} sec.^{2}) at 15° C and 760 mm $=0.002378$ (lb.-ft.$^{-4}$ sec.^{2}).

Specific weight of "standard" air, 1.2255 kg/m^3 $=0.07651$ lb./ft.^{3}

mk^2, Moment of inertia (indicate axis of the radius of gyration, k, by proper subscript).

S, Area.

S_w, Wing area, etc.

G, Gap.

b, Span.

c, Chord length.

b/c, Aspect ratio.

f, Distance from $c.\ g.$ to elevator hinge.

μ, Coefficient of viscosity.

3. AERODYNAMICAL SYMBOLS

V, True air speed.

q, Dynamic (or impact) pressure $=\frac{1}{2}\rho V^2$

L, Lift, absolute coefficient $C_L=\frac{L}{qS}$

D, Drag, absolute coefficient $C_D=\frac{D}{qS}$

C, Cross-wind force, absolute coefficient $C_C=\frac{C}{qS}$

R, Resultant force. (Note that these coefficients are twice as large as the old coefficients L_C, D_C.)

i_w, Angle of setting of wings (relative to thrust line).

i_t, Angle of stabilizer setting with reference to thrust line.

γ, Dihedral angle.

$\rho\frac{Vl}{\mu}$, Reynolds Number, where l is a linear dimension.

e. g., for a model airfoil 3 in. chord, 100 mi./hr. normal pressure, 0° C: 255,000 and at 15° C., 230,000;

or for a model of 10 cm chord 40 m/sec, corresponding numbers are 299,000 and 270,000.

C_p, Center of pressure coefficient (ratio of distance of $C.\ P.$ from leading edge to chord length).

β, Angle of stabilizer setting with reference to lower wing, (i_t-i_w).

α, Angle of attack.

ϵ, Angle of downwash.

NOTICE

REPORT No. 244

AERODYNAMIC CHARACTERISTICS OF AIRFOILS—IV

CONTINUATION OF REPORTS NOS. 93, 124, AND 182

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INTRODUCTION

This collection of data on airfoils has been made from the published reports of a number of the leading aerodynamic laboratories of this country and Europe.[1] The information which was originally expressed according to the different customs of the several laboratories is here presented in a uniform series of charts and tables suitable for the use of designing engineers and for purposes of general reference.

It is a well-known fact that the results obtained in different laboratories, because of their individual methods of testing, are not strictly comparable even if proper scale corrections for size of model and speed of tests are supplied. It is, therefore, unwise to compare too closely the coefficients of two wing sections tested in different laboratories. Tests of different wing sections from the same source, however, may be relied on to give true relative values.

The series of airfoils designated N. A. C. A.–M1 to N. A. C. A.–M27 (Reference Nos. 506 to 532) were tested in the variable density wind tunnel of the National Advisory Committee for Aeronautics at a pressure of approximately 20 atmospheres.

The absolute system of coefficients has been used, since it is thought by the National Advisory Committee for Aeronautics that this system is the one most suited for international use and yet it is one from which a desired transformation can be easily made. For this purpose a set of transformation constants is given.

Each airfoil section is given a reference number, and the test data are presented in the form of curves from which the coefficients can be read with sufficient accuracy for designing purposes. The dimensions of the profile of each section are given at various stations along the chord in per cent of the chord, the latter also serving as the datum line. When two sets of ordinates are necessary, on account of taper in chord or ordinate, those for the maximum section (at center of span) are given on the individual characteristic sheets, while those for the tip (dotted) section are given in separate tables, page 226. Where the ratio of ordinate to chord remains constant the one set of ordinates applies to both center and tip section. The shape of the section is also shown with reasonable accuracy to enable one to more clearly visualize the section under consideration, together with its characteristics.

The authority for the results here presented is given as the name of the laboratory at which the experiments were conducted, with the size of model, wind velocity, and year of test.

TRANSFORMATION CONSTANTS

For the convenience of those who prefer to use a system of units other than the absolute system, there is given below a table of transformation constants based on the standard condition adopted by the National Advisory Committee for Aeronautics of—

Temperature	= 15.6° C.	= 60.1° F.
Pressure	= 760 mm Hg.	= 29.92 in. Hg.
Humidity	= 0.	
Gravity	= 9.806 m/sec.^{2}	= 32.172 ft./sec.^{2}

1 A previous collections of airfoil sections 1 to 503 and charts 1 to 12 may be found in N. A. C. A. Reports Nos. 93, 124, and 182.

thus giving values of specific weight of air

$$W = 1.223 \text{ kg/m}^3 = 0.07635 \text{ lb./ft.}^3$$

and of density

ρ = 0.1247 in the French engineering or kilogram, meter, second system.

Or

= 0.00237 in the English or pound, foot, second system.

In absolute units	$P = CV^2\rho/2$
In kg/m² (m/sec.)	$P = .0625\ CV^2$
In kg/m² (km/hr.)	$P = .004822\ CV^2$
In lb./sq. ft. (ft./sec.)	$P = .001189\ CV^2$
In lb./sq. ft. (mi./hr.)	$P = .002558\ CV^2$

Note that these constants are half as large as those used in Reports Nos. 93 and 124 and that the absolute coefficients used in this report are twice as large as the old coefficients. (See Report No. 240 regarding change in absolute coefficients.)

INDEX

Three separate types of index are given—chart indexes which make it possible for a designer to select the wing section most suitable for the particular design in which he is interested; a group index which is arranged by countries and laboratories at which tests were conducted, each section also being designated by a reference number; and an alphabetical index.

CHART INDEX

In order that the designer may easily pick out a wing section which is suited to the type of airplane on which he is working, four index charts are given which classify the wings according to their aerodynamic and structural properties. In the charts of this report a lower-case letter is placed adjacent to the reference number giving Vl values, so that a comparison can be made without referring to the individual drawings. In this value V represents wind velocity in feet per second and l a linear dimension, the chord, in feet.

In chart No. 13 the minimum drag, C_D, is plotted against the L/D at one-fourth the maximum lift, C_L. This chart should be used in choosing a wing section for a high-speed airplane, the wing sections being more suited for this use the farther they are from the lower left-hand corner.

In chart No. 14 the mean spar depth is plotted against the maximum lift, C_L, in order to show the possible strength and lightness of the wing structure. The higher the maximum lift coefficient is the smaller will be the wing area and the lighter the structural weight, and in the same way the greater the depth of the spars the lighter will be their weight, so that the sections the greatest distance from the lower left-hand corner will give the lightest and strongest wings. The "mean spar depth" is obtained by assuming the spars to be located respectively at 15 and 60 per cent of the chord, and by dividing the sum of their thicknesses by 2. In the case of sections tapered in ordinate, or chord, or both, the mean spar depth of the maximum section (section at center of span) is taken in per cent of the constant chord for the ordinate taper, and of the mean chord for the chord taper although accompanied, in certain airfoils, with an ordinate taper.

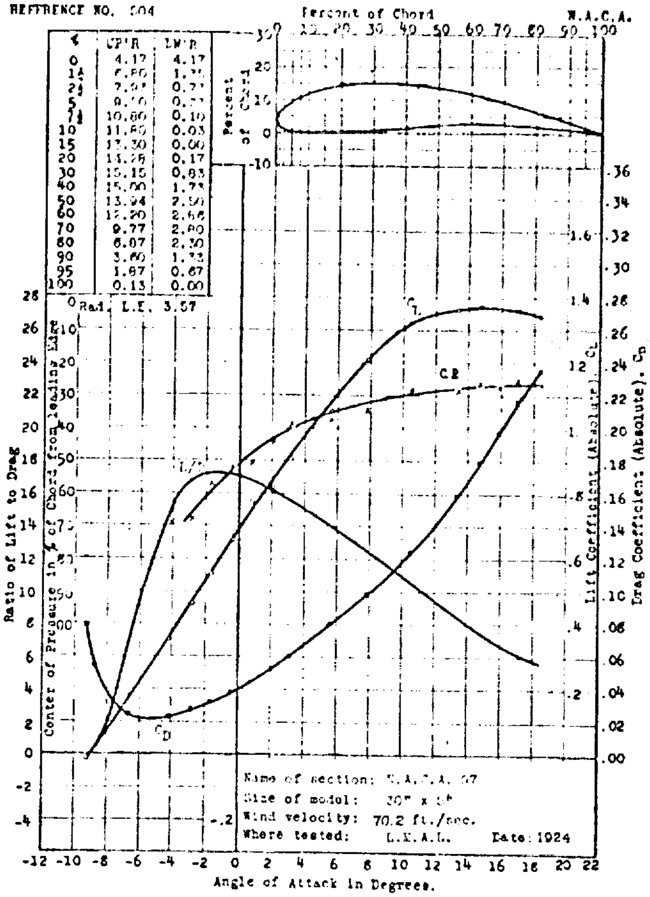
In chart No. 15 the maximum, L/D, is plotted against the maximum lift, C_L, which is of use in choosing the wing section for a slow and efficient airplane. In the same way as before the sections farthest from the lower left-hand corner are the best for this purpose.

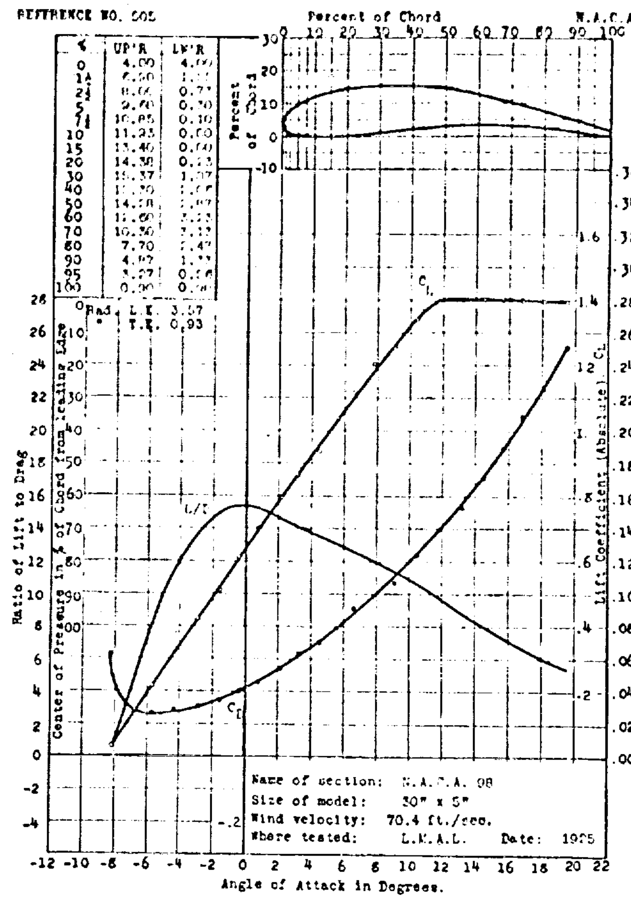
In chart No. 16 the L/D at two-thirds the maximum lift, C_L, is plotted against the maximum lift, C_L. This chart can be used for choosing a section that will give an efficient climb or a long range at cruising speed. The best sections for this purpose will be farthest from the lower left-hand corner of the chart.

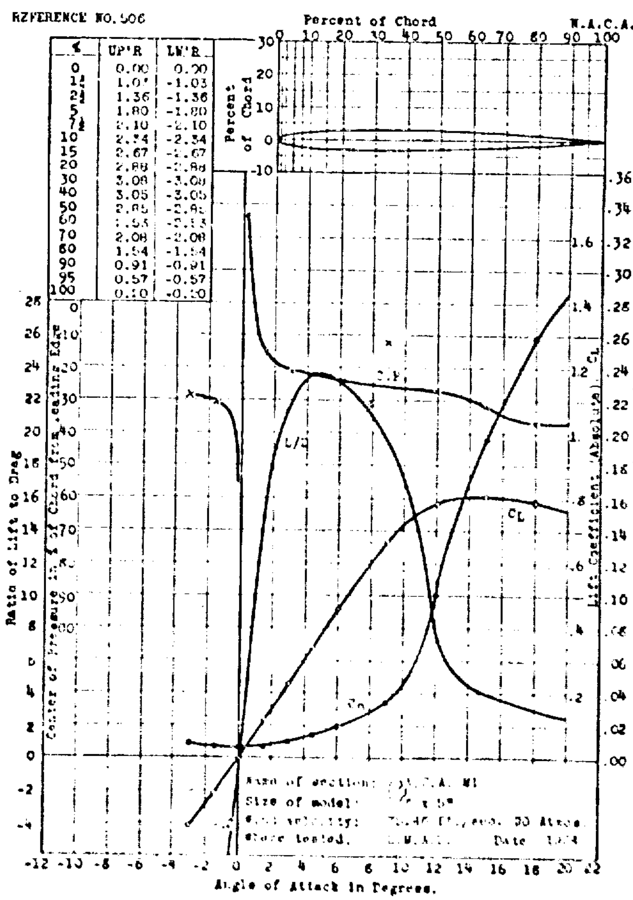
CHART INDEX

GROUP INDEX

ALPHABETICAL INDEX


REFERENCE NO. 504
Percent of Chord
N.A.C.A.
Rad. L.E. 3.57
Name of section: N.A.C.A. 97
Wind velocity: 70.2 ft./sec.
Where tested: L.M.A.L.
Date: 1924
Angle of Attack in Degrees.
Ratio of Lift to Drag
Lift Coefficient (Absolute) C_L
Drag Coefficient (Absolute), C_D


REFERENCE NO. 505
Percent of Chord
N.A.C.A.
Name of section: N.A.C.A. 98
Size of model: 30" x 5"
Wind velocity: 70.4 ft./sec.
Where tested: L.M.A.L.
Date: 1925
Angle of Attack in Degrees.
Ratio of Lift to Drag
Lift Coefficient (Absolute) C_L
Drag Coefficient (Absolute), C_D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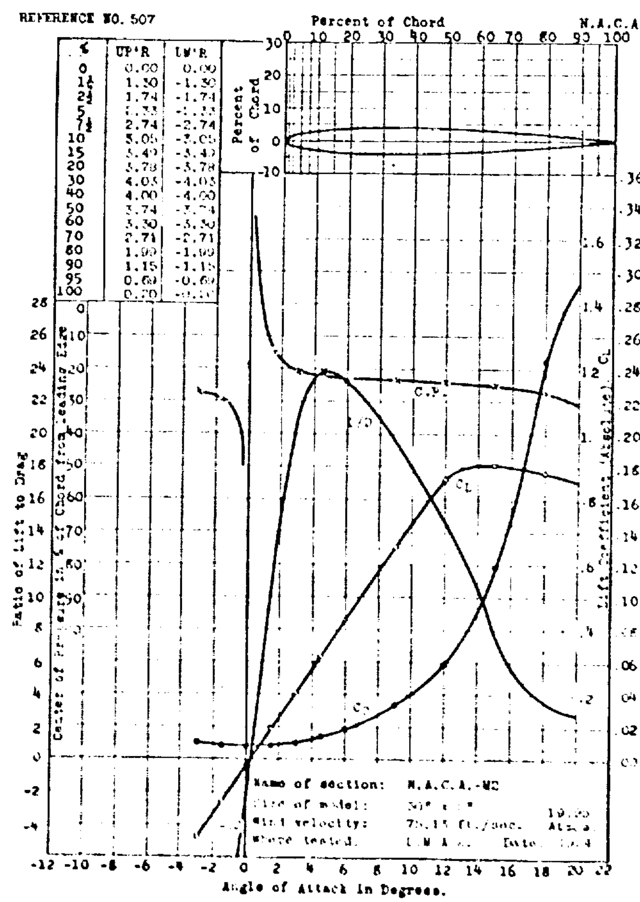
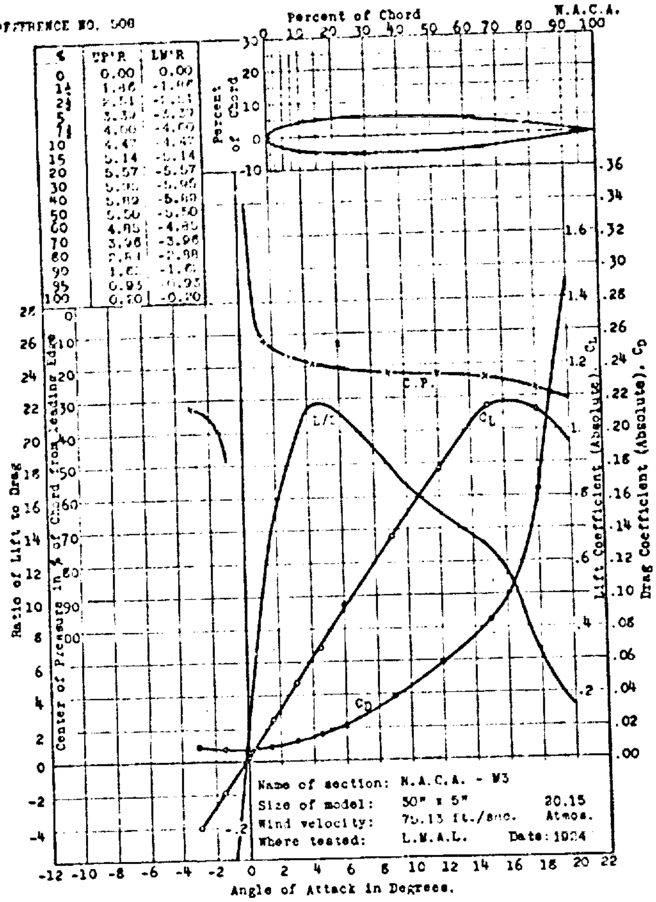
Percent of Chord
N.A.C.A.
Angle of Attack in Degrees.
Ratio of Lift to Drag
Drag Coefficient (Absolute), C_D


REFERENCE NO. 507
Percent of Chord
N.A.C.A.
Name of section: N.A.C.A.-M2
Angle of Attack in Degrees.
Ratio of Lift to Drag
Drag Coefficient (Absolute), C_D

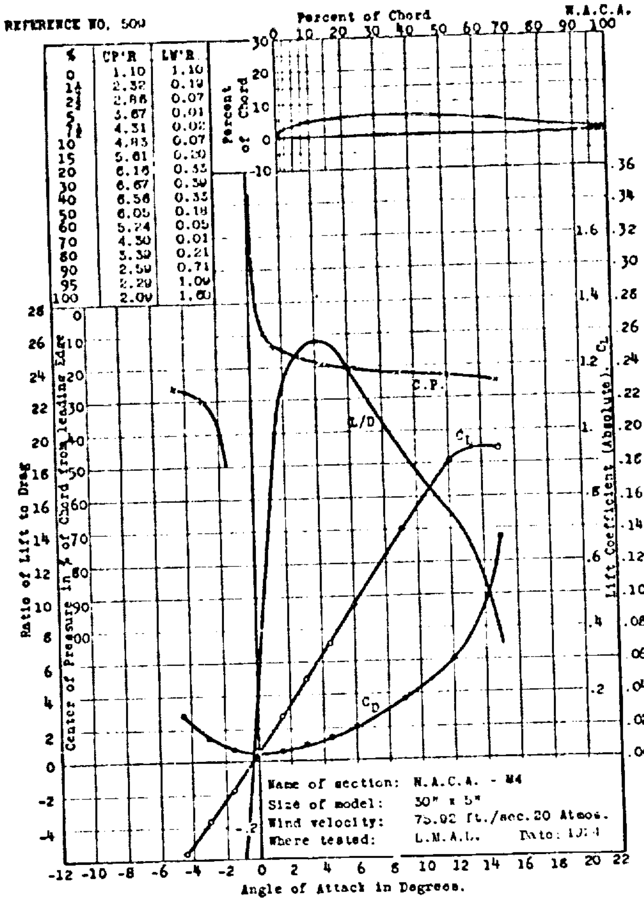
REFERENCE NO. 508

%	UP'R	LW'R
0	0.00	0.00
1¼	1.46	[illegible]
2½	[illegible]	[illegible]
5	[illegible]	[illegible]
7½	4.00	-4.00
10	4.47	[illegible]
15	5.14	-5.14
20	5.57	-5.57
30	[illegible]	-5.95
40	5.89	-5.89
50	5.50	-5.50
60	4.85	-4.85
70	3.96	-3.96
80	[illegible]	-2.89
90	1.6[illegible]	-1.6[illegible]
95	0.93	-0.93
100	0.20	-0.20



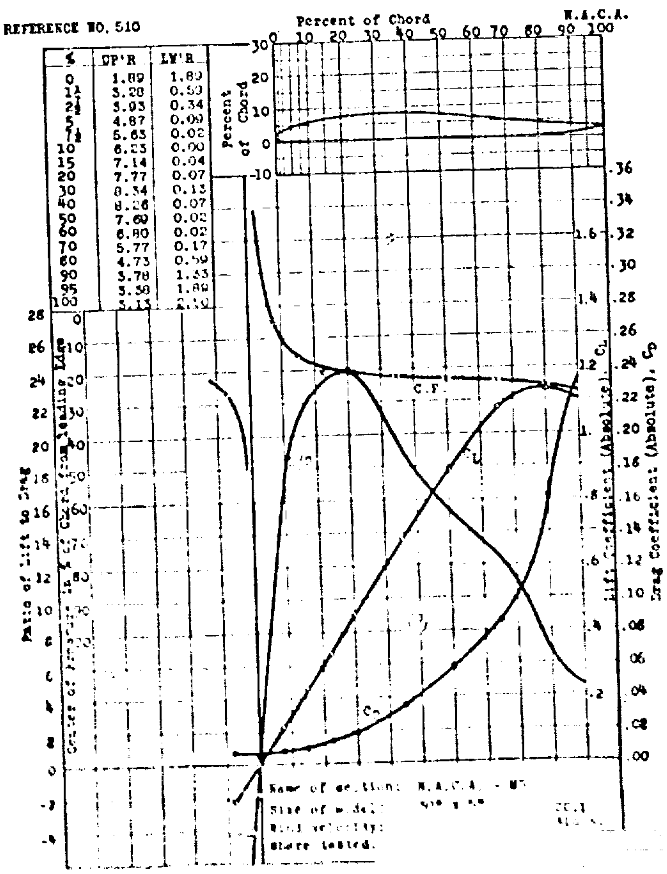
REFERENCE NO. 509

%	UP'R	LW'R
0	1.10	1.10
1¼	2.32	0.19
2½	2.86	0.07
5	3.67	0.01
7½	4.31	0.02
10	4.83	0.07
15	5.61	0.20
20	6.16	0.33
30	6.67	0.39
40	6.56	0.33
50	6.05	0.18
60	5.24	0.05
70	4.30	0.01
80	3.39	0.21
90	2.59	0.71
95	2.29	1.09
100	2.09	1.60



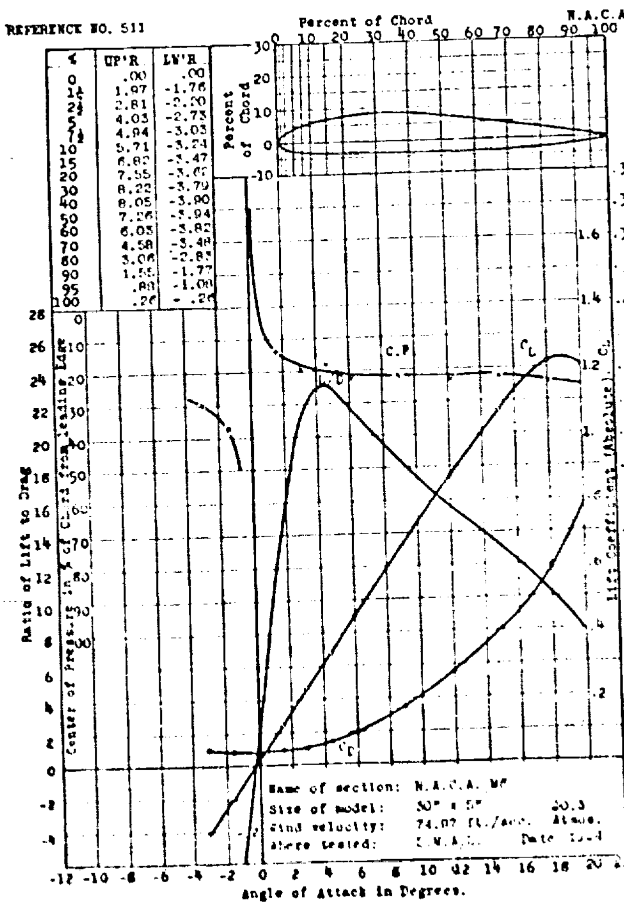
REFERENCE NO. 510

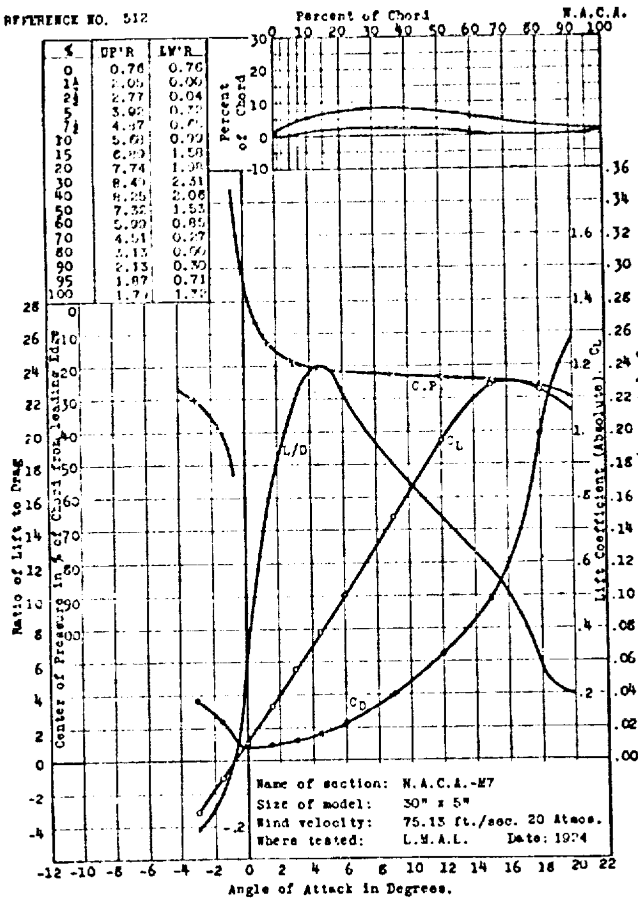
%	UP'R	LW'R
0	1.89	1.89
1¼	3.28	0.59
2½	3.93	0.34
5	4.87	0.09
7½	5.63	0.02
10	6.23	0.00
15	7.14	0.04
20	7.77	0.07
30	8.34	0.13
40	8.26	0.07
50	7.69	0.02
60	6.80	0.02
70	5.77	0.17
80	4.73	0.59
90	3.78	1.33
95	3.38	1.89
100	3.13	2.39



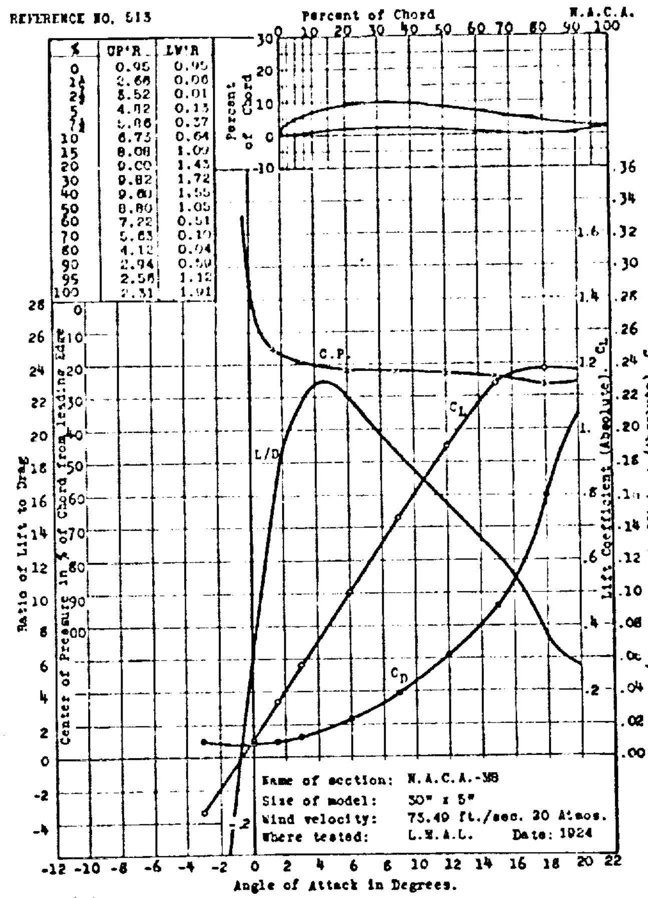
REFERENCE NO. 511

%	UP'R	LW'R
0	.00	.00
1¼	1.97	-1.76
2½	2.81	-2.20
5	4.03	-2.73
7½	4.94	-3.03
10	5.71	-3.24
15	6.82	-3.47
20	7.55	-3.6[illegible]
30	8.22	-3.79
40	8.05	-3.90
50	7.26	-3.94
60	6.05	-3.82
70	4.58	-3.48
80	3.06	-2.83
90	1.55	-1.77
95	.88	-1.08
100	.26	- .26

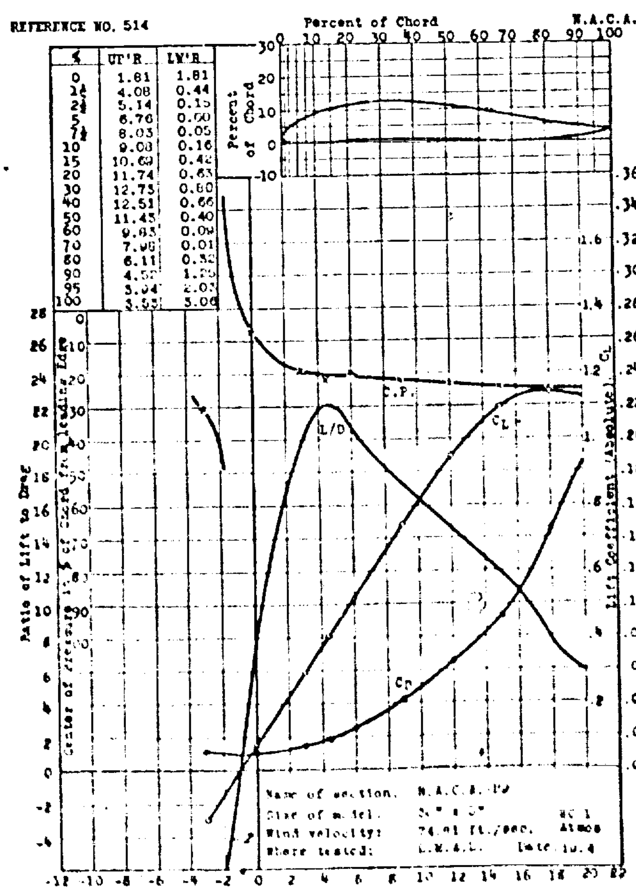




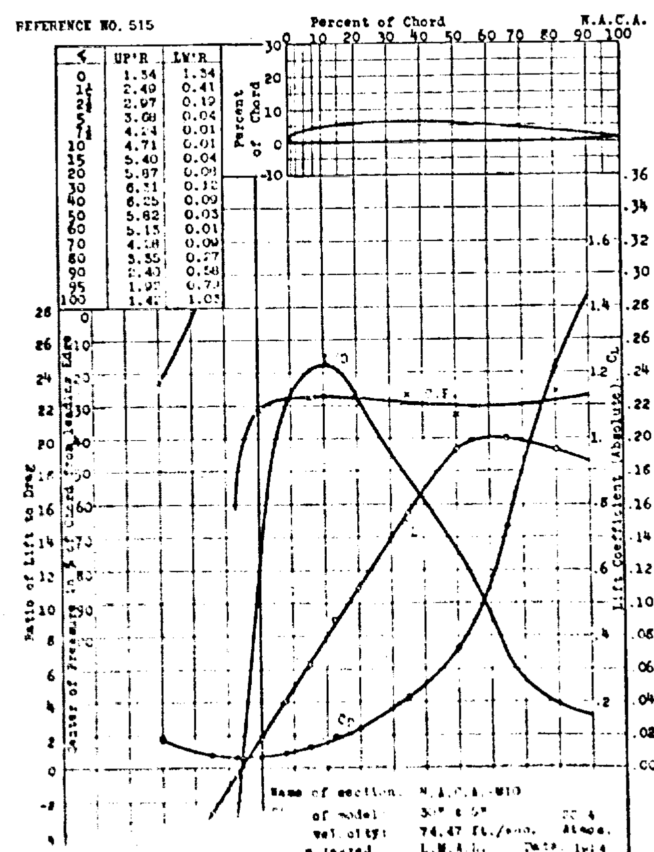
%	UP'R	LW'R
0	0.76	0.76
1¼	2.05	0.00
2½	2.77	0.04
5	3.92	[illegible]
7½	4.37	[illegible]
10	5.63	0.99
15	6.99	1.58
20	7.74	1.98
30	8.40	2.31
40	8.25	2.06
50	7.32	1.53
60	5.99	0.85
70	4.51	0.27
80	3.13	0.00
90	2.13	0.30
95	1.87	0.71
100	1.77	1.72



%	UP'R	LW'R
0	0.95	0.95
1¼	2.68	0.00
2½	3.52	0.01
5	4.82	0.13
7½	5.86	0.37
10	6.73	0.64
15	8.08	1.09
20	9.00	1.43
30	9.82	1.72
40	9.80	1.55
50	8.80	1.05
60	7.22	0.51
70	5.63	0.10
80	4.12	0.04
90	2.94	0.50
95	2.56	1.12
100	2.31	1.91

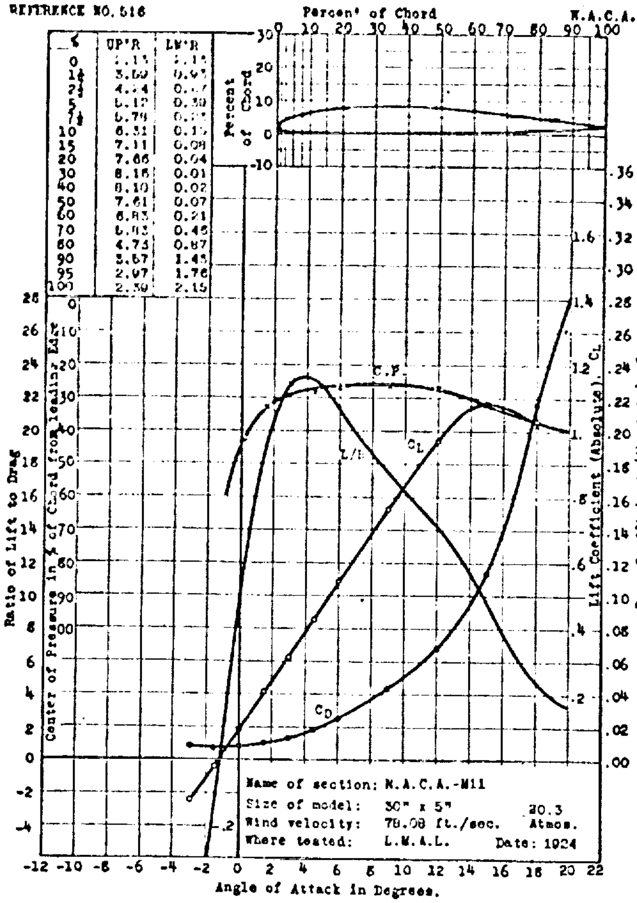


%	UP'R	LW'R
0	1.81	1.81
1¼	4.08	0.44
2½	5.14	0.15
5	6.76	0.00
7½	8.03	0.05
10	9.08	0.16
15	10.69	0.42
20	11.74	0.63
30	12.75	0.60
40	12.51	0.66
50	11.45	0.40
60	9.85	0.09
70	7.96	0.01
80	6.11	0.32
90	4.57	1.25
95	3.04	2.03
100	3.55	3.06



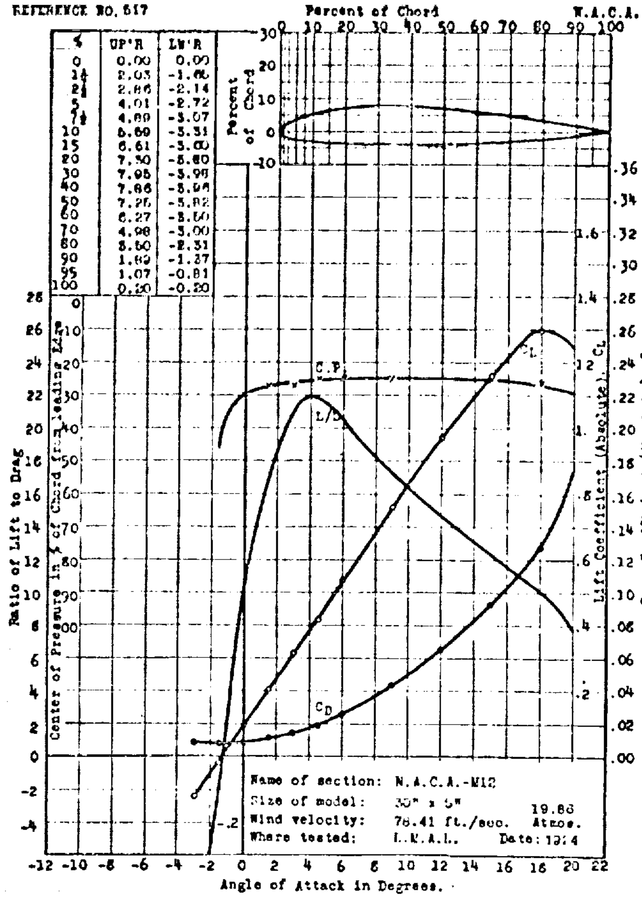
%	UP'R	LW'R
0	1.34	1.34
1¼	2.40	0.41
2½	2.97	0.19
5	3.08	0.04
7½	4.24	0.01
10	4.71	0.01
15	5.40	0.04
20	5.87	0.09
30	6.31	0.12
40	6.25	0.09
50	5.82	0.03
60	5.15	0.01
70	4.18	0.09
80	3.35	0.27
90	2.40	0.58
95	1.97	0.73
100	1.42	1.05

REFERENCE NO. 516



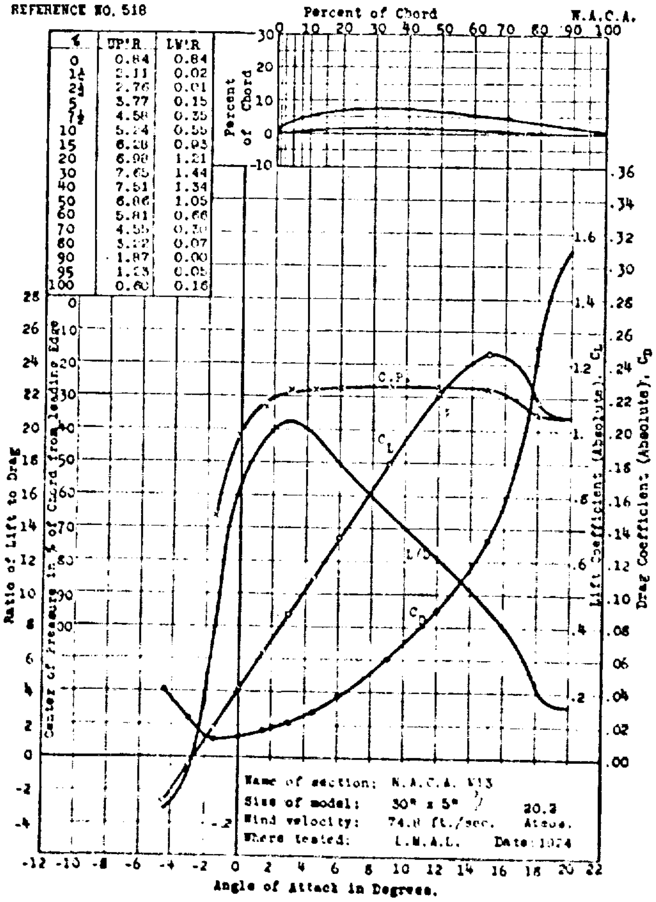
%	UP'R	LW'R
0	[illegible]	[illegible]
1¼	3.50	0.95
2½	4.44	[illegible]
5	5.12	0.39
7½	5.79	[illegible]
10	6.31	[illegible]
15	7.11	0.09
20	7.66	0.04
30	8.15	0.01
40	8.10	0.02
50	7.61	0.07
60	6.85	0.21
70	5.93	0.45
80	4.73	0.87
90	3.57	1.43
95	2.97	1.76
100	2.30	2.15

REFERENCE NO. 517



%	UP'R	LW'R
0	0.00	0.00
1¼	2.03	-1.66
2½	2.86	-2.14
5	4.01	-2.72
7½	4.89	-3.07
10	5.69	-3.31
15	6.61	-3.60
20	7.30	-3.80
30	7.95	-3.99
40	7.86	-3.94
50	7.26	-3.82
60	6.27	-3.50
70	4.98	-3.00
80	3.60	-2.31
90	1.89	-1.37
95	1.07	-0.81
100	0.20	-0.20

REFERENCE NO. 518



%	UP'R	LW'R
0	0.84	0.84
1¼	2.11	0.02
2½	2.76	0.01
5	3.77	0.15
7½	4.58	0.35
10	5.24	0.55
15	6.28	0.93
20	6.98	1.21
30	7.65	1.44
40	7.51	1.34
50	6.86	1.05
60	5.81	0.66
70	4.55	0.30
80	3.12	0.07
90	1.87	0.00
95	1.23	0.05
100	0.60	0.16

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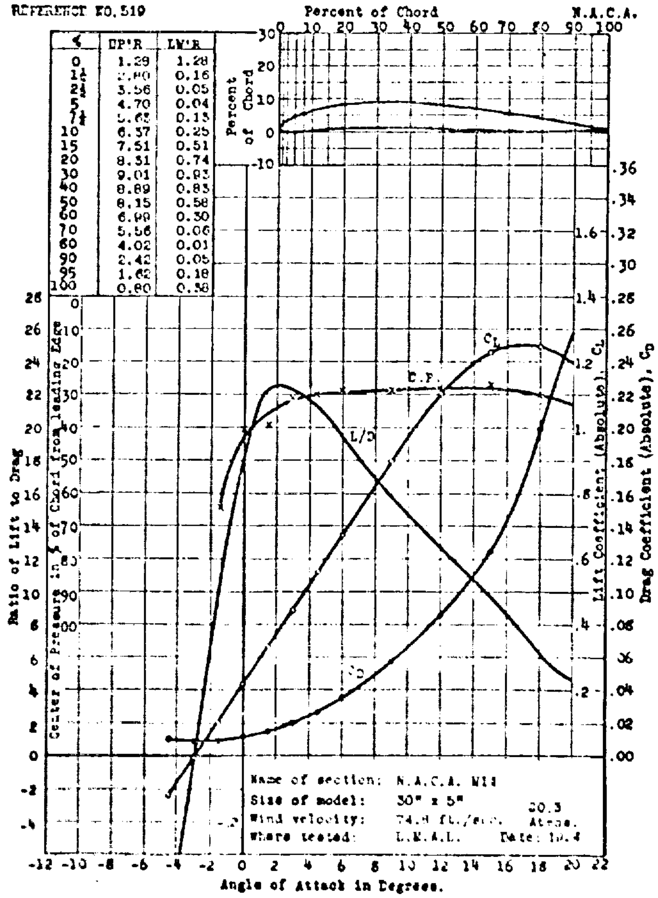

%	UP'R	LW'R
0	1.29	1.28
1¼	2.80	0.16
2½	3.56	0.05
5	4.70	0.04
7½	5.65	0.13
10	6.37	0.25
15	7.51	0.51
20	8.31	0.74
30	9.01	0.93
40	8.89	0.83
50	8.15	0.58
60	6.99	0.30
70	5.56	0.06
80	4.02	0.01
90	2.42	0.05
95	1.62	0.18
100	0.80	0.38

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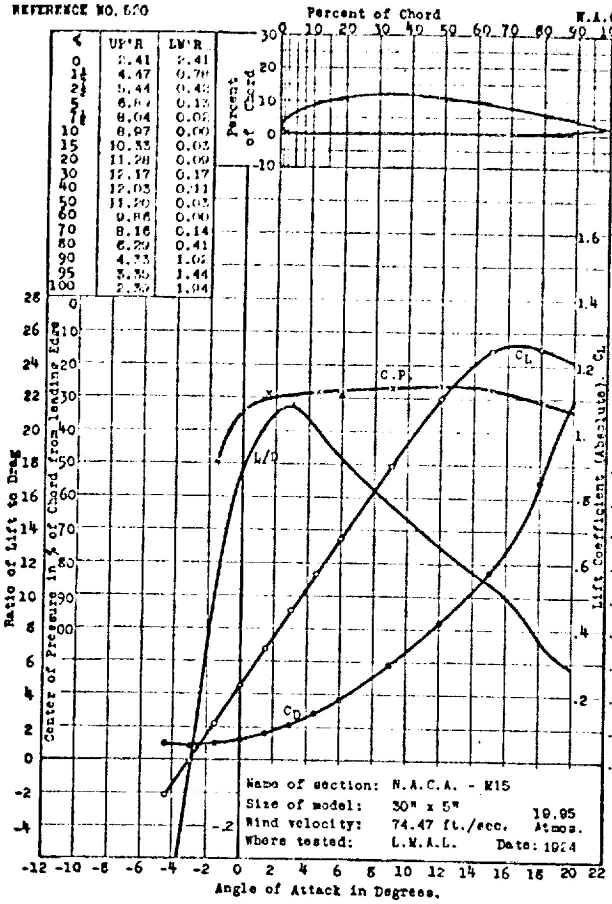
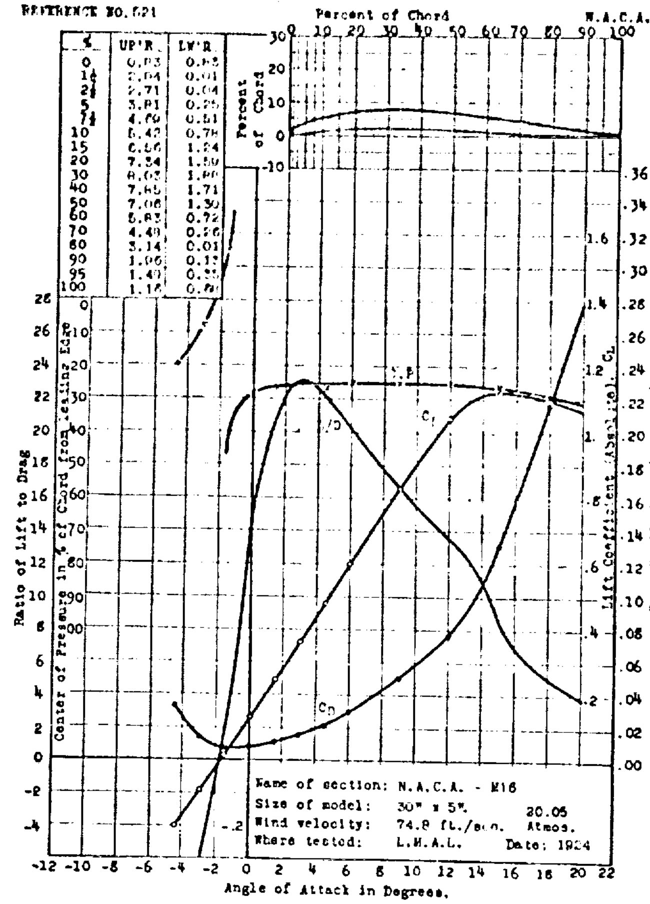


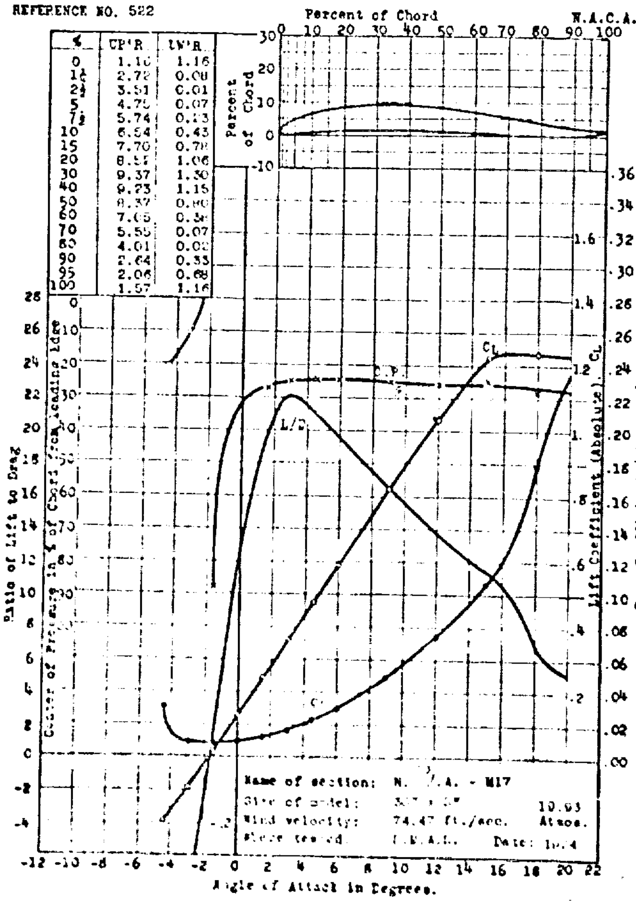
<	UP'R	LW'R
0	2.41	2.41
1¼	4.47	0.70
2½	5.44	0.43
5	6.6[illegible]	0.13
7½	8.04	0.02
10	8.97	0.00
15	10.33	0.03
20	11.28	0.09
30	12.17	0.17
40	12.03	0.11
50	11.20	0.03
60	9.86	0.00
70	8.16	0.14
80	6.29	0.41
90	4.73	1.02
95	3.55	1.44
100	2.37	1.94

REFERENCE NO. 521



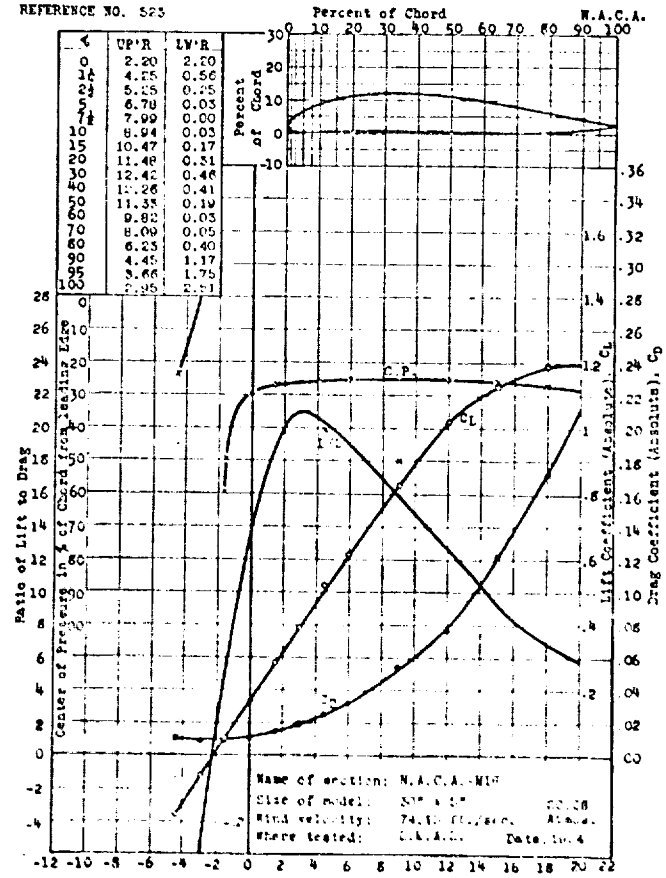
<	UP'R	LW'R
0	0.83	0.83
1¼	2.04	0.01
2½	2.71	0.04
5	3.81	0.25
7½	4.69	0.51
10	5.42	0.78
15	6.56	1.24
20	7.34	1.59
30	8.03	1.80
40	7.85	1.71
50	7.08	1.30
60	5.83	0.72
70	4.49	0.26
80	3.14	0.01
90	1.96	0.13
95	1.49	0.35
100	1.16	[illegible]

REFERENCE NO. 522



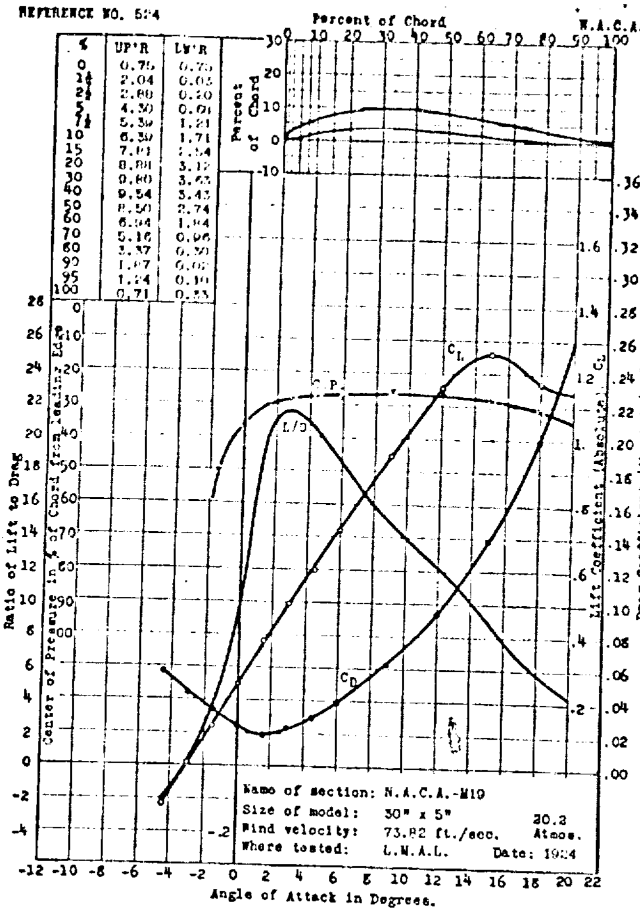
<	UP'R	LW'R
0	1.16	1.16
1¼	2.72	0.08
2½	3.51	0.01
5	4.75	0.07
7½	5.74	0.23
10	6.54	0.43
15	7.70	0.78
20	8.57	1.06
30	9.37	1.30
40	9.73	1.15
50	8.37	0.80
60	7.05	0.38
70	5.55	0.07
80	4.01	0.02
90	2.64	0.33
95	2.06	0.68
100	1.57	1.16

REFERENCE NO. 523



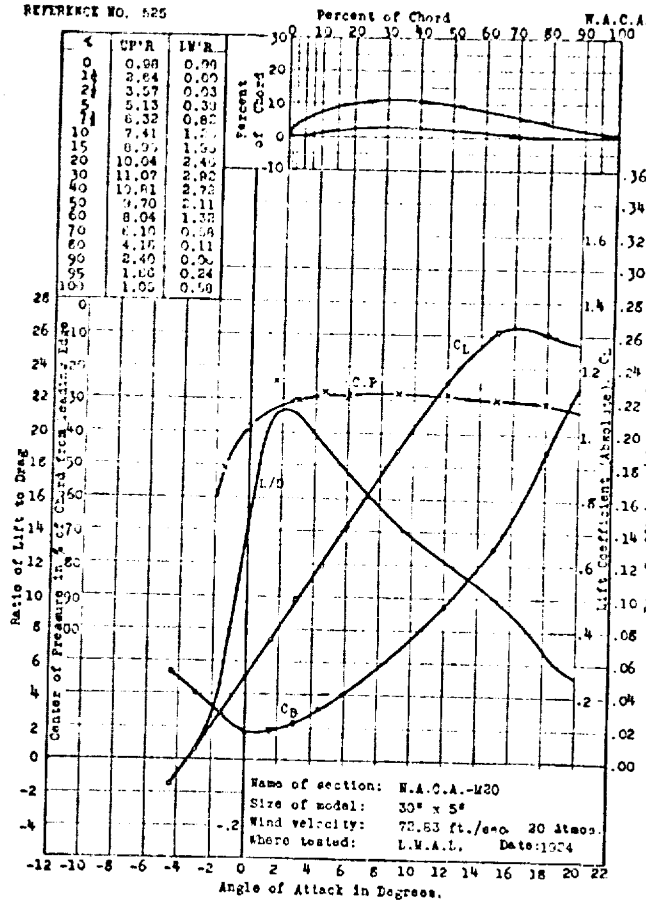
<	UP'R	LW'R
0	2.20	2.20
1¼	4.25	0.56
2½	5.25	0.25
5	6.78	0.03
7½	7.99	0.00
10	8.94	0.03
15	10.47	0.17
20	11.48	0.31
30	12.42	0.46
40	12.26	0.41
50	11.35	0.19
60	9.82	0.03
70	8.09	0.05
80	6.25	0.40
90	4.45	1.17
95	3.66	1.75
100	2.95	2.51

REFERENCE NO. 524



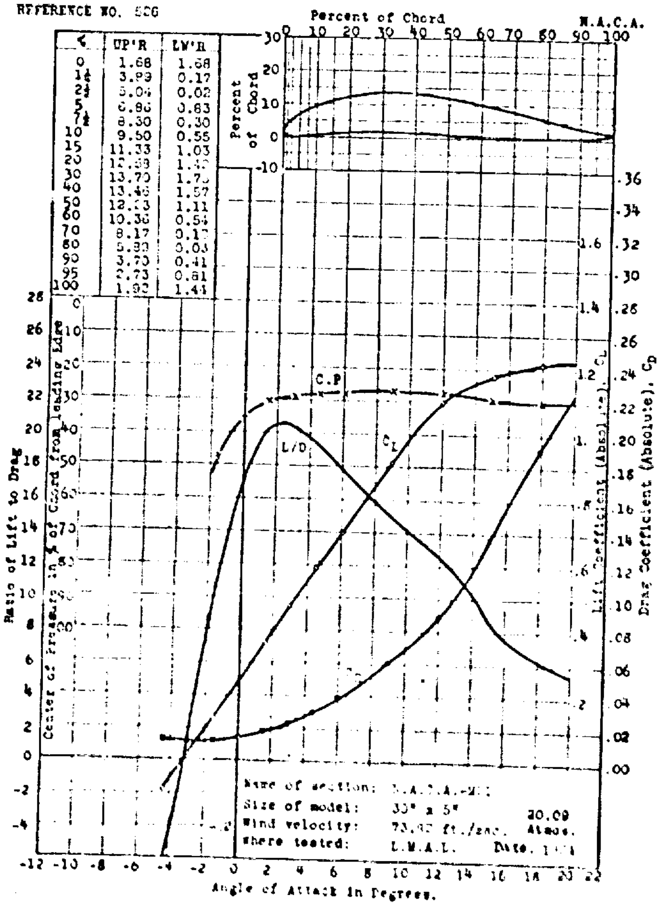
%	UP'R	LW'R
0	0.75	0.75
1¼	2.04	0.05
2½	2.60	0.20
5	4.30	0.01
7½	5.39	1.21
10	6.30	1.71
15	7.61	2.54
20	8.88	3.12
30	9.60	3.63
40	9.54	3.43
50	8.50	2.74
60	6.94	1.84
70	5.16	0.96
80	3.37	0.30
90	1.97	0.05
95	1.24	0.10
100	0.71	0.53

REFERENCE NO. 525



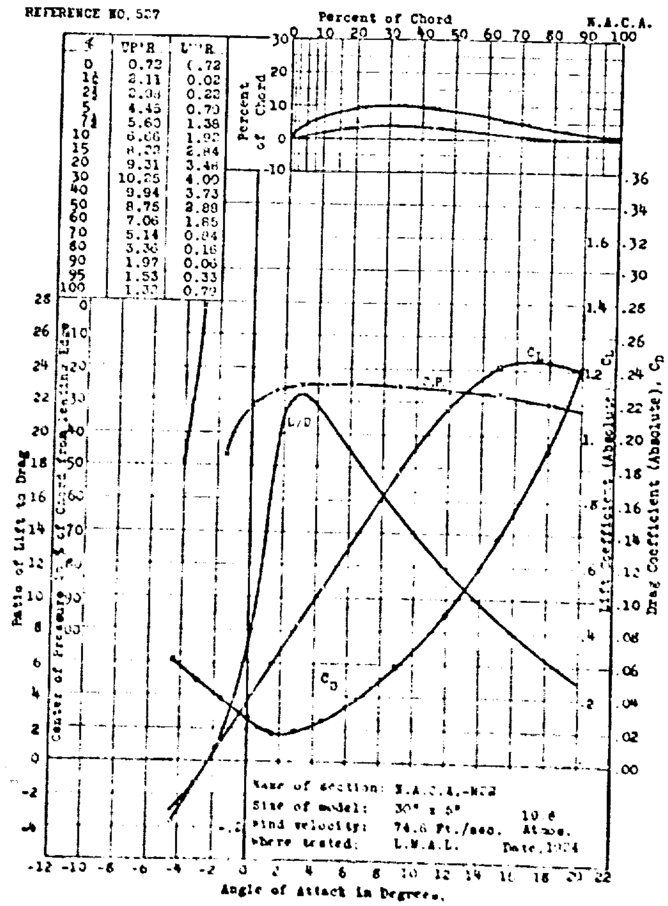
%	UP'R	LW'R
0	0.98	0.99
1¼	2.84	0.09
2½	3.57	0.03
5	5.13	0.39
7½	6.32	0.82
10	7.41	1.[illegible]
15	8.95	1.55
20	10.04	2.45
30	11.07	2.82
40	10.81	2.72
50	9.70	2.11
60	8.04	1.32
70	6.10	0.58
80	4.16	0.11
90	2.40	0.02
95	1.66	0.24
100	1.05	0.58

REFERENCE NO. 526



%	UP'R	LW'R
0	1.68	1.68
1¼	3.93	0.17
2½	5.04	0.02
5	6.86	0.83
7½	8.30	0.30
10	9.50	0.55
15	11.33	1.03
20	12.33	1.4[illegible]
30	13.70	1.75
40	13.46	1.57
50	12.13	1.11
60	10.36	0.54
70	8.17	0.17
80	5.83	0.03
90	3.70	0.41
95	2.73	0.81
100	1.92	1.41

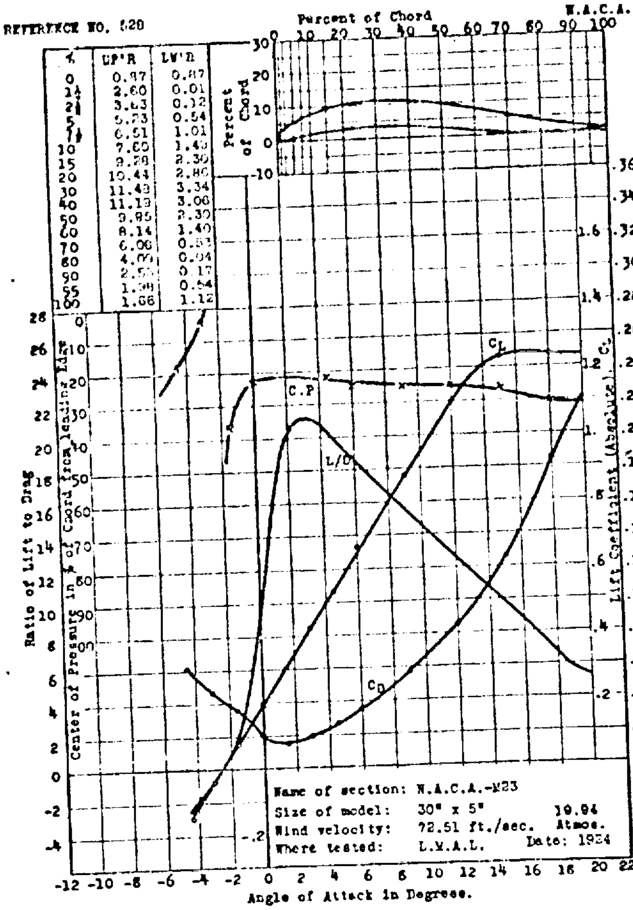
REFERENCE NO. 527



%	UP'R	LW'R
0	0.72	0.72
1¼	2.11	0.02
2½	2.93	0.23
5	4.45	0.70
7½	5.60	1.38
10	6.66	1.92
15	8.22	2.84
20	9.31	3.46
30	10.25	4.00
40	9.94	3.73
50	8.75	2.89
60	7.06	1.65
70	5.14	0.84
80	3.36	0.16
90	1.97	0.06
95	1.53	0.33
100	1.32	0.72

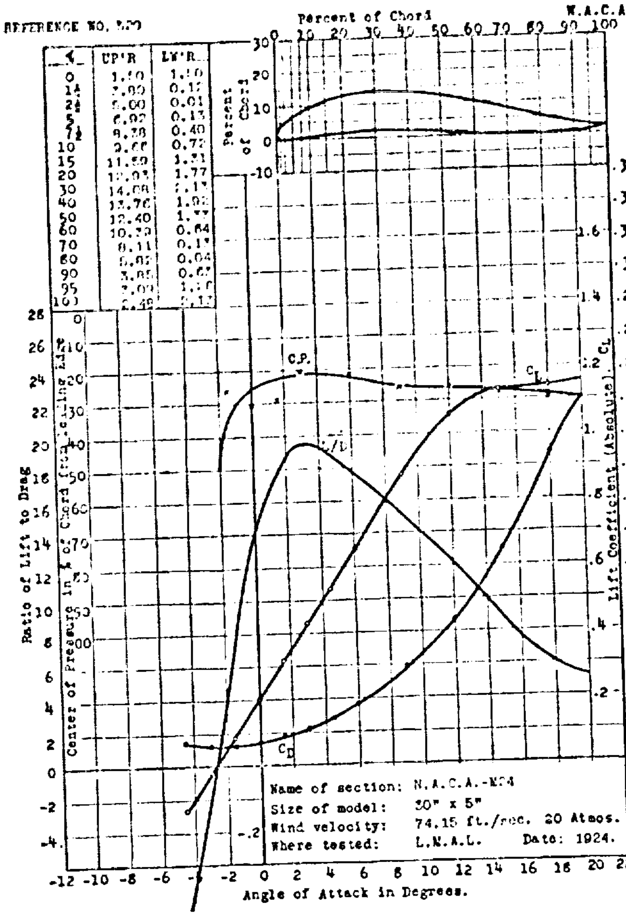
REFERENCE NO. 528

%	UP'R	LW'R
0	0.97	0.87
1¼	2.60	0.01
2½	3.63	0.12
5	5.73	0.54
7½	6.51	1.01
10	7.60	1.43
15	9.28	2.30
20	10.44	2.86
30	11.43	3.34
40	11.13	3.06
50	9.85	2.30
60	8.14	1.40
70	6.06	0.53
80	4.00	0.04
90	2.55	0.17
95	1.39	0.54
100	1.66	1.12



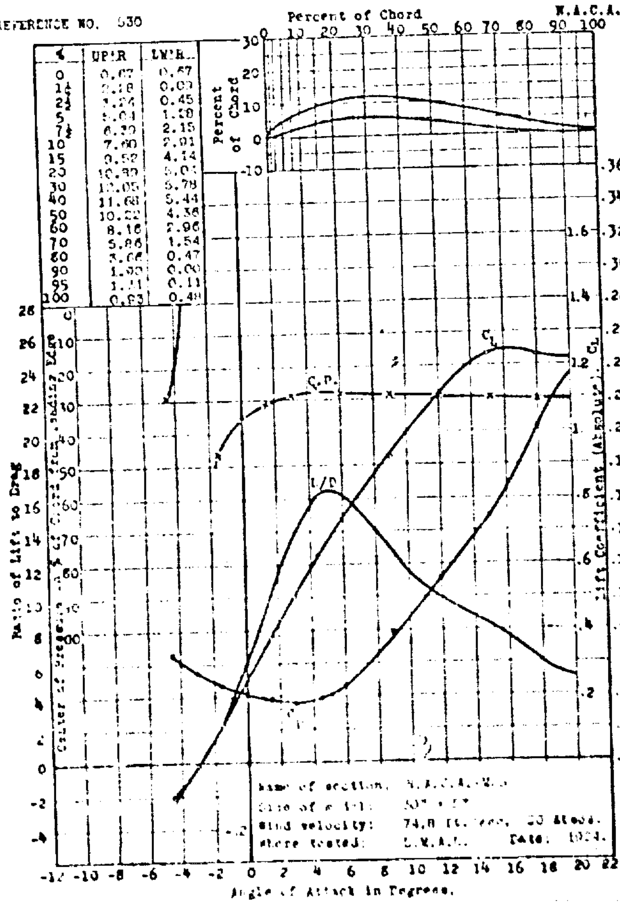
REFERENCE NO. 529

%	UP'R	LW'R
0	1.50	1.50
1¼	[illegible]	0.17
2½	5.00	0.01
5	6.92	0.13
7½	8.78	0.40
10	9.66	0.72
15	11.59	1.31
20	12.93	1.77
30	14.08	[illegible]
40	13.76	1.92
50	12.40	1.77
60	10.73	0.64
70	8.11	0.17
80	5.83	0.04
90	3.85	0.67
95	2.09	[illegible]
100	2.48	[illegible]



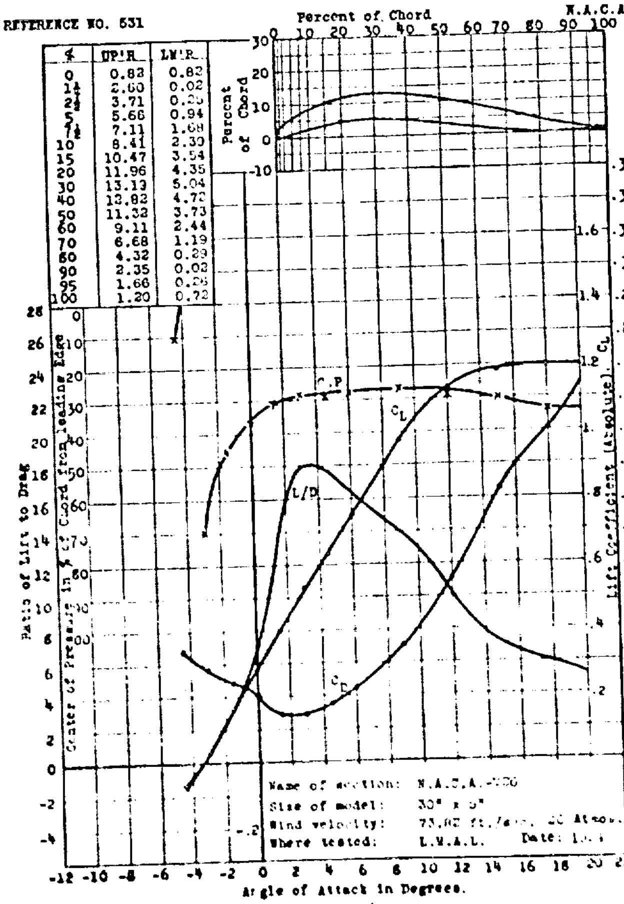
REFERENCE NO. 530

%	UP'R	LW'R
0	0.67	0.57
1¼	2.18	0.03
2½	[illegible]	0.45
5	[illegible]	1.28
7½	6.30	2.15
10	7.60	2.91
15	9.52	4.14
20	10.92	5.03
30	12.05	5.78
40	11.68	5.44
50	10.22	4.38
60	8.16	2.96
70	5.86	1.54
80	3.66	0.47
90	1.93	0.00
95	1.31	0.11
100	0.83	0.48

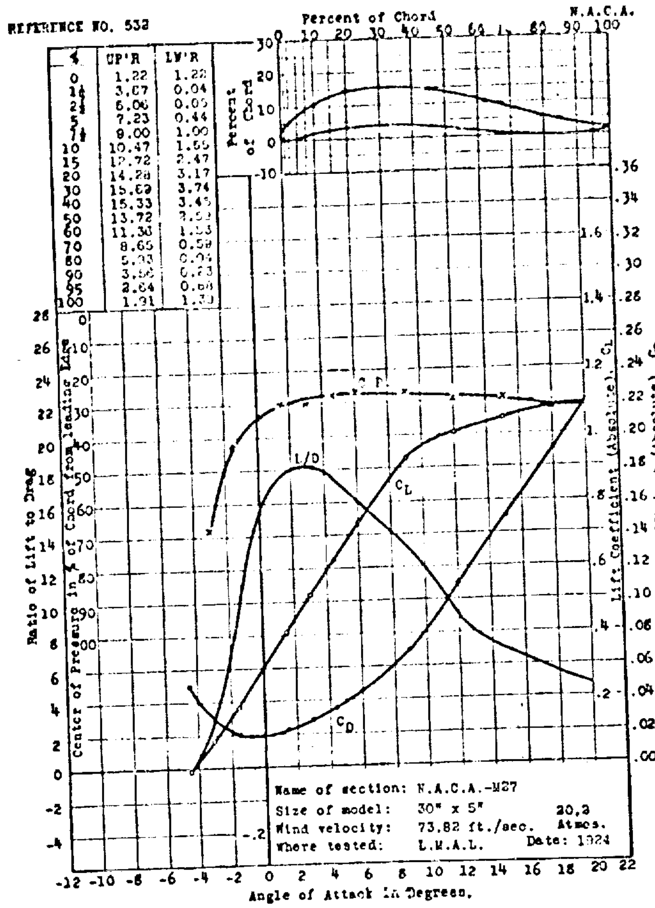


REFERENCE NO. 531

%	UP'R	LW'R
0	0.83	0.82
1¼	2.60	0.02
2½	3.71	0.25
5	5.66	0.94
7½	7.11	1.68
10	8.41	2.30
15	10.47	3.54
20	11.96	4.35
30	13.13	5.04
40	12.82	4.72
50	11.32	3.73
60	9.11	2.44
70	6.68	1.19
80	4.32	0.29
90	2.35	0.03
95	1.66	0.26
100	1.20	0.72

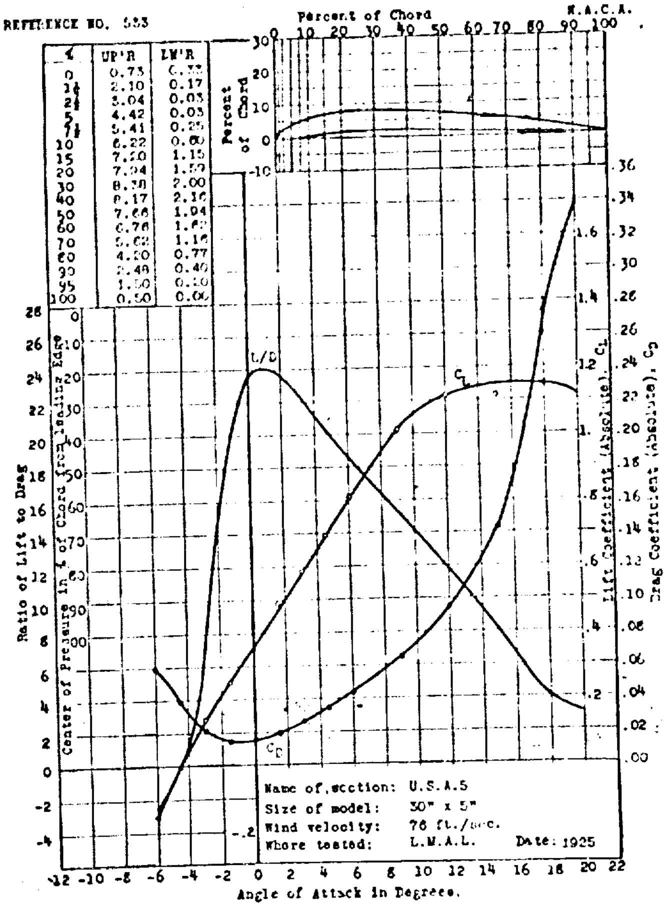


REFERENCE NO. 532



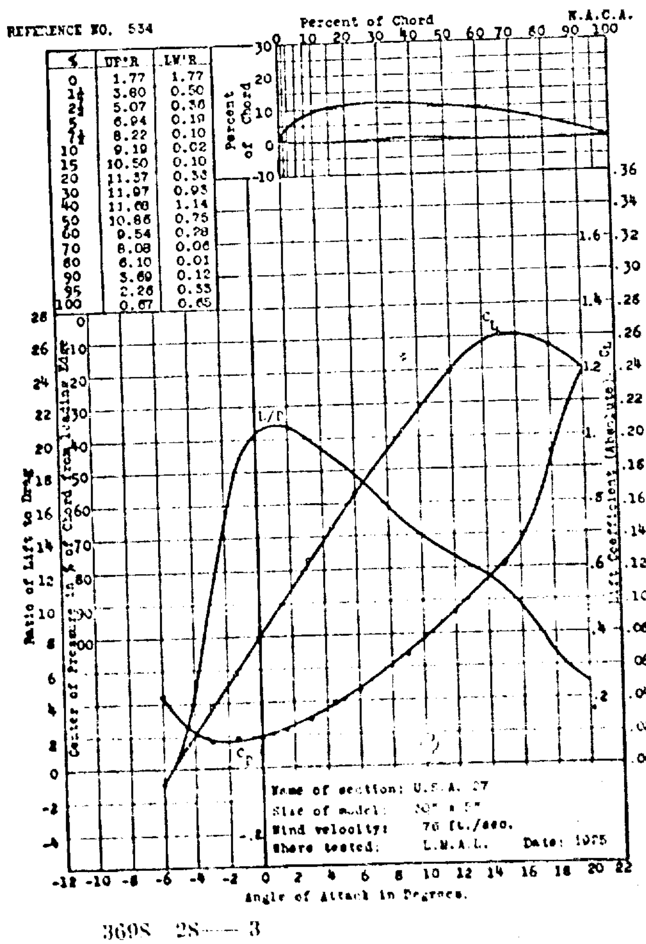
%	UP'R	LW'R
0	1.22	1.22
1¼	3.07	0.04
2½	6.08	0.05
5	7.23	0.44
7½	9.00	1.00
10	10.47	1.55
15	12.72	2.47
20	14.28	3.17
30	15.69	3.74
40	15.33	3.45
50	13.72	2.52
60	11.38	1.53
70	8.65	0.58
80	5.93	0.04
90	3.56	0.23
95	2.64	0.68
100	1.31	1.30

REFERENCE NO. 533



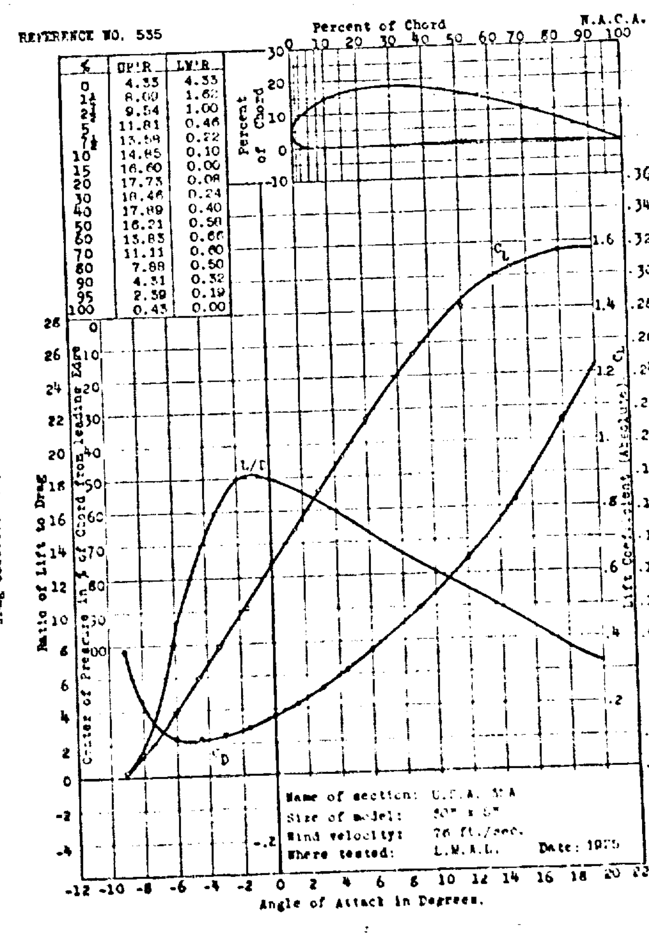
%	UP'R	LW'R
0	0.73	0.73
1¼	2.10	0.17
2½	3.04	0.03
5	4.42	0.03
7½	5.41	0.25
10	6.22	0.60
15	7.20	1.15
20	7.94	1.57
30	8.30	2.00
40	8.17	2.16
50	7.66	1.94
60	6.76	1.62
70	5.68	1.16
80	4.20	0.77
90	2.49	0.40
95	1.50	0.20
100	0.50	0.06

REFERENCE NO. 534



%	UP'R	LW'R
0	1.77	1.77
1¼	3.80	0.50
2½	5.07	0.36
5	6.94	0.19
7½	8.22	0.10
10	9.19	0.02
15	10.50	0.10
20	11.37	0.38
30	11.97	0.93
40	11.68	1.14
50	10.86	0.75
60	9.54	0.28
70	8.08	0.06
80	6.10	0.01
90	3.69	0.12
95	2.26	0.33
100	0.67	0.65

REFERENCE NO. 535



%	UP'R	LW'R
0	4.33	4.33
1¼	8.00	1.62
2½	9.54	1.00
5	11.81	0.46
7½	13.59	0.22
10	14.85	0.10
15	16.60	0.00
20	17.73	0.08
30	18.46	0.24
40	17.89	0.40
50	16.21	0.58
60	13.83	0.66
70	11.11	0.60
80	7.88	0.50
90	4.31	0.32
95	2.39	0.19
100	0.43	0.00

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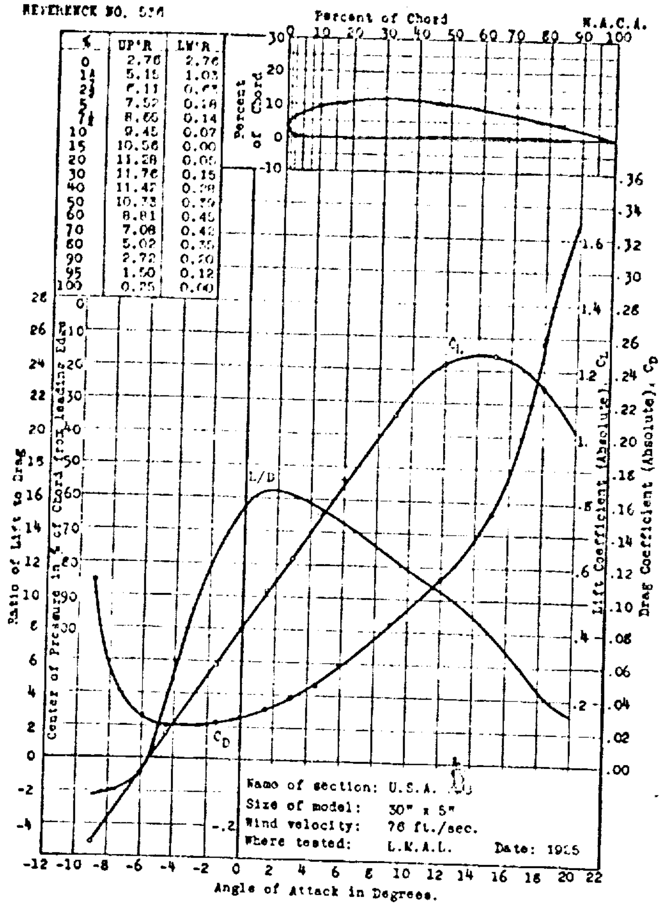
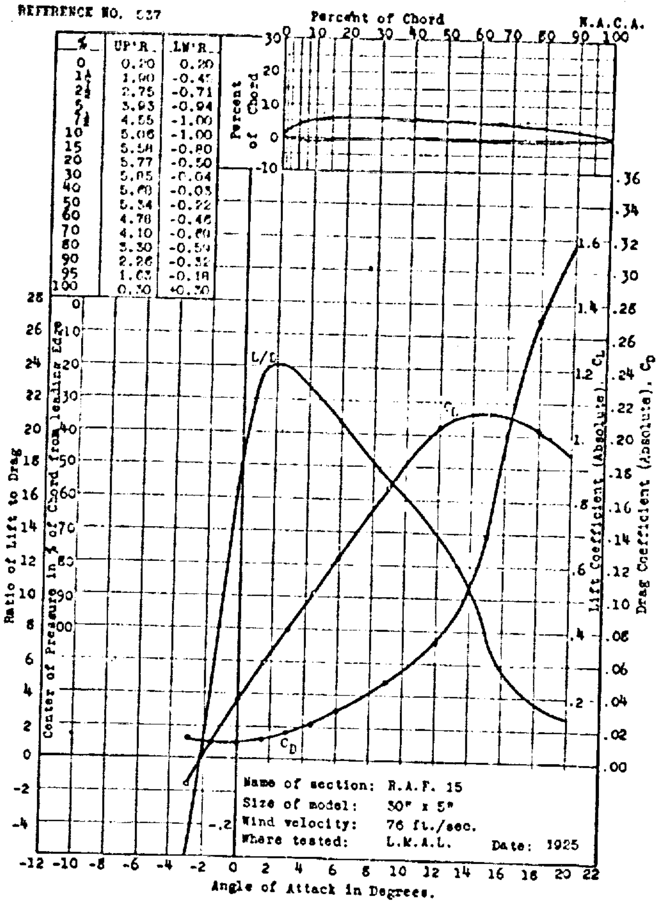
REFERENCE NO. 536

%	UP'R	LW'R
0	2.76	2.76
1¼	5.15	1.03
2½	6.11	0.67
5	7.52	0.18
7½	8.66	0.14
10	9.45	0.07
15	10.56	0.00
20	11.28	0.05
30	11.76	0.15
40	11.47	0.29
50	10.73	0.39
60	8.81	0.45
70	7.08	0.42
80	5.02	0.35
90	2.72	0.20
95	1.50	0.12
100	0.75	0.00



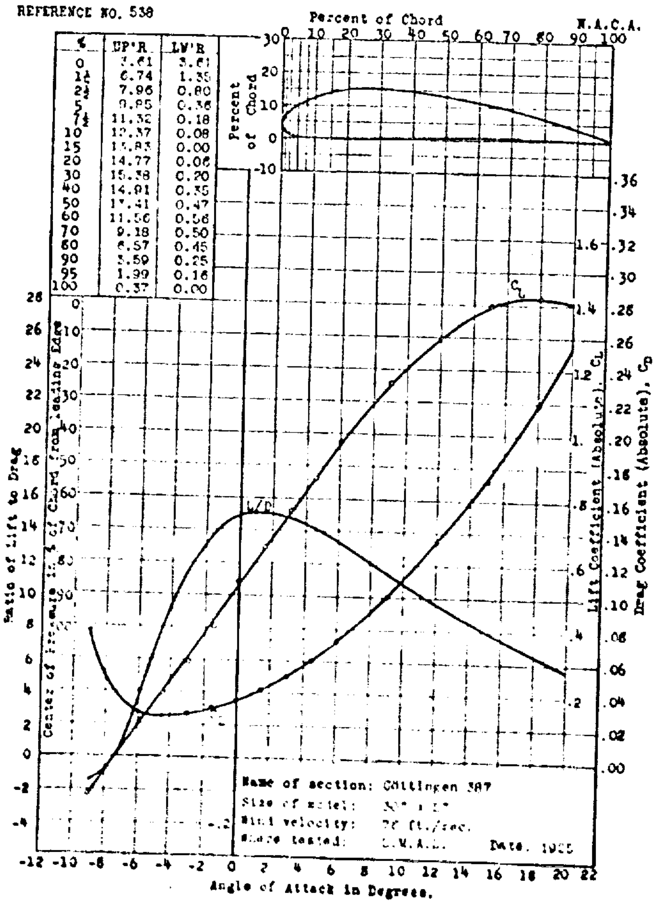
REFERENCE NO. 537

%	UP'R	LW'R
0	0.20	0.20
1¼	1.90	-0.47
2½	2.75	-0.71
5	3.93	-0.94
7½	4.55	-1.00
10	5.06	-1.00
15	5.58	-0.80
20	5.77	-0.50
30	5.85	-0.04
40	5.60	-0.03
50	5.34	-0.22
60	4.78	-0.46
70	4.10	-0.60
80	3.30	-0.59
90	2.26	-0.32
95	1.63	-0.18
100	0.30	+0.30



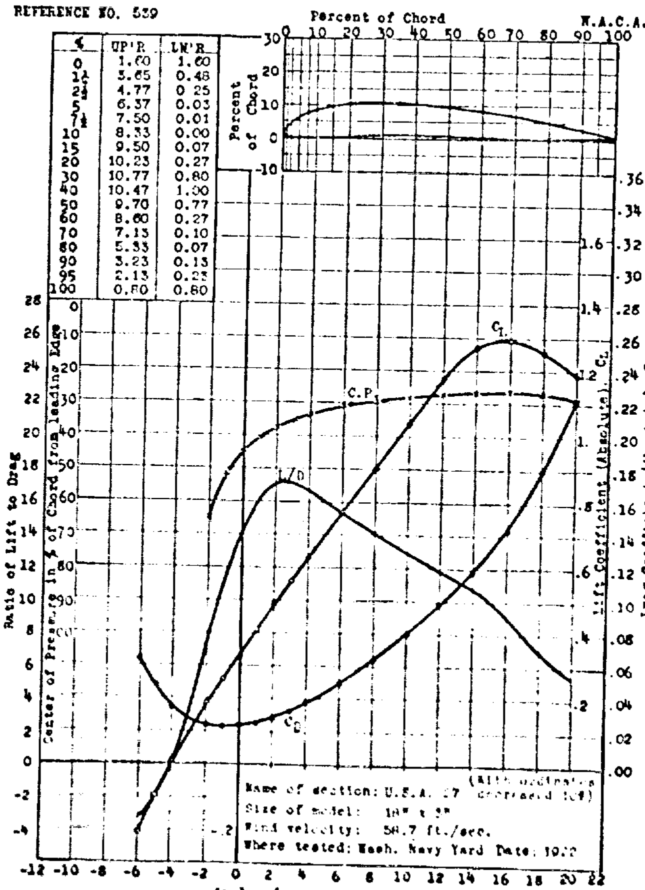
REFERENCE NO. 538

%	UP'R	LW'R
0	3.61	3.61
1¼	6.74	1.35
2½	7.96	0.80
5	9.85	0.36
7½	11.32	0.18
10	12.37	0.08
15	13.83	0.00
20	14.77	0.06
30	15.38	0.20
40	14.81	0.35
50	13.41	0.47
60	11.56	0.56
70	9.18	0.50
80	6.57	0.45
90	3.59	0.25
95	1.99	0.16
100	0.37	0.00

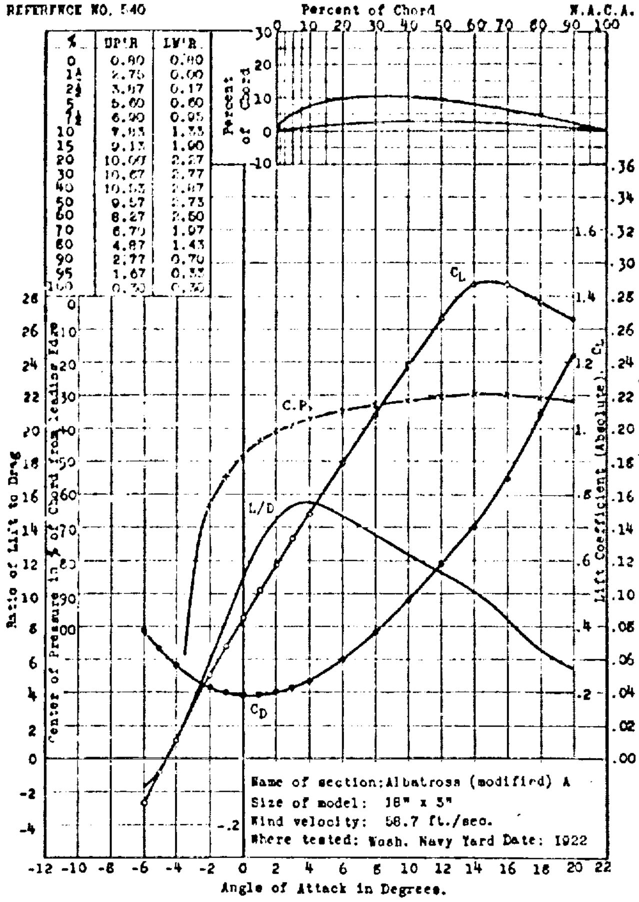


REFERENCE NO. 539

%	UP'R	LW'R
0	1.60	1.60
1¼	3.65	0.48
2½	4.77	0.25
5	6.37	0.03
7½	7.50	0.01
10	8.33	0.00
15	9.50	0.07
20	10.23	0.27
30	10.77	0.80
40	10.47	1.00
50	9.70	0.77
60	8.60	0.27
70	7.13	0.10
80	5.33	0.07
90	3.23	0.13
95	2.13	0.23
100	0.80	0.80

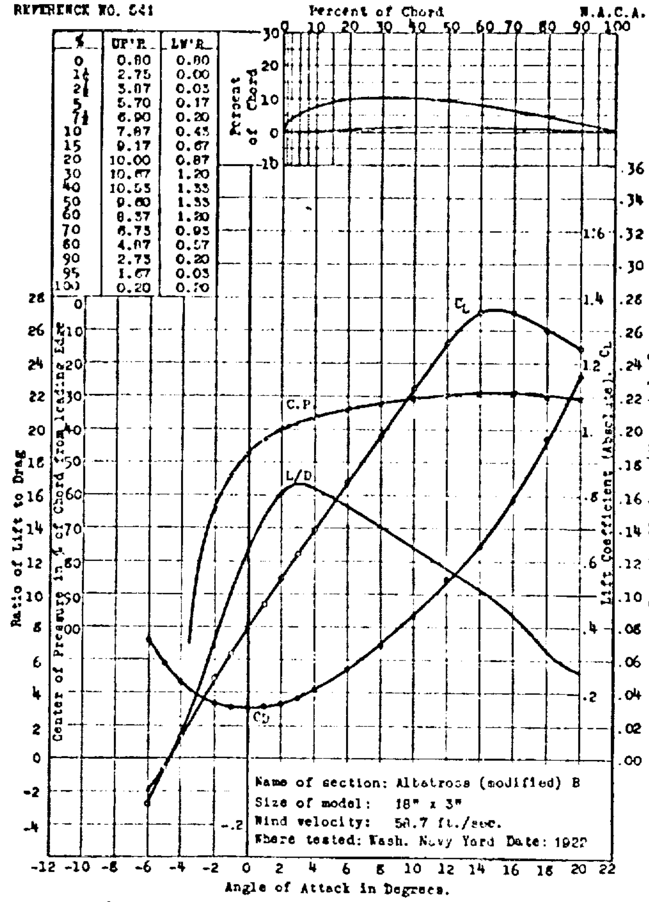


REFERENCE NO. 540



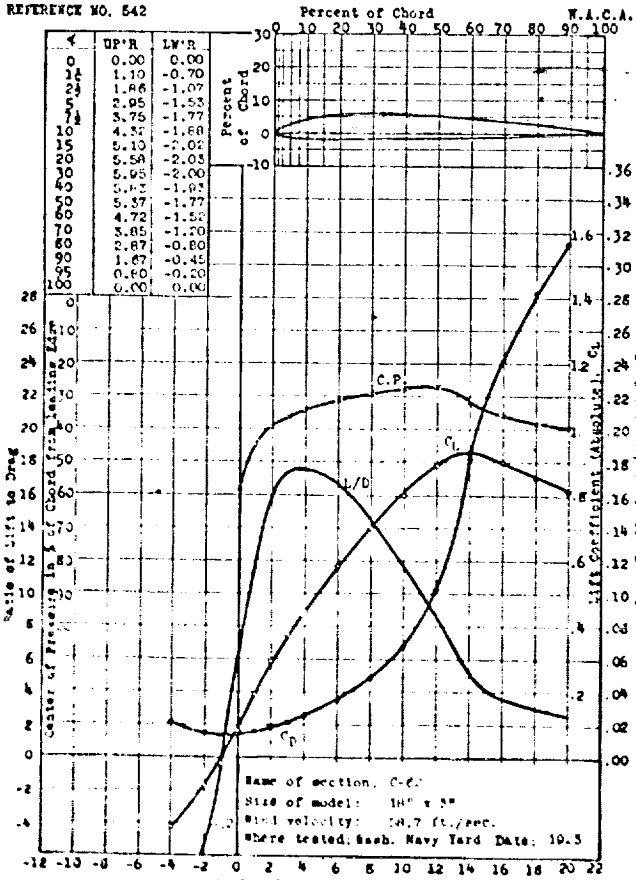
%	UP'R	LW'R
0	0.80	0.80
1¼	2.75	0.00
2½	3.87	0.17
5	5.60	0.60
7½	6.90	0.95
10	7.83	1.33
15	9.13	1.90
20	10.07	2.27
30	10.67	2.77
40	10.53	2.87
50	9.57	2.73
60	8.27	2.60
70	6.70	1.97
80	4.87	1.43
90	2.77	0.70
95	1.67	0.33
100	0.30	0.30

REFERENCE NO. 541



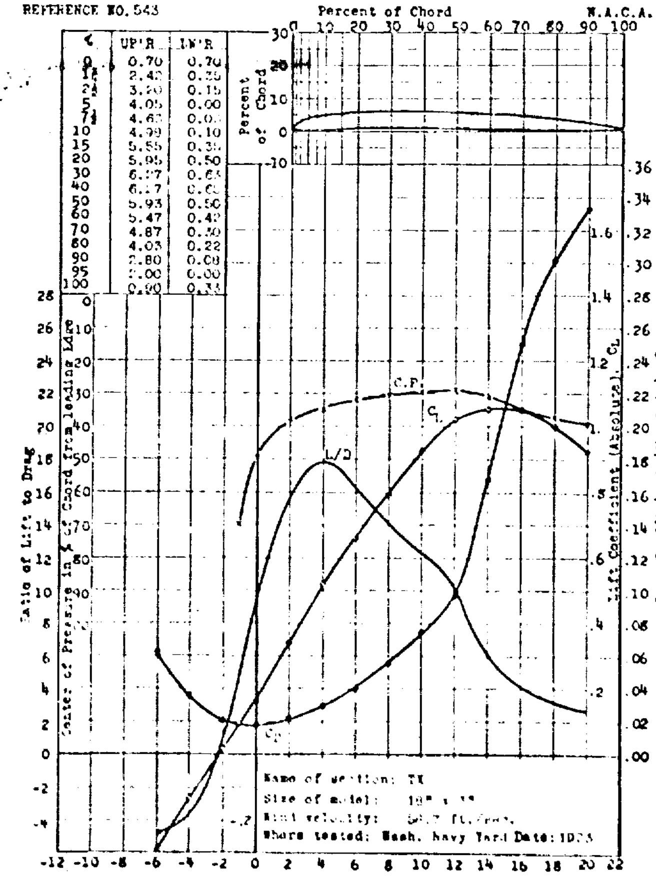
%	UP'R	LW'R
0	0.80	0.80
1¼	2.75	0.00
2½	3.87	0.03
5	5.70	0.17
7½	6.90	0.20
10	7.87	0.43
15	9.17	0.67
20	10.00	0.87
30	10.67	1.20
40	10.53	1.33
50	9.60	1.33
60	8.37	1.20
70	6.73	0.93
80	4.07	0.57
90	2.73	0.20
95	1.67	0.03
100	0.20	0.70

REFERENCE NO. 542

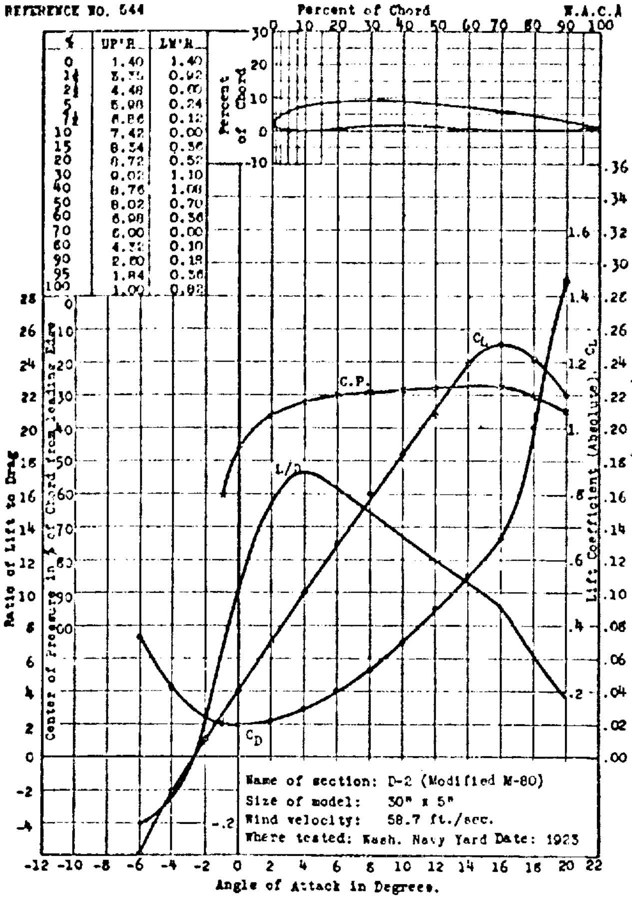


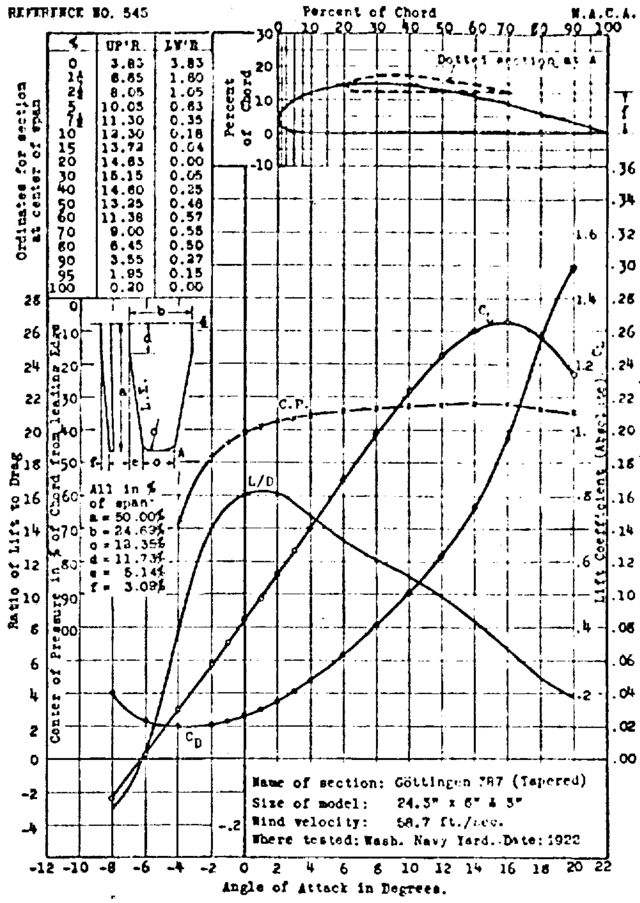
%	UP'R	LW'R
0	0.00	0.00
1¼	1.10	-0.70
2½	1.86	-1.07
5	2.95	-1.53
7½	3.75	-1.77
10	4.32	-1.88
15	5.10	-2.02
20	5.58	-2.03
30	5.95	-2.00
40	5.83	-1.93
50	5.37	-1.77
60	4.72	-1.52
70	3.85	-1.20
80	2.87	-0.80
90	1.67	-0.45
95	0.60	-0.20
100	0.00	0.00

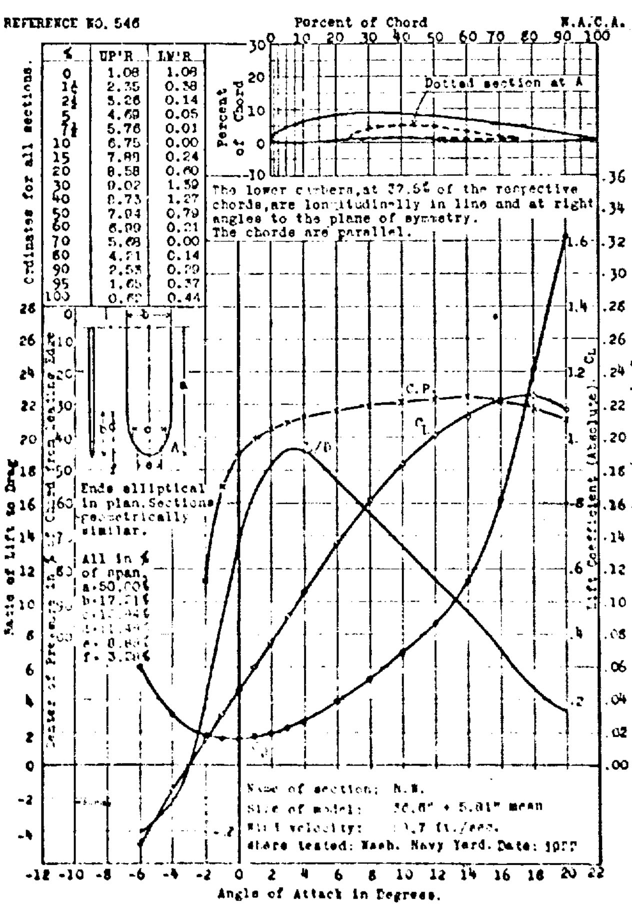
REFERENCE NO. 543

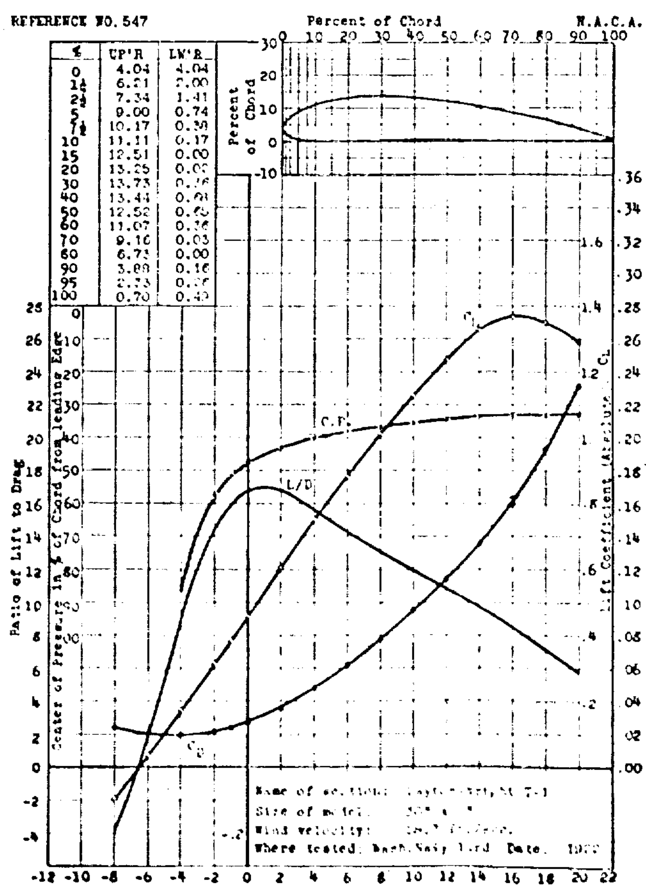


%	UP'R	LW'R
0	0.70	0.70
1¼	2.42	0.35
2½	3.20	0.15
5	4.05	0.00
7½	4.63	0.05
10	4.99	0.10
15	5.55	0.35
20	5.95	0.50
30	6.27	0.63
40	6.17	0.62
50	5.93	0.50
60	5.47	0.42
70	4.87	0.30
80	4.03	0.22
90	2.80	0.08
95	2.00	0.00
100	0.90	0.33

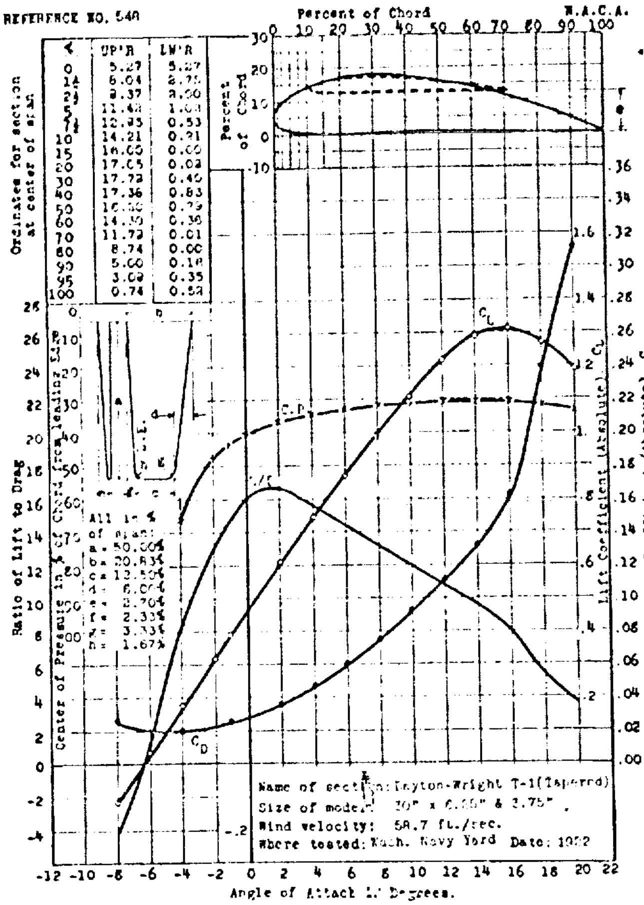

REFERENCE NO. 544
Percent of Chord
N.A.C.A.
Name of section: D-2 (Modified M-80)
Size of model: 30" x 5"
Wind velocity: 58.7 ft./sec.
Where tested: Wash. Navy Yard Date: 1923
Ratio of Lift to Drag
Center of Pressure in % of Chord from Leading Edge
Lift Coefficient (Absolute), C_L
Drag Coefficient (Absolute), C_D
Angle of Attack in Degrees.


REFERENCE NO. 545
Percent of Chord
N.A.C.A.
Dotted section at A
Ordinates for section at center of span
All in % of span
a = 50.00%
b = 24.69%
c = 13.35%
d = 11.73%
e = 5.14%
f = 3.09%
Name of section: Göttingen 387 (Tapered)
Size of model: 24.3" x 6" & 3"
Wind velocity: 58.7 ft./sec.
Where tested: Wash. Navy Yard. Date: 1922
Ratio of Lift to Drag
Center of Pressure in % of Chord from Leading Edge
Lift Coefficient (Absolute), C_L
Drag Coefficient (Absolute), C_D
Angle of Attack in Degrees.


REFERENCE NO. 546
Percent of Chord
N.A.C.A.
Dotted section at A
Ordinates for all sections.
The lower cambers, at 37.5% of the respective chords, are longitudinally in line and at right angles to the plane of symmetry. The chords are parallel.
Ends elliptical in plan. Sections geometrically similar.
All in % of span.
Name of section: N.B.
Where tested: Wash. Navy Yard. Date: 1922
Ratio of Lift to Drag
Lift Coefficient (Absolute), C_L
Drag Coefficient (Absolute), C_D
Angle of Attack in Degrees.

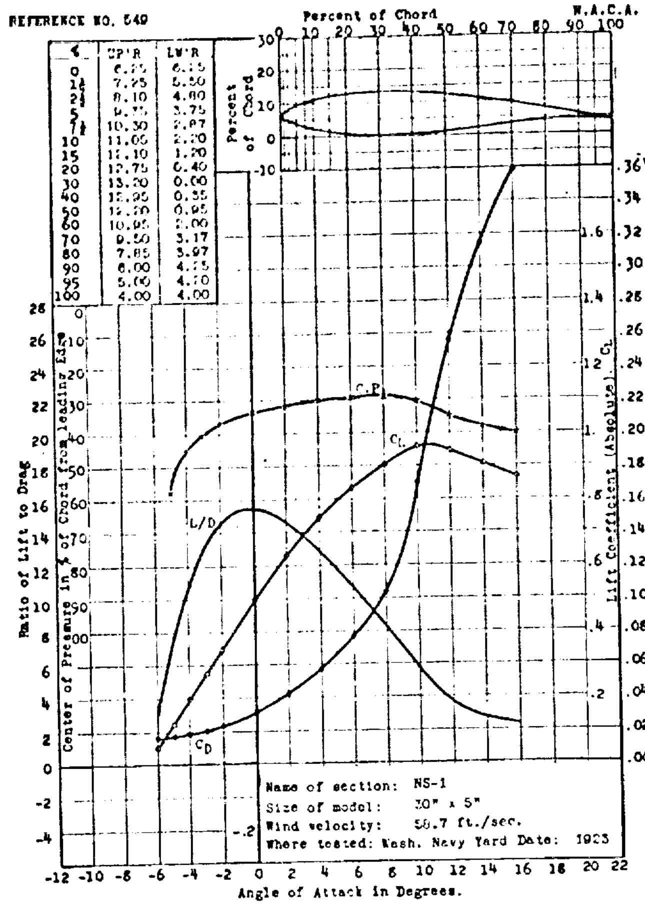

REFERENCE NO. 547
Percent of Chord
N.A.C.A.
Where tested. Wash. Navy Yard. Date.
Ratio of Lift to Drag
Center of Pressure in % of Chord from Leading Edge
Drag Coefficient (Absolute), C_D
Angle of Attack in Degrees.

REFERENCE NO. 548



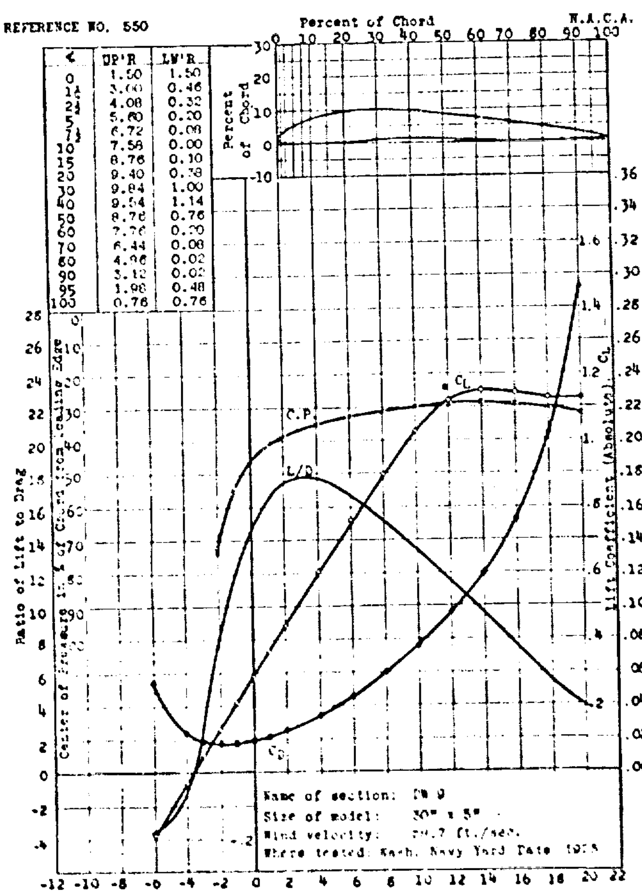
%	UP'R	LW'R
0	5.27	5.27
1¼	6.04	2.75
2½	8.37	2.00
5	11.48	1.08
7½	12.85	0.53
10	14.21	0.21
15	16.00	0.00
20	17.05	0.03
30	17.73	0.45
40	17.36	0.83
50	16.30	0.79
60	14.30	0.36
70	11.73	0.01
80	8.74	0.00
90	5.00	0.18
95	3.08	0.35
100	0.74	0.53

REFERENCE NO. 549



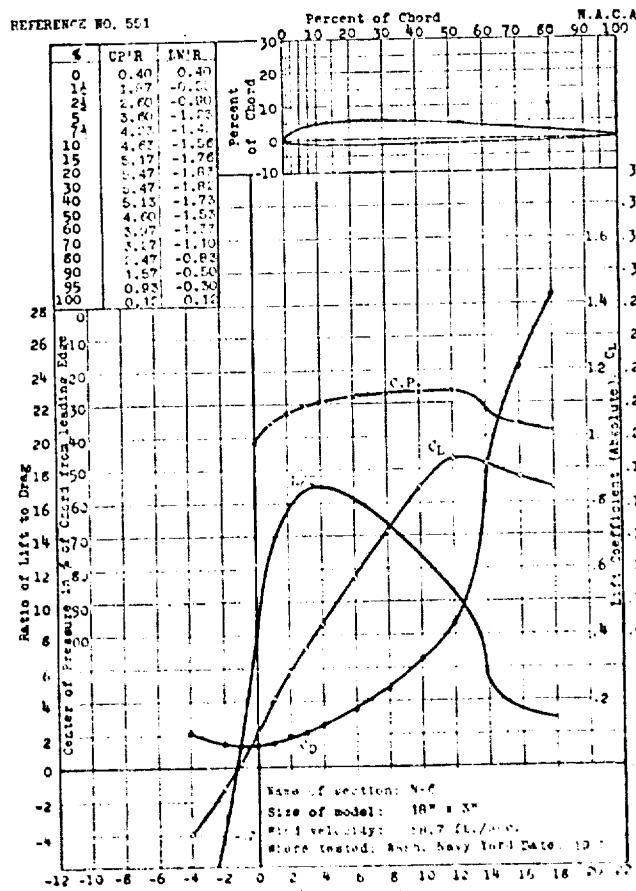
%	UP'R	LW'R
0	6.15	6.15
1¼	7.25	5.50
2½	8.10	4.80
5	9.75	3.75
7½	10.30	2.87
10	11.05	2.20
15	12.10	1.20
20	12.75	0.40
30	13.20	0.00
40	12.95	0.35
50	12.20	0.95
60	10.95	2.00
70	9.50	3.17
80	7.85	3.97
90	6.00	4.75
95	5.00	4.70
100	4.00	4.00

REFERENCE NO. 550



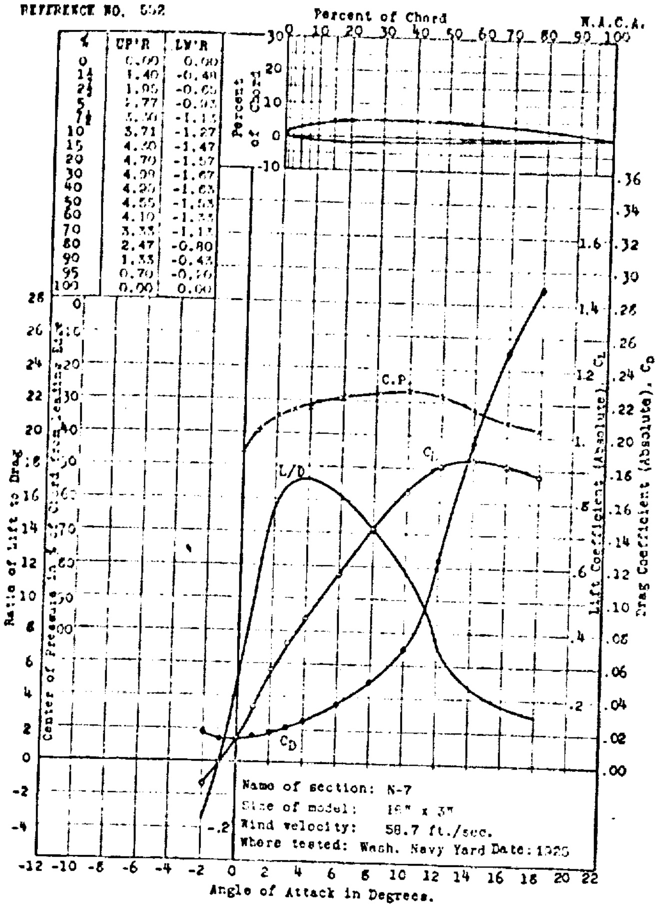
%	UP'R	LW'R
0	1.50	1.50
1¼	3.00	0.46
2½	4.08	0.32
5	5.60	0.20
7½	6.72	0.08
10	7.58	0.00
15	8.76	0.10
20	9.40	0.38
30	9.84	1.00
40	9.54	1.14
50	8.76	0.76
60	7.76	0.30
70	6.44	0.08
80	4.96	0.02
90	3.12	0.02
95	1.98	0.48
100	0.76	0.76

REFERENCE NO. 551



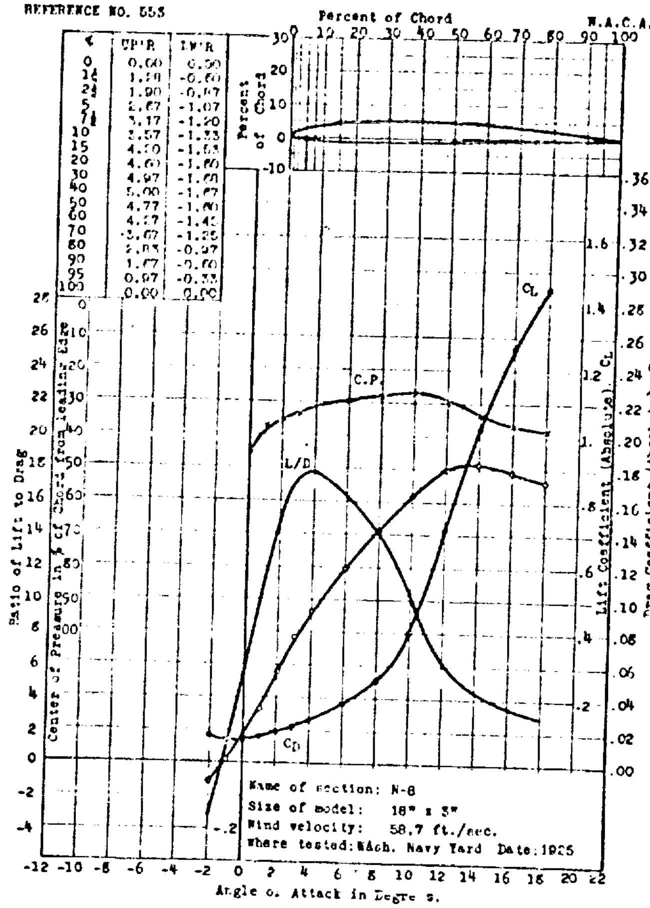
%	UP'R	LW'R
0	0.40	0.40
1¼	1.87	-0.53
2½	2.60	-0.80
5	3.60	-1.23
7½	4.23	-1.4
10	4.63	-1.56
15	5.17	-1.76
20	5.47	-1.83
30	5.47	-1.82
40	5.13	-1.73
50	4.60	-1.53
60	3.97	-1.37
70	3.27	-1.10
80	2.47	-0.83
90	1.57	-0.50
95	0.93	-0.30
100	0.12	0.12

REFERENCE NO. 552



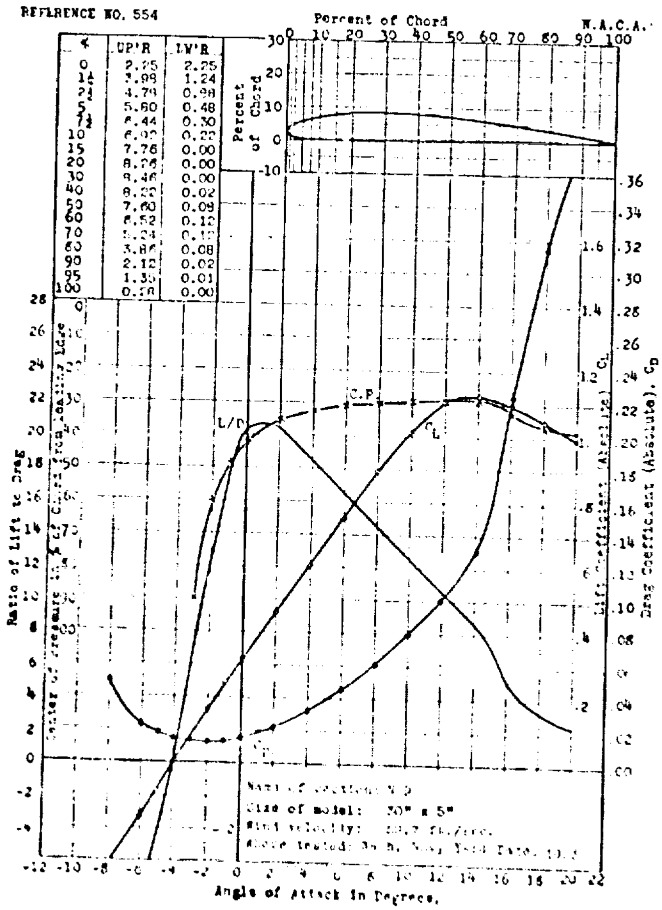
%	UP'R	LW'R
0	0.00	0.00
1¼	1.40	-0.48
2½	1.95	-0.65
5	2.77	-0.93
7½	3.30	-1.13
10	3.71	-1.27
15	4.30	-1.47
20	4.70	-1.57
30	4.99	-1.67
40	4.92	-1.63
50	4.55	-1.53
60	4.10	-1.33
70	3.33	-1.13
80	2.47	-0.80
90	1.33	-0.43
95	0.70	-0.20
100	0.00	0.00

REFERENCE NO. 553



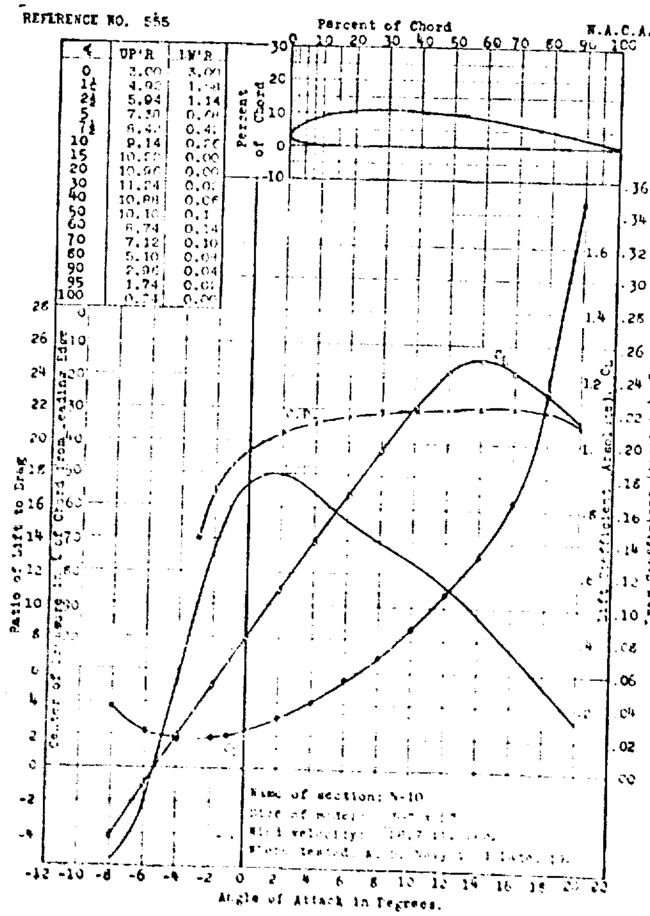
%	UP'R	LW'R
0	0.00	0.00
1¼	1.50	-0.60
2½	1.90	-0.87
5	2.67	-1.07
7½	3.17	-1.20
10	3.57	-1.33
15	4.30	-1.53
20	4.60	-1.60
30	4.97	-1.63
40	5.00	-1.67
50	4.77	-1.60
60	4.57	-1.43
70	3.67	-1.25
80	2.83	-0.97
90	1.67	-0.60
95	0.97	-0.33
100	0.00	0.00

REFERENCE NO. 554

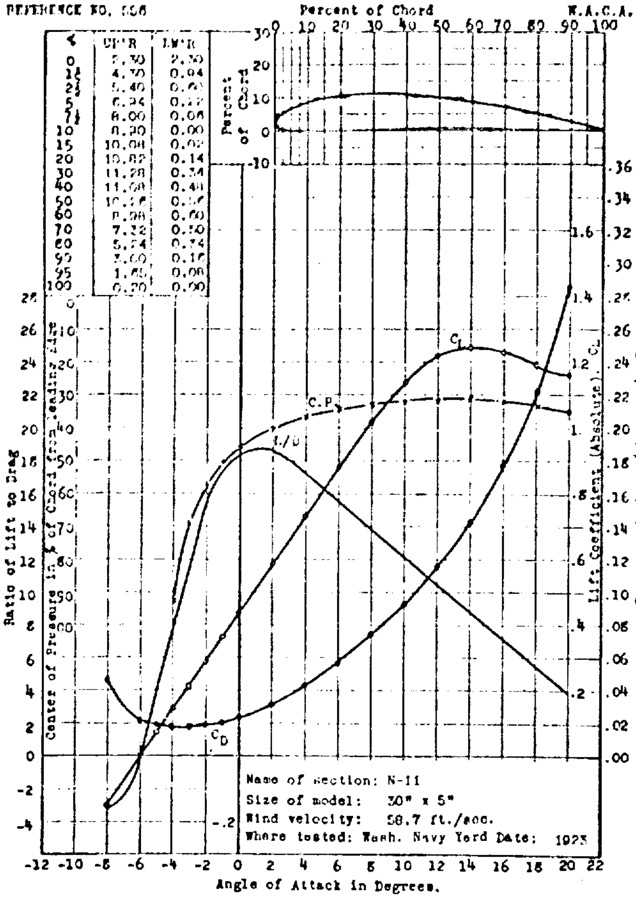


%	UP'R	LW'R
0	2.25	2.25
1¼	3.98	1.24
2½	4.79	0.98
5	5.60	0.48
7½	6.44	0.30
10	6.92	0.22
15	7.76	0.00
20	8.76	0.00
30	9.46	0.00
40	8.22	0.02
50	7.60	0.09
60	6.52	0.12
70	5.24	0.12
80	3.86	0.08
90	2.12	0.02
95	1.35	0.01
100	0.58	0.00

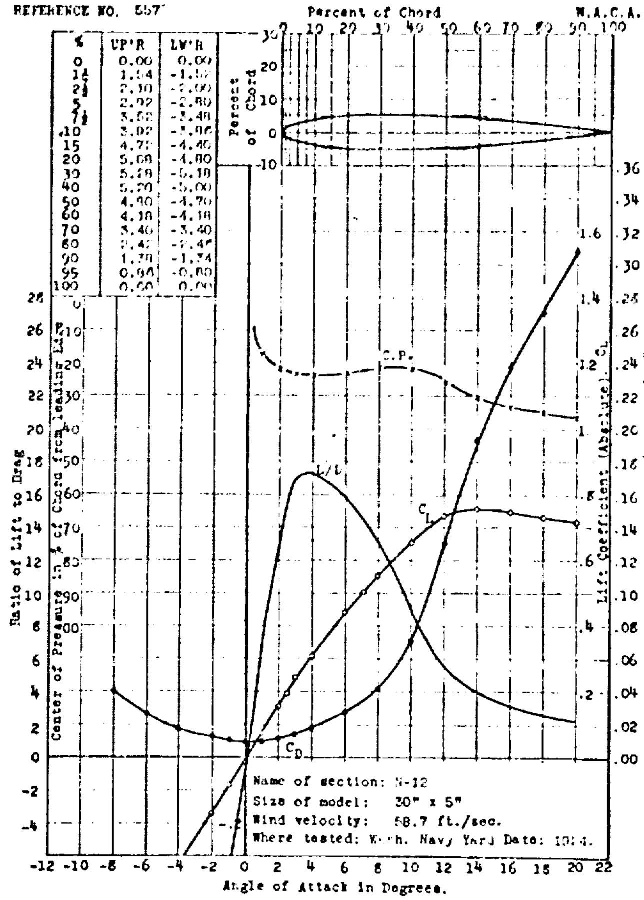
REFERENCE NO. 555



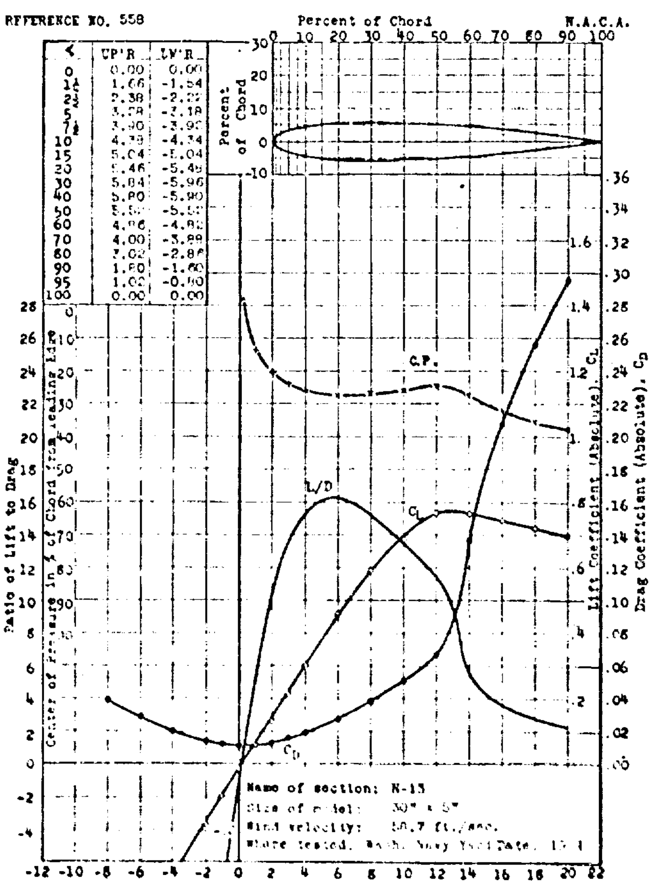
%	UP'R	LW'R
0	3.00	3.00
1¼	4.92	[illegible]
2½	5.94	1.14
5	7.50	0.68
7½	8.43	0.41
10	9.14	0.26
15	10.52	0.00
20	10.90	0.00
30	11.24	0.02
40	10.88	0.06
50	10.10	0.1
60	8.74	0.14
70	7.12	0.10
80	5.10	0.04
90	2.96	0.04
95	1.74	0.02
100	0.74	0.00



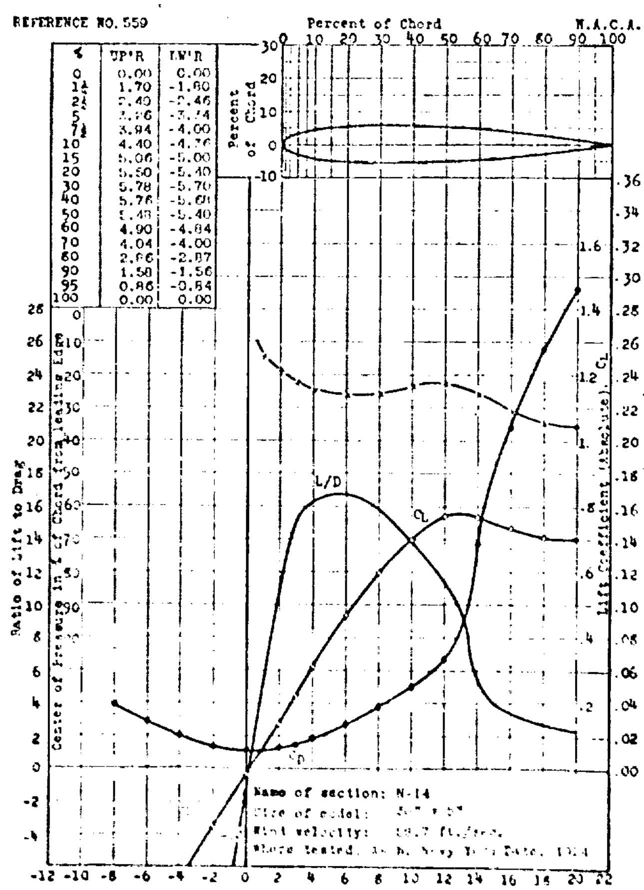
∢	UP'R	LW'R
0	2.30	2.30
1¼	4.70	0.04
2½	5.40	0.60
5	6.24	0.12
7½	8.00	0.06
10	8.90	0.00
15	10.08	0.02
20	10.82	0.14
30	11.28	0.34
40	11.08	0.48
50	[illegible]	[illegible]
60	8.98	0.60
70	7.32	0.50
80	5.74	0.34
90	3.60	0.16
95	1.65	0.08
100	0.20	0.00



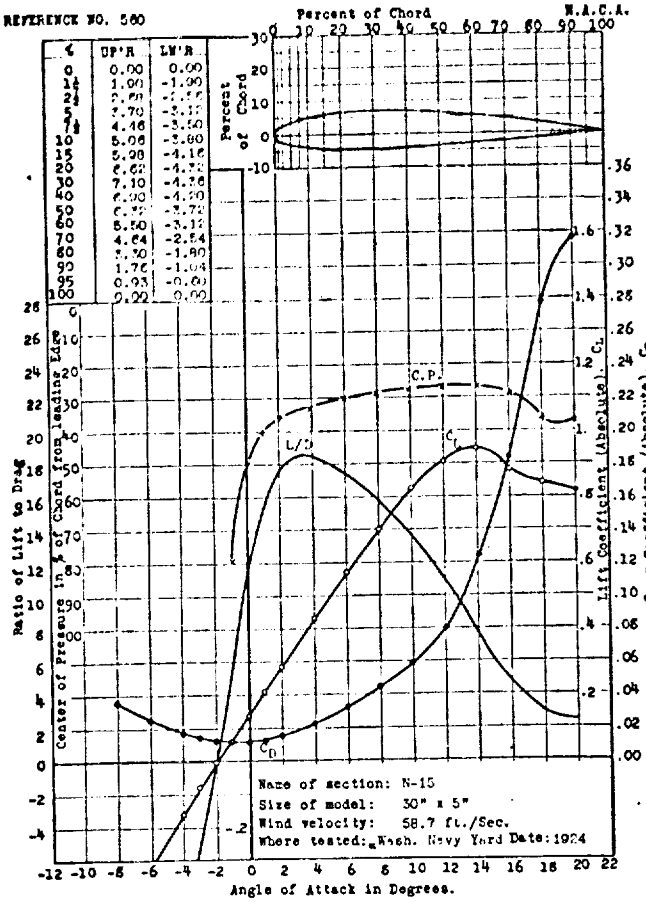
∢	UP'R	LW'R
0	0.00	0.00
1¼	1.04	-1.52
2½	2.10	-2.00
5	2.92	-2.80
7½	3.62	-3.48
10	[illegible]	-3.96
15	4.72	-4.46
20	5.08	-4.80
30	5.28	-5.18
40	5.20	-5.00
50	4.90	-4.70
60	4.18	-4.18
70	3.40	-3.40
80	2.42	-2.46
90	1.70	-1.74
95	0.94	-0.80
100	0.00	0.00



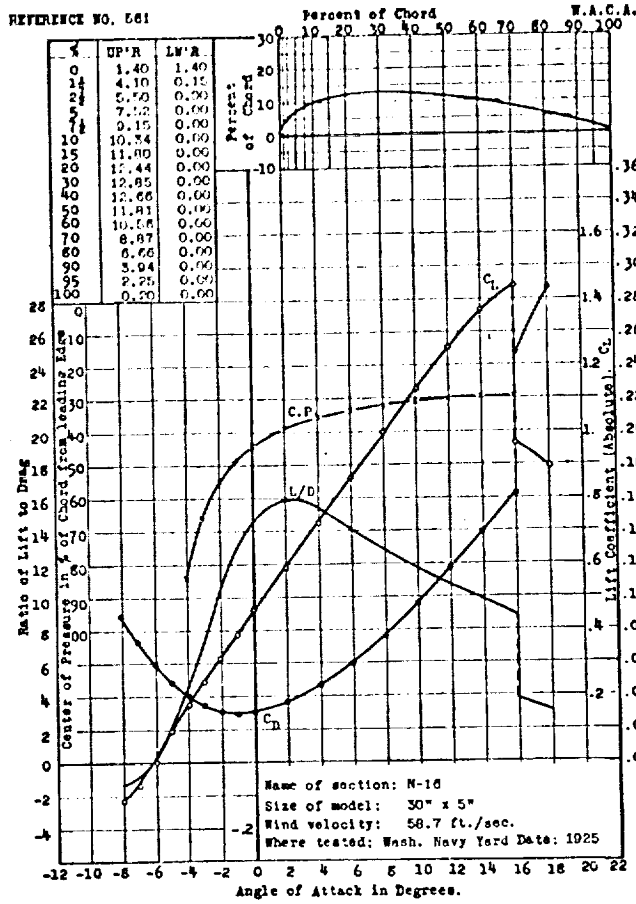
∢	UP'R	LW'R
0	0.00	0.00
1¼	1.66	-1.54
2½	2.38	-2.22
5	3.28	-3.18
7½	3.90	-3.92
10	4.39	-4.34
15	5.04	-5.04
20	5.46	-5.49
30	5.84	-5.96
40	5.80	-5.90
50	[illegible]	[illegible]
60	4.86	-4.82
70	4.00	-3.88
80	3.02	-2.86
90	1.80	-1.60
95	1.02	-0.90
100	0.00	0.00



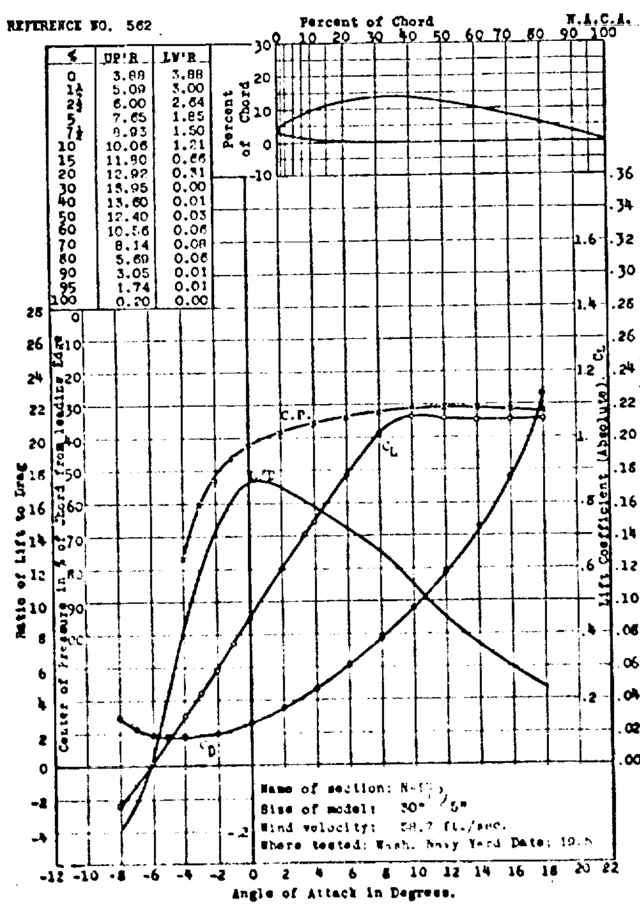
∢	UP'R	LW'R
0	0.00	0.00
1¼	1.70	-1.80
2½	2.40	-2.46
5	3.26	-3.24
7½	3.94	-4.00
10	4.40	-4.76
15	5.06	-5.00
20	5.50	-5.40
30	5.78	-5.70
40	5.76	-5.68
50	5.48	-5.40
60	4.90	-4.84
70	4.04	-4.00
80	2.86	-2.87
90	1.50	-1.56
95	0.86	-0.84
100	0.00	0.00



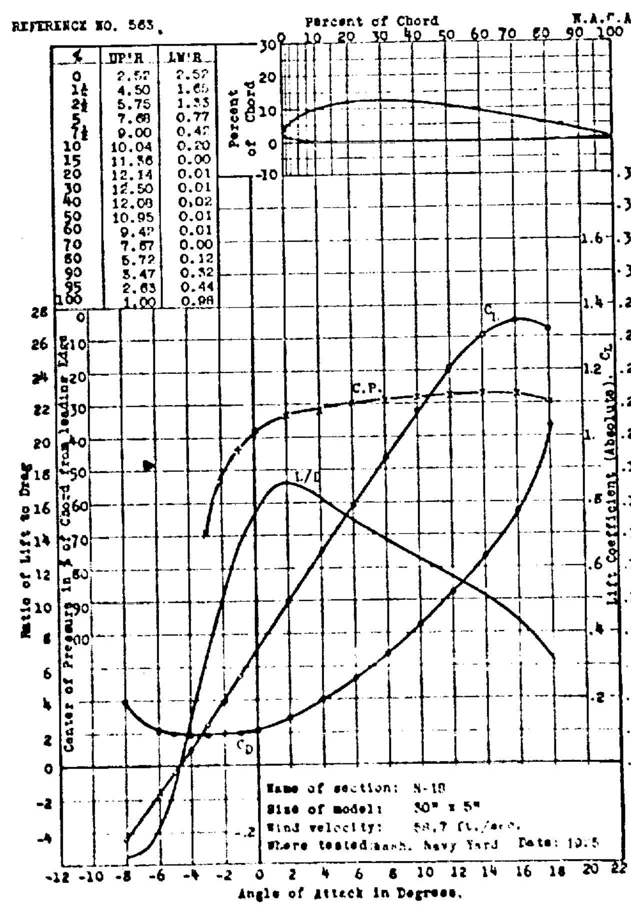
%	UP'R	LW'R
0	0.00	0.00
1¼	1.00	-1.90
2½	2.60	[illegible]
5	3.70	-3.17
7½	4.46	-3.50
10	5.06	-3.80
15	5.98	-4.16
20	6.62	-4.32
30	7.10	-4.36
40	6.90	-4.30
50	6.72	-3.72
60	5.50	-3.12
70	4.64	-2.54
80	3.30	-1.80
90	1.76	-1.04
95	0.93	-0.60
100	0.22	0.00



%	UP'R	LW'R
0	1.40	1.40
1¼	4.10	0.15
2½	5.50	0.00
5	7.52	0.00
7½	9.15	0.00
10	10.34	0.00
15	11.80	0.00
20	12.44	0.00
30	12.85	0.00
40	12.66	0.00
50	11.81	0.00
60	10.56	0.00
70	8.87	0.00
80	6.66	0.00
90	3.94	0.00
95	2.25	0.00
100	0.20	0.00



%	UP'R	LW'R
0	3.88	3.88
1¼	5.09	3.00
2½	6.00	2.64
5	7.65	1.85
7½	9.93	1.50
10	10.06	1.21
15	11.90	0.66
20	12.92	0.31
30	13.95	0.00
40	13.60	0.01
50	12.40	0.03
60	10.56	0.06
70	8.14	0.08
80	5.69	0.06
90	3.05	0.01
95	1.74	0.01
100	0.20	0.00

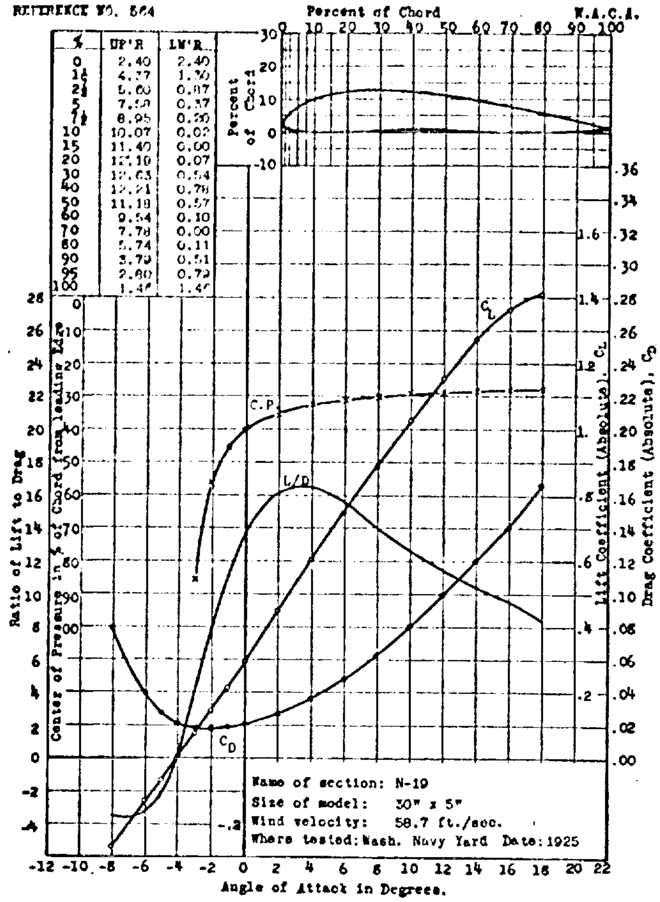


%	UP'R	LW'R
0	2.57	2.57
1¼	4.50	1.65
2½	5.75	1.33
5	7.68	0.77
7½	9.00	0.42
10	10.04	0.20
15	11.56	0.00
20	12.14	0.01
30	12.50	0.01
40	12.08	0.02
50	10.95	0.01
60	9.42	0.01
70	7.67	0.00
80	5.72	0.12
90	3.47	0.32
95	2.63	0.44
100	1.00	0.98

REFERENCE NO. 564

N.A.C.A.

%	UP'R	LW'R
0	2.40	2.40
1¼	4.77	1.30
2½	5.60	0.87
5	7.50	0.37
7½	8.95	0.20
10	10.07	0.02
15	11.40	0.00
20	12.10	0.07
30	12.63	0.54
40	12.21	0.78
50	11.19	0.57
60	9.54	0.10
70	7.78	0.00
80	5.74	0.11
90	3.79	0.51
95	2.80	0.79
100	1.46	1.46

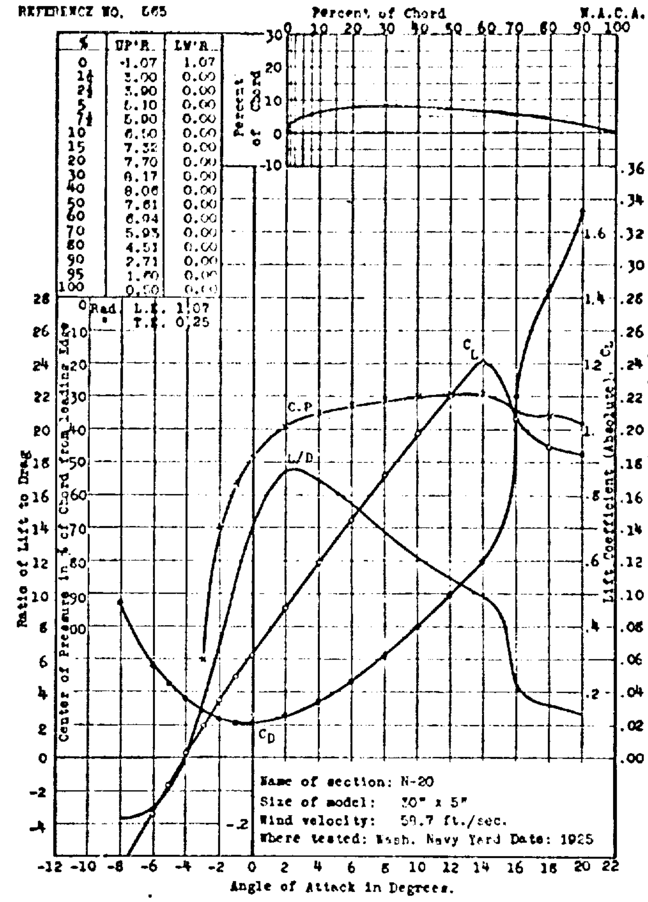


REFERENCE NO. 565

N.A.C.A.

%	UP'R	LW'R
0	1.07	1.07
1¼	3.00	0.00
2½	3.90	0.00
5	5.10	0.00
7½	6.00	0.00
10	6.50	0.00
15	7.32	0.00
20	7.70	0.00
30	8.17	0.00
40	8.06	0.00
50	7.61	0.00
60	6.94	0.00
70	5.93	0.00
80	4.51	0.00
90	2.71	0.00
95	1.50	0.00
100	0.50	0.00

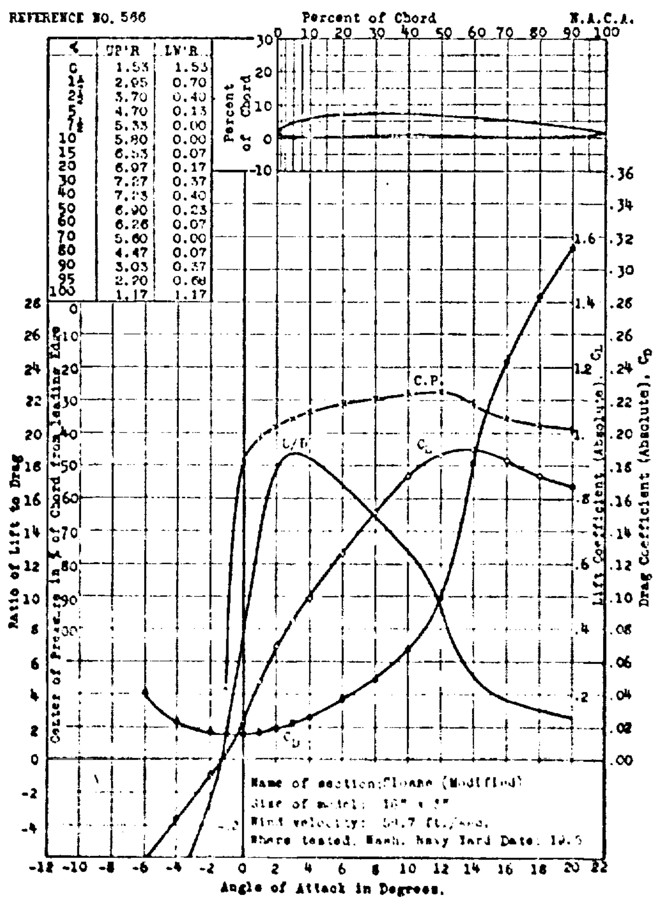
Rad.		
	L.E.	1.07
	T.E.	0.25



REFERENCE NO. 566

N.A.C.A.

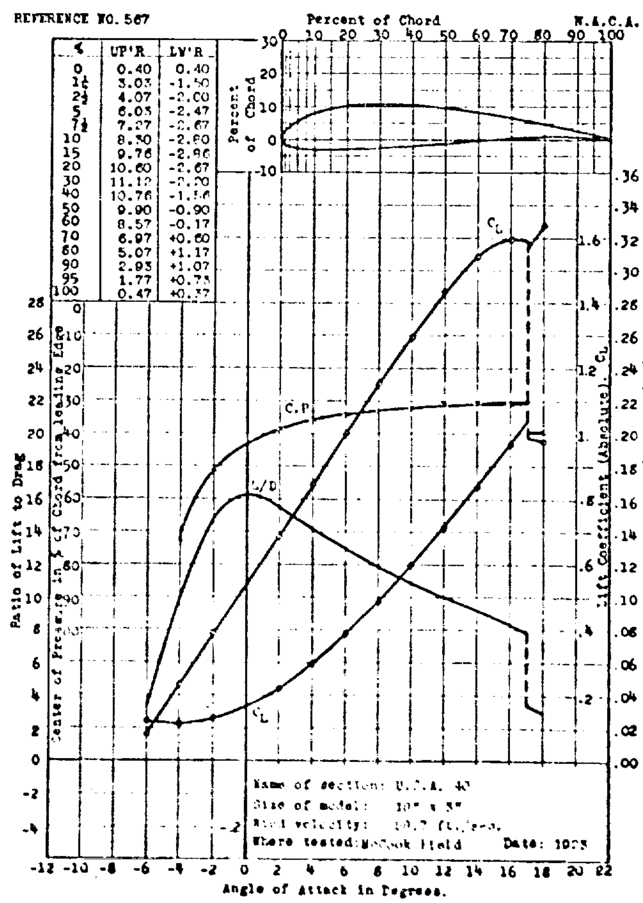
%	UP'R	LW'R
0	1.53	1.53
1¼	2.95	0.70
2½	3.70	0.40
5	4.70	0.13
7½	5.33	0.00
10	5.80	0.00
15	6.53	0.07
20	6.97	0.17
30	7.27	0.37
40	7.33	0.40
50	6.90	0.23
60	6.26	0.07
70	5.60	0.00
80	4.47	0.07
90	3.03	0.37
95	2.70	0.68
100	1.17	1.17



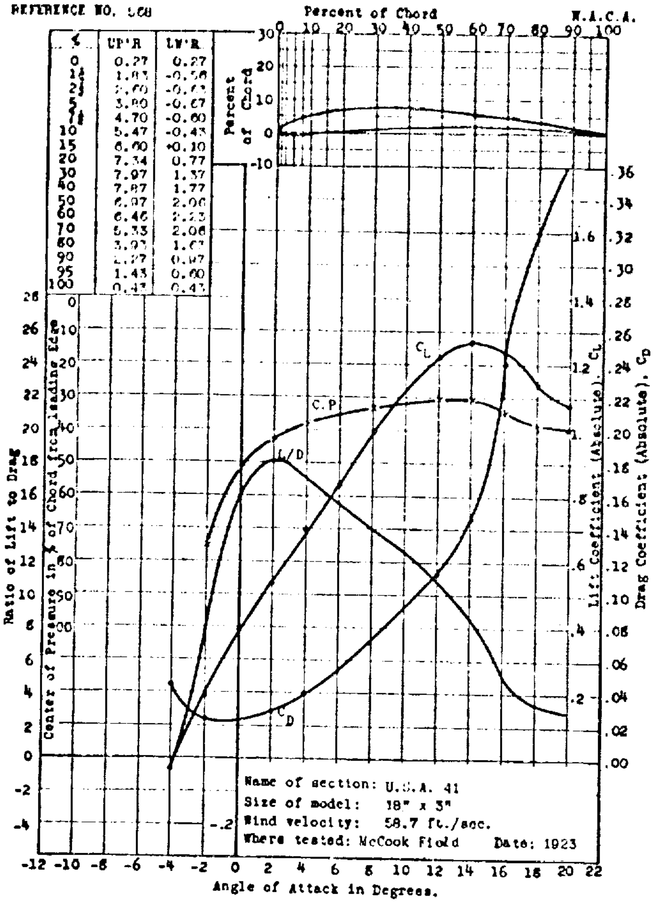
REFERENCE NO. 567

N.A.C.A.

%	UP'R	LW'R
0	0.40	0.40
1¼	3.03	-1.50
2½	4.07	-2.00
5	6.03	-2.47
7½	7.27	-2.67
10	8.30	-2.80
15	9.76	-2.86
20	10.60	-2.67
30	11.12	-2.20
40	10.76	-1.56
50	9.90	-0.90
60	8.57	-0.17
70	6.97	+0.60
80	5.07	+1.17
90	2.93	+1.07
95	1.77	+0.73
100	0.47	+0.37

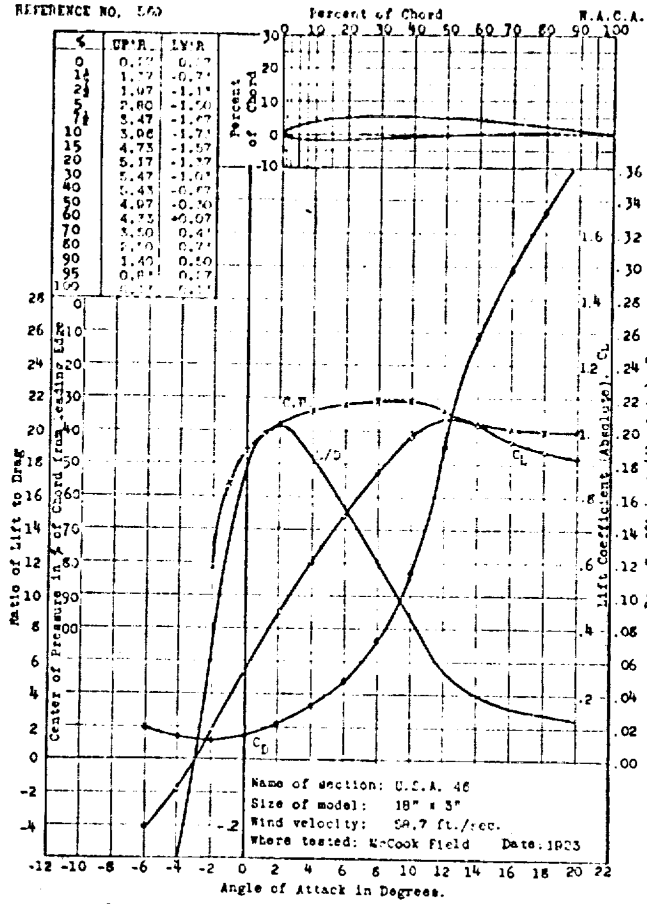


REFERENCE NO. 568



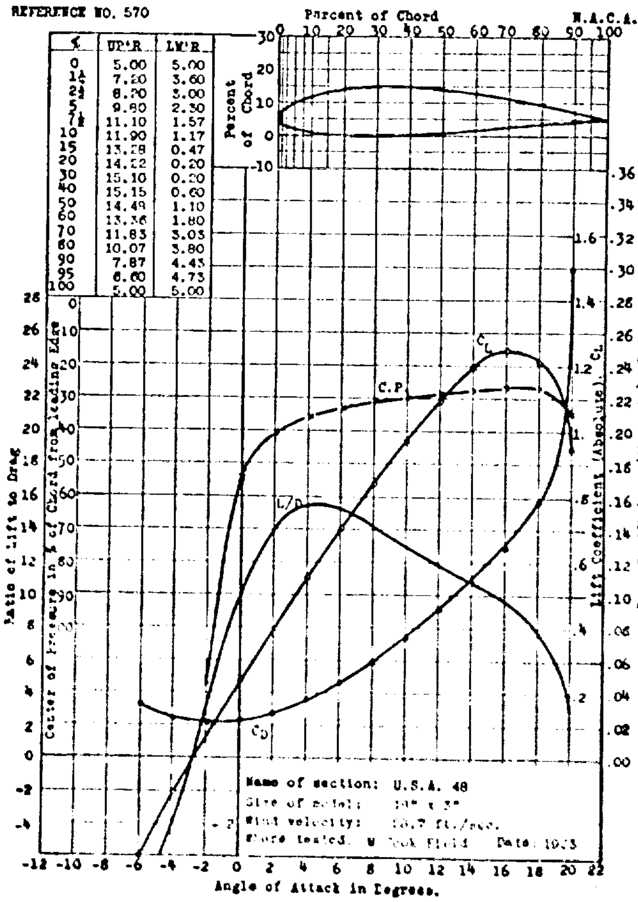
%	UP'R	LW'R
0	0.27	0.27
1¼	1.83	-0.58
2½	2.60	-0.63
5	3.80	-0.67
7½	4.70	-0.60
10	5.47	-0.43
15	6.00	+0.10
20	7.34	0.77
30	7.97	1.37
40	7.87	1.77
50	6.97	2.00
60	6.46	2.23
70	5.33	2.06
80	3.93	1.67
90	2.27	0.97
95	1.43	0.60
100	0.43	0.43

REFERENCE NO. 569



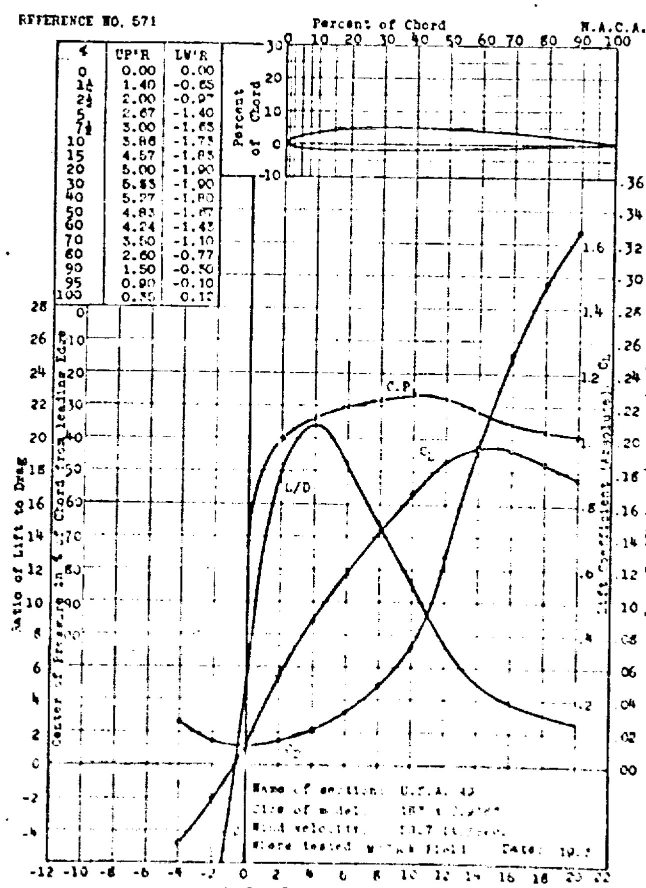
%	UP'R	LW'R
0	[illegible]	[illegible]
1¼	1.77	-0.7[illegible]
2½	1.97	-1.1[illegible]
5	2.80	-1.50
7½	3.47	-1.67
10	3.96	-1.73
15	4.73	-1.57
20	5.17	-1.37
30	5.47	-1.0[illegible]
40	5.43	-0.67
50	4.97	-0.30
60	4.73	+0.07
70	3.50	0.4[illegible]
80	[illegible]	0.7[illegible]
90	1.40	0.50
95	0.8[illegible]	0.17
100	[illegible]	[illegible]

REFERENCE NO. 570

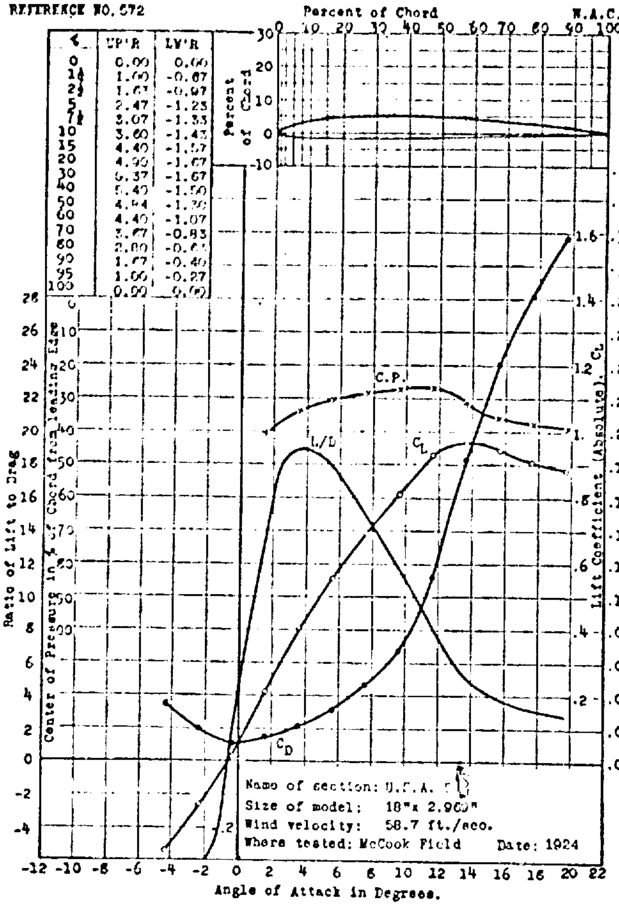


%	UP'R	LW'R
0	5.00	5.00
1¼	7.20	3.60
2½	8.20	3.00
5	9.80	2.30
7½	11.10	1.57
10	11.90	1.17
15	13.28	0.47
20	14.22	0.20
30	15.10	0.20
40	15.15	0.60
50	14.49	1.10
60	13.36	1.80
70	11.83	3.03
80	10.07	3.80
90	7.87	4.43
95	6.60	4.73
100	5.00	5.00

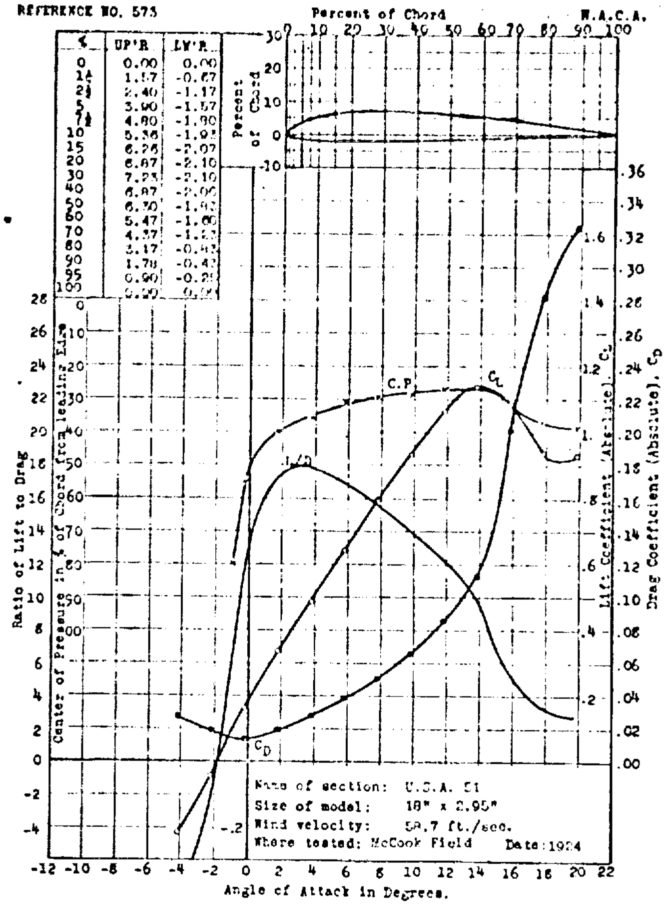
REFERENCE NO. 571



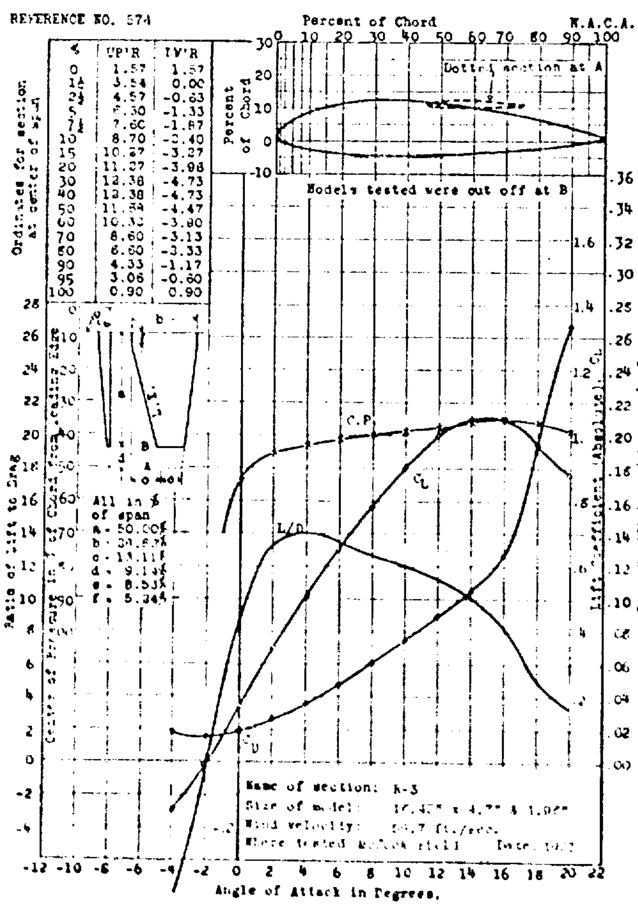
%	UP'R	LW'R
0	0.00	0.00
1¼	1.40	-0.65
2½	2.00	-0.97
5	2.67	-1.40
7½	3.00	-1.65
10	3.86	-1.73
15	4.57	-1.85
20	5.00	-1.90
30	5.83	-1.90
40	5.77	-1.80
50	4.83	-1.67
60	4.24	-1.43
70	3.50	-1.10
80	2.60	-0.77
90	1.50	-0.50
95	0.90	-0.10
100	0.35	0.12



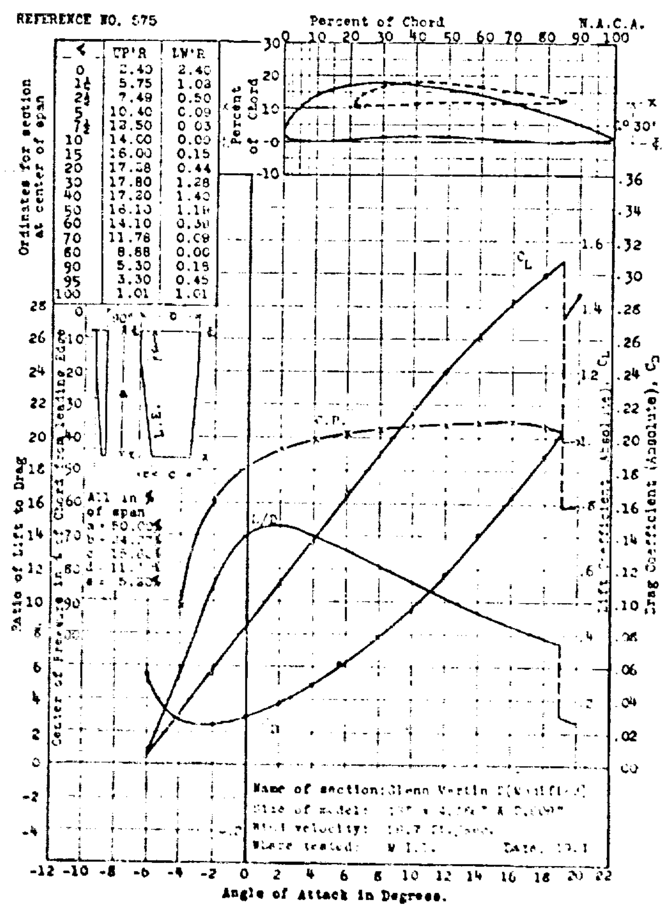
%	UP'R	LW'R
0	0.00	0.00
1¼	1.00	-0.67
2½	1.63	-0.97
5	2.47	-1.23
7½	3.07	-1.33
10	3.60	-1.43
15	4.40	-1.57
20	4.90	-1.67
30	5.37	-1.67
40	5.40	-1.50
50	4.44	-1.30
60	4.40	-1.07
70	3.67	-0.93
80	2.00	-0.63
90	1.67	-0.40
95	1.00	-0.27
100	0.00	0.00



%	UP'R	LW'R
0	0.00	0.00
1¼	1.57	-0.67
2½	2.40	-1.17
5	3.90	-1.57
7½	4.80	-1.80
10	5.36	-1.93
15	6.26	-2.07
20	6.87	-2.10
30	7.23	-2.10
40	6.87	-2.00
50	6.70	-1.93
60	5.47	-1.80
70	4.37	-1.53
80	3.17	-0.83
90	1.78	-0.43
95	0.90	-0.25
100	0.20	0.00

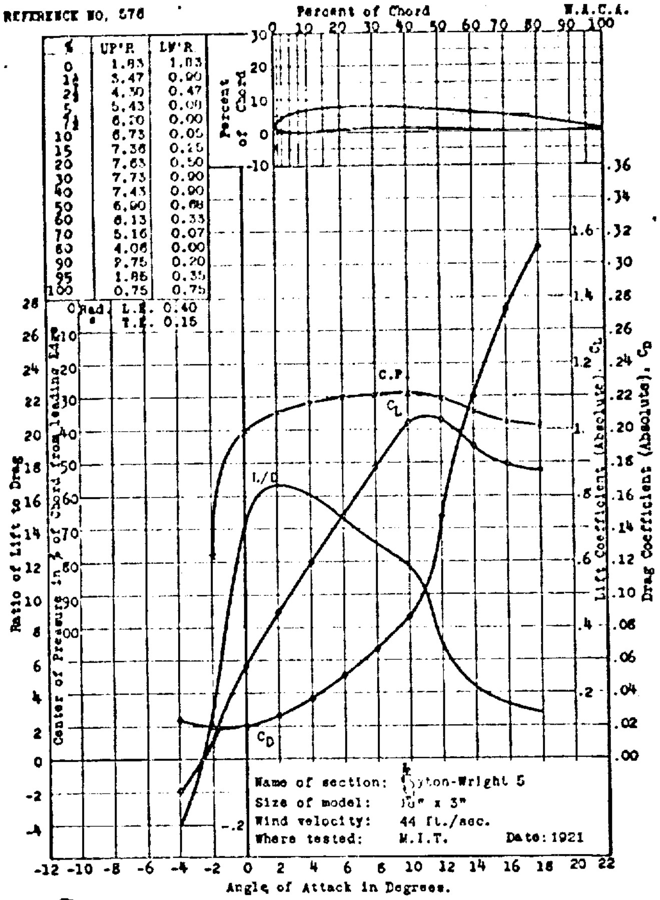


%	UP'R	LW'R
0	1.57	1.57
1¼	3.54	0.00
2½	4.57	-0.63
5	6.30	-1.33
7½	7.60	-1.87
10	8.70	-2.40
15	10.27	-3.27
20	11.37	-3.98
30	12.38	-4.73
40	12.38	-4.73
50	11.84	-4.47
60	10.30	-3.80
70	8.60	-3.13
80	6.60	-3.33
90	4.33	-1.17
95	3.06	-0.60
100	0.90	0.90



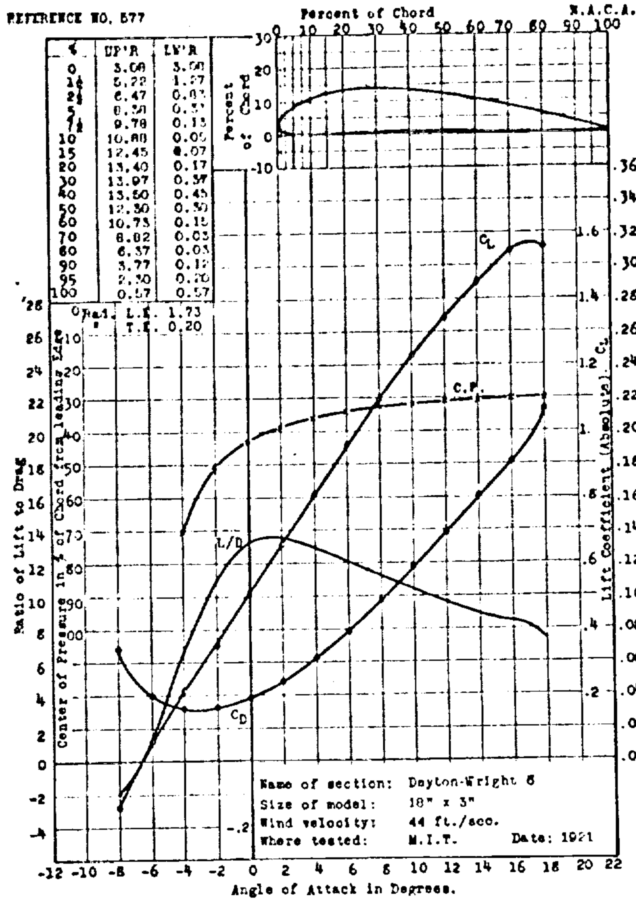
%	UP'R	LW'R
0	2.40	2.40
1¼	5.75	1.03
2½	7.49	0.50
5	10.40	0.09
7½	12.50	0.03
10	14.00	0.00
15	16.00	0.15
20	17.38	0.44
30	17.80	1.28
40	17.20	1.40
50	16.10	1.16
60	14.10	0.30
70	11.78	0.08
80	8.88	0.00
90	5.30	0.19
95	3.30	0.45
100	1.01	1.01

REFERENCE NO. 576



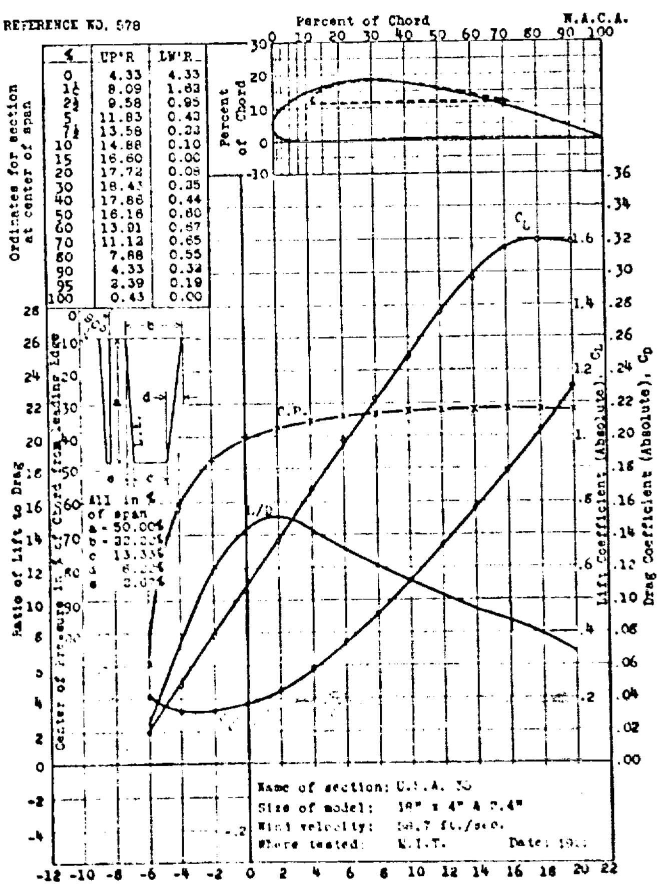
%	UP'R	LW'R
0	1.83	1.03
1¼	3.47	0.90
2½	4.30	0.47
5	5.43	0.00
7½	6.20	0.00
10	6.73	0.05
15	7.36	0.25
20	7.63	0.50
30	7.73	0.90
40	7.43	0.90
50	6.90	0.68
60	6.13	0.33
70	5.16	0.07
80	4.06	0.00
90	2.75	0.20
95	1.86	0.35
100	0.75	0.75

REFERENCE NO. 577



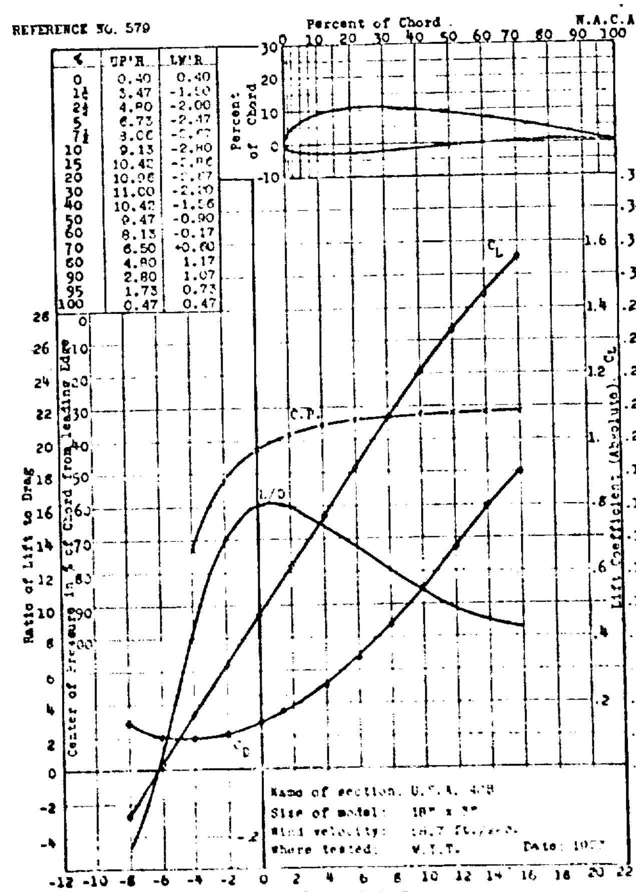
%	UP'R	LW'R
0	3.08	3.08
1¼	5.22	1.27
2½	6.47	0.83
5	8.50	0.57
7½	9.78	0.13
10	10.80	0.05
15	12.45	0.07
20	13.40	0.17
30	13.97	0.37
40	13.50	0.45
50	12.30	0.30
60	10.73	0.15
70	8.02	0.03
80	6.37	0.03
90	3.77	0.12
95	2.30	0.20
100	0.57	0.57

REFERENCE NO. 578



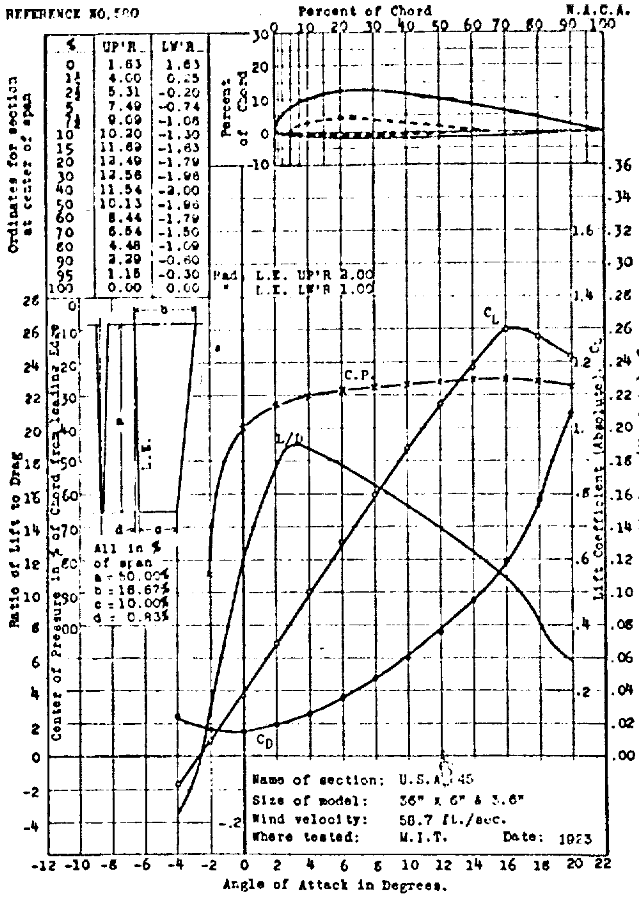
%	UP'R	LW'R
0	4.33	4.33
1¼	8.09	1.83
2½	9.58	0.95
5	11.83	0.43
7½	13.58	0.23
10	14.88	0.10
15	16.60	0.00
20	17.72	0.08
30	18.43	0.35
40	17.86	0.44
50	16.16	0.60
60	13.91	0.67
70	11.12	0.65
80	7.88	0.55
90	4.33	0.32
95	2.39	0.19
100	0.43	0.00

REFERENCE NO. 579



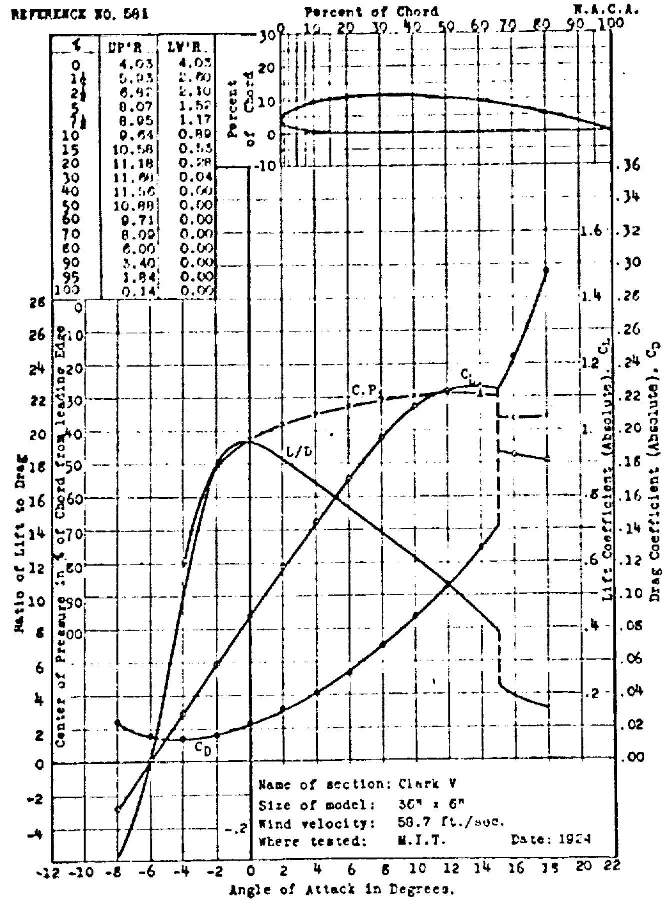
%	UP'R	LW'R
0	0.40	0.40
1¼	3.47	-1.30
2½	4.80	-2.00
5	6.73	-2.47
7½	8.00	[illegible]
10	9.13	-2.80
15	10.42	[illegible]
20	10.96	[illegible]
30	11.00	[illegible]
40	10.42	-1.56
50	9.47	-0.90
60	8.13	-0.17
70	6.50	+0.60
80	4.80	1.17
90	2.80	1.07
95	1.73	0.73
100	0.47	0.47

REFERENCE NO. 580



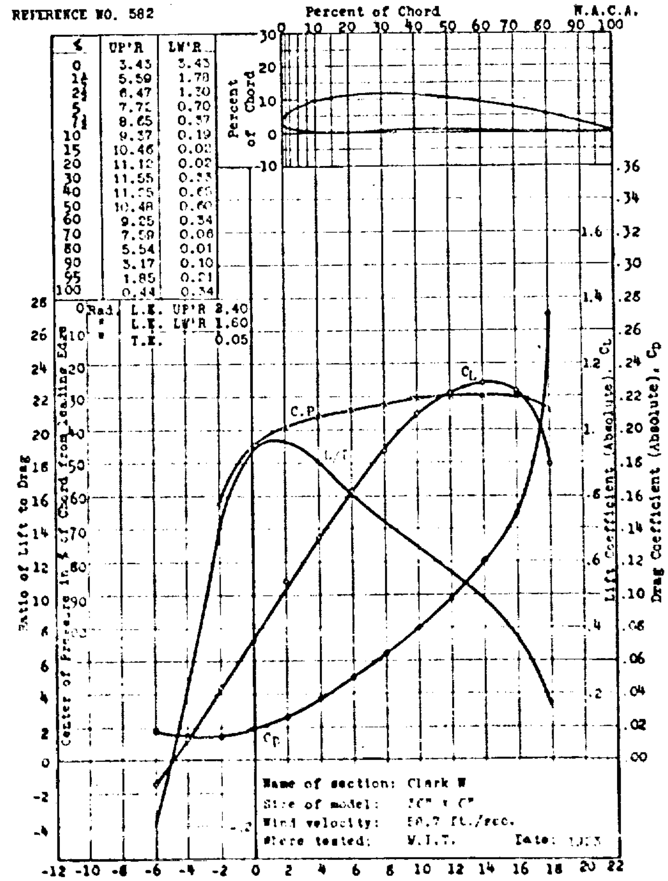
%	UP'R	LW'R
0	1.63	1.63
1¼	4.00	0.25
2½	5.31	-0.20
5	7.49	-0.74
7½	9.09	-1.06
10	10.20	-1.30
15	11.69	-1.63
20	12.49	-1.79
30	12.58	-1.98
40	11.54	-2.00
50	10.13	-1.96
60	8.44	-1.79
70	6.54	-1.50
80	4.48	-1.09
90	2.29	-0.60
95	1.16	-0.30
100	0.00	0.00

REFERENCE NO. 581



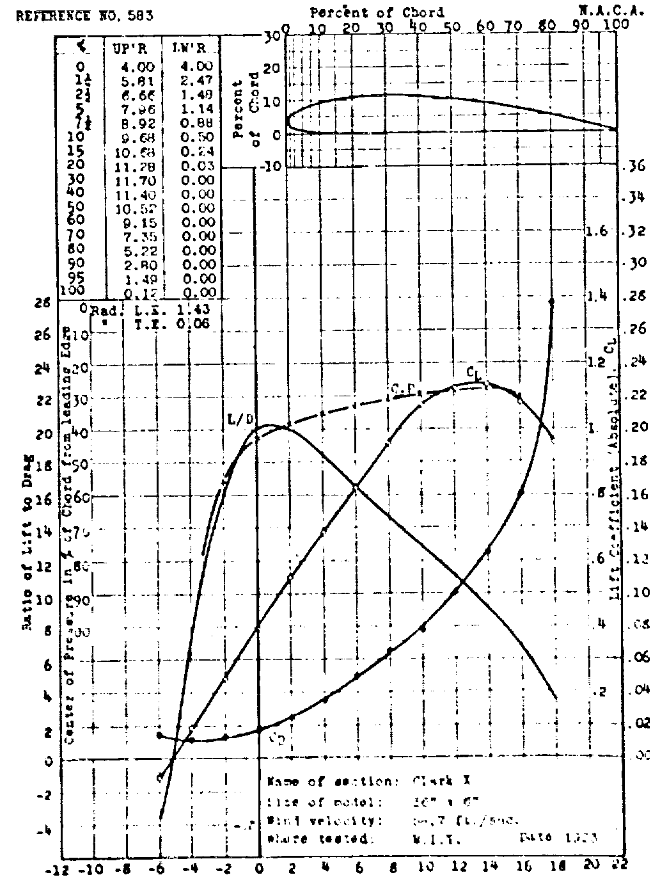
%	UP'R	LW'R
0	4.03	4.03
1¼	5.93	2.60
2½	6.97	2.10
5	8.07	1.57
7½	8.95	1.17
10	9.64	0.89
15	10.58	0.55
20	11.18	0.28
30	11.60	0.04
40	11.56	0.00
50	10.88	0.00
60	9.71	0.00
70	8.09	0.00
80	6.00	0.00
90	3.40	0.00
95	1.84	0.00
100	0.14	0.00

REFERENCE NO. 582

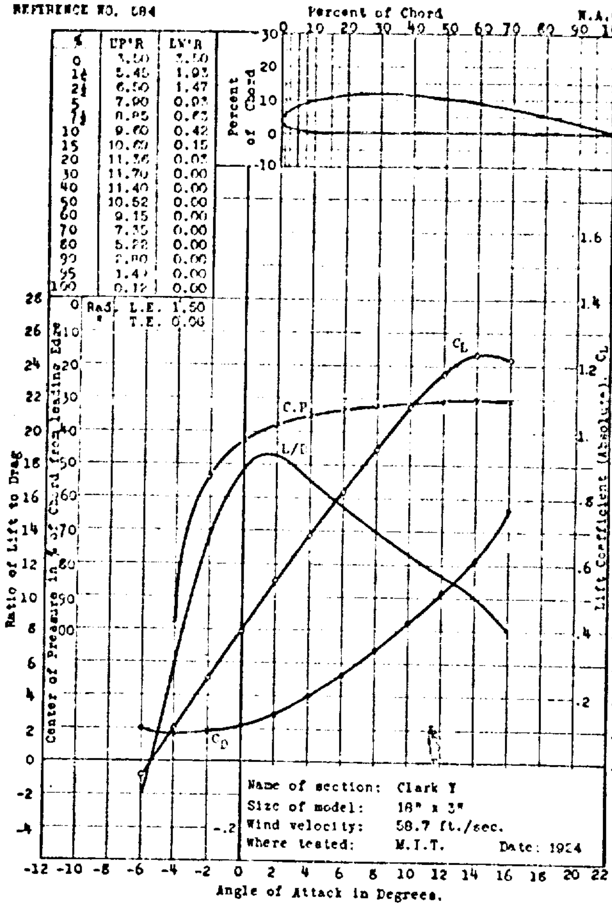


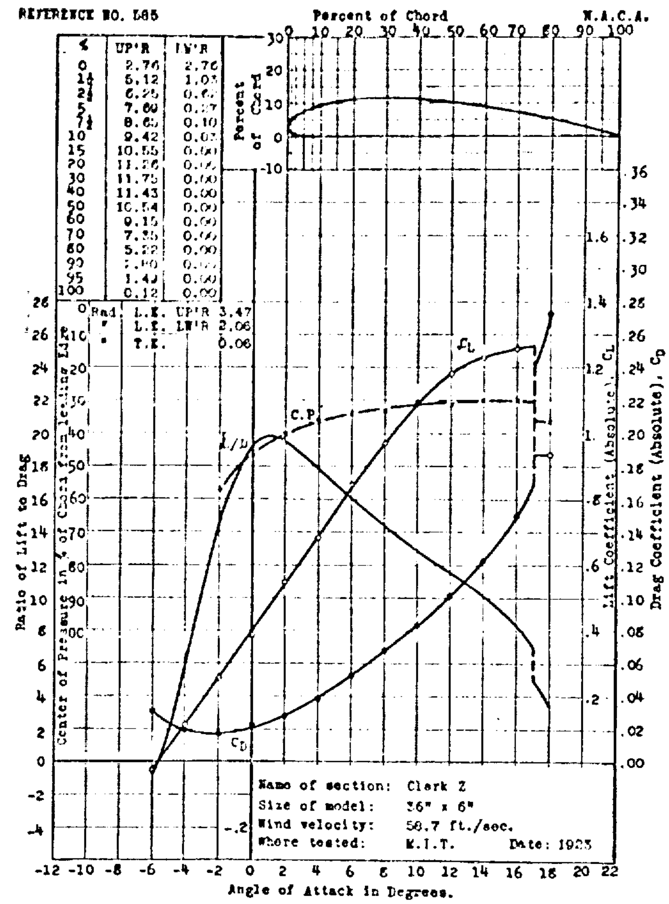
%	UP'R	LW'R
0	3.43	3.43
1¼	5.59	1.78
2½	6.47	1.30
5	7.72	0.70
7½	8.65	0.37
10	9.37	0.19
15	10.46	0.02
20	11.12	0.02
30	11.55	0.33
40	11.25	0.65
50	10.48	0.60
60	9.25	0.34
70	7.59	0.06
80	5.54	0.01
90	3.17	0.10
95	1.85	0.21
100	0.44	0.34

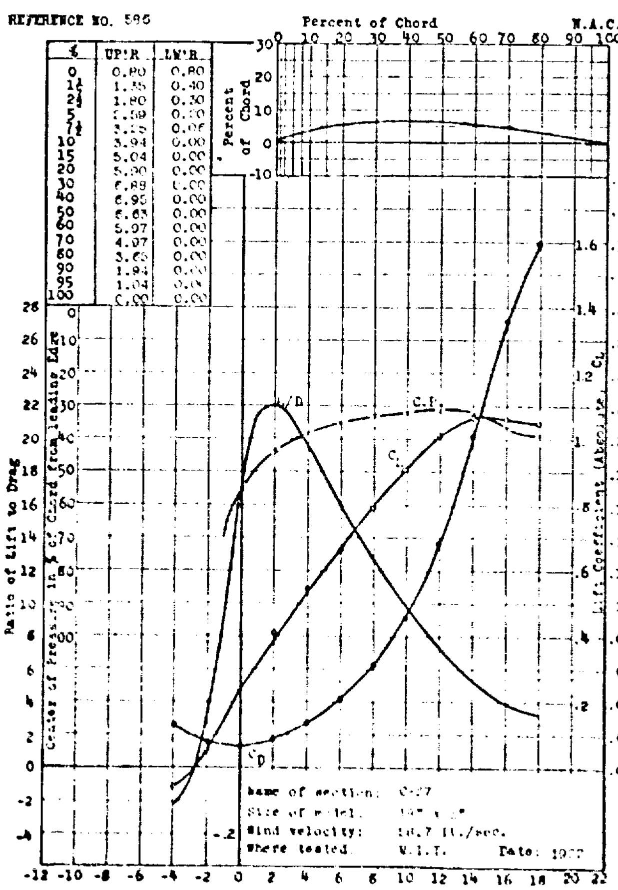
REFERENCE NO. 583

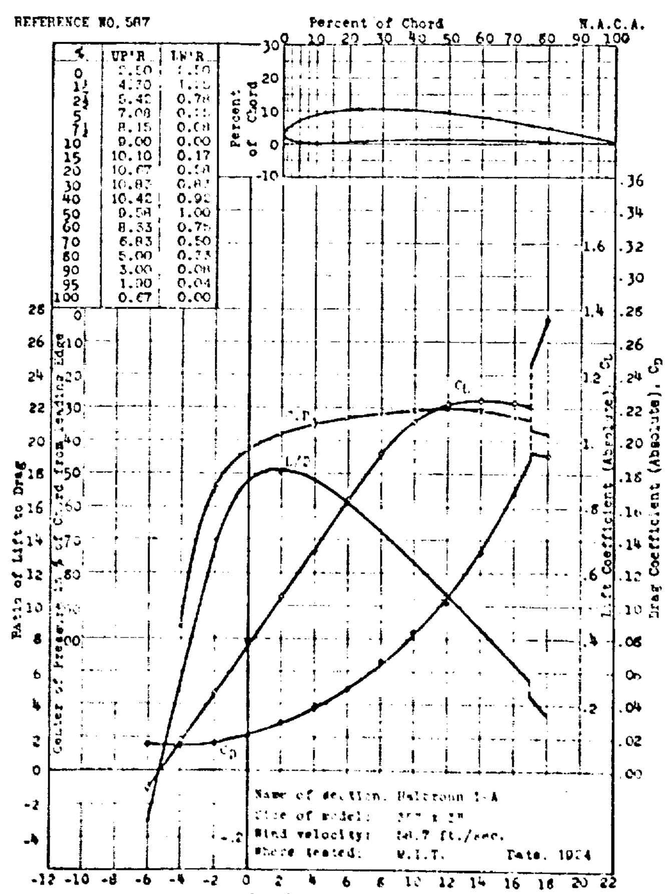


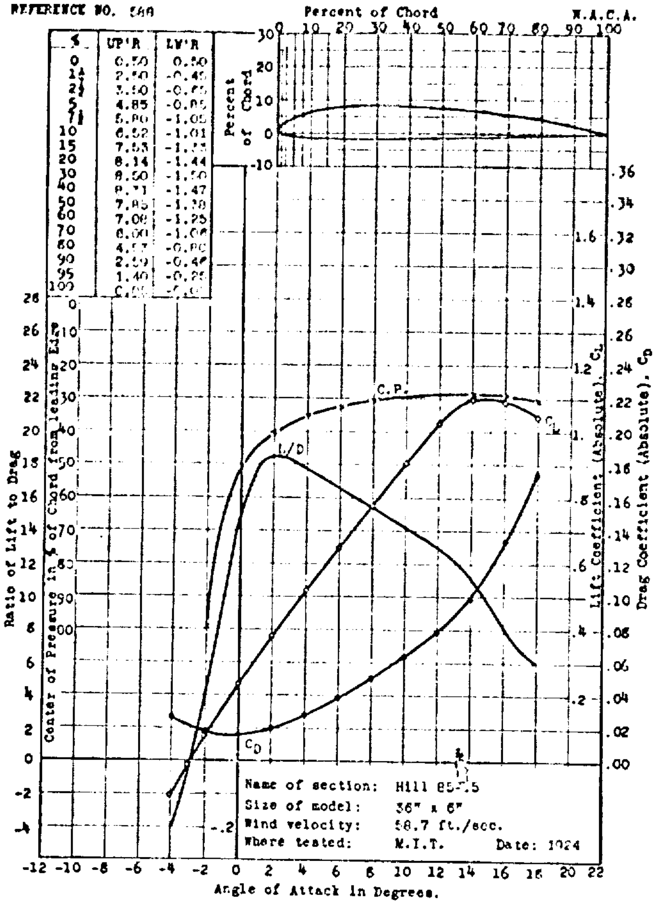
%	UP'R	LW'R
0	4.00	4.00
1¼	5.81	2.47
2½	6.66	1.48
5	7.96	1.14
7½	8.92	0.88
10	9.68	0.50
15	10.68	0.24
20	11.78	0.03
30	11.70	0.00
40	11.40	0.00
50	10.52	0.00
60	9.15	0.00
70	7.35	0.00
80	5.22	0.00
90	2.80	0.00
95	1.49	0.00
100	0.12	0.00

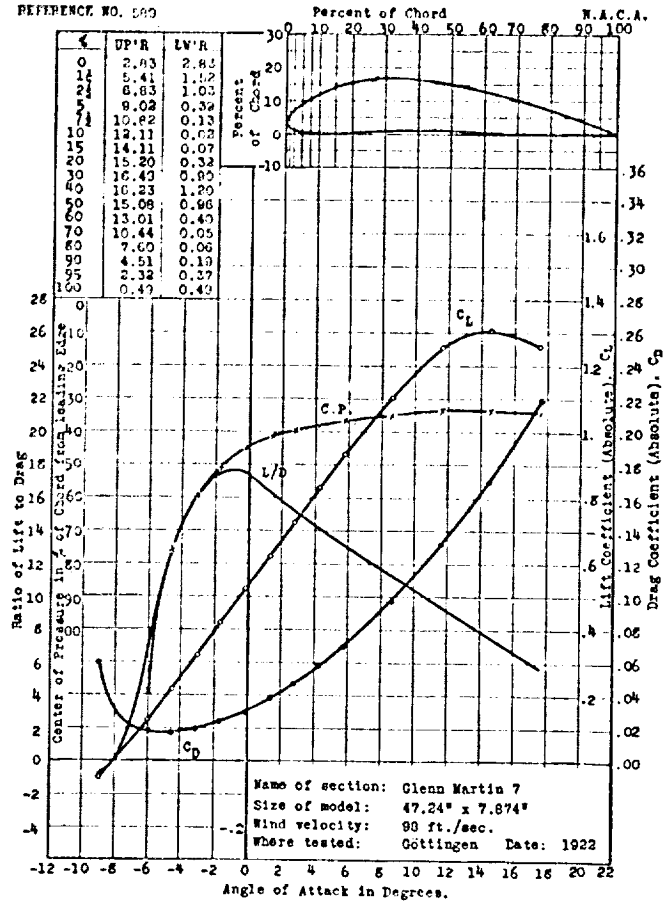

REFERENCE NO. 584
Percent of Chord
N.A.C.A.
Name of section: Clark Y
Size of model: 18" x 3"
Wind velocity: 58.7 ft./sec.
Where tested: M.I.T.
Date: 1924
Ratio of Lift to Drag
Lift Coefficient (Absolute), C_L
Drag Coefficient (Absolute), C_D
Angle of Attack in Degrees.

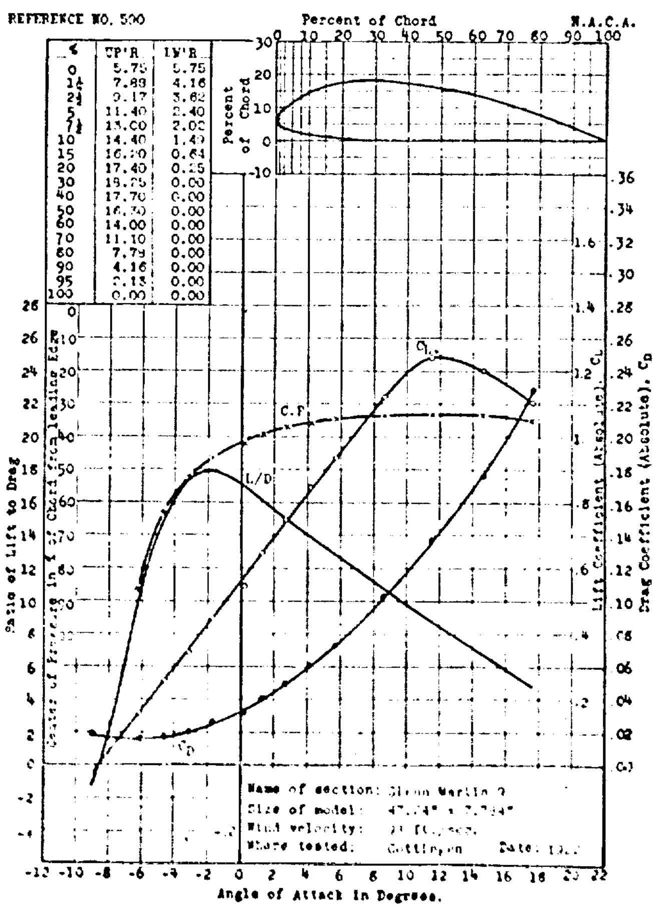

REFERENCE NO. 585
Percent of Chord
N.A.C.A.
Name of section: Clark Z
Size of model: 36" x 6"
Wind velocity: 58.7 ft./sec.
Where tested: M.I.T.
Date: 1925
Ratio of Lift to Drag
Lift Coefficient (Absolute), C_L
Drag Coefficient (Absolute), C_D
Angle of Attack in Degrees.

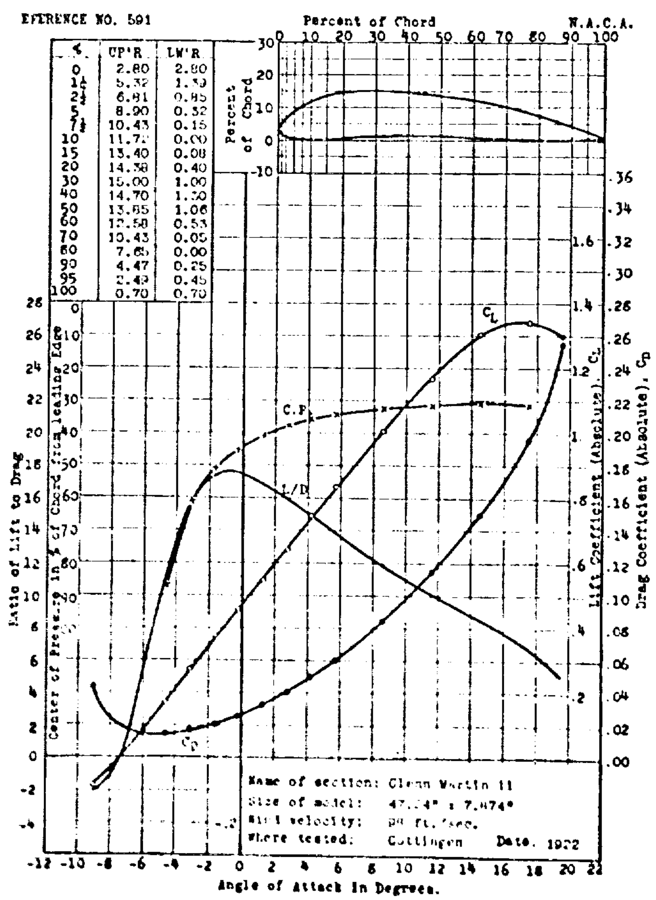

REFERENCE NO.
Percent of Chord
N.A.C.A.
Ratio of Lift to Drag
Drag Coefficient (Absolute), C_D
Angle of Attack in Degrees.


REFERENCE NO. 587
Percent of Chord
N.A.C.A.
Ratio of Lift to Drag
Lift Coefficient (Absolute), C_L
Drag Coefficient (Absolute), C_D
Angle of Attack in Degrees.


REFERENCE NO. 589
Percent of Chord
N.A.C.A.
Name of section: Hill 85-15
Size of model: 36" x 6"
Wind velocity: 58.7 ft./sec.
Where tested: M.I.T.
Date: 1924
Angle of Attack in Degrees.
Ratio of Lift to Drag
Center of Pressure in % of Chord from leading Edge
Lift Coefficient (Absolute), C_L
Drag Coefficient (Absolute), C_D

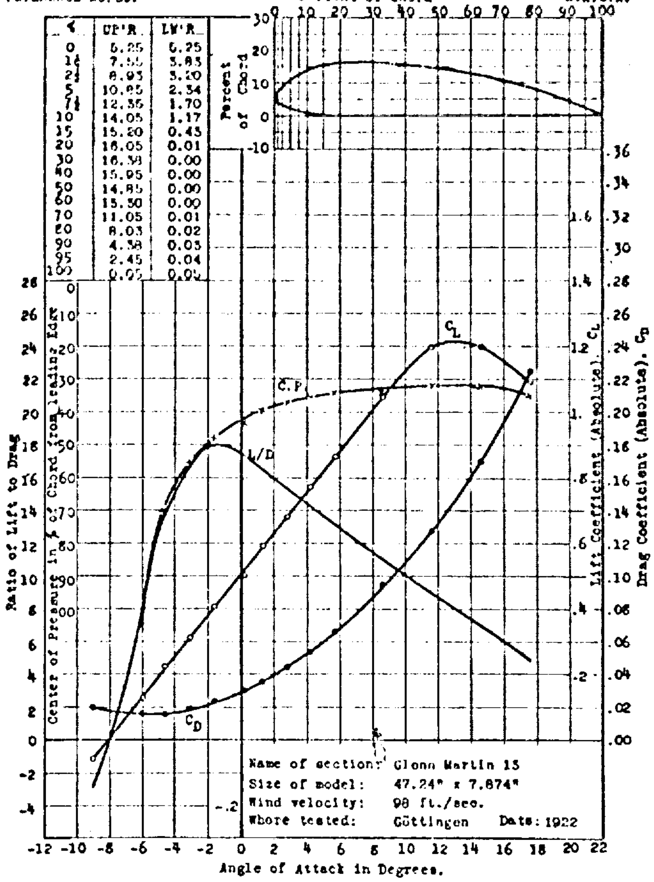

REFERENCE NO. 589
Percent of Chord
N.A.C.A.
Name of section: Glenn Martin 7
Size of model: 47.24" x 7.874"
Wind velocity: 98 ft./sec.
Where tested: Göttingen
Date: 1922
Angle of Attack in Degrees.
Ratio of Lift to Drag
Center of Pressure in % of Chord from leading Edge
Lift Coefficient (Absolute), C_L
Drag Coefficient (Absolute), C_D


REFERENCE NO. 590
Percent of Chord
N.A.C.A.
Name of section: Glenn Martin 9
Angle of Attack in Degrees.
Ratio of Lift to Drag
Lift Coefficient (Absolute), C_L
Drag Coefficient (Absolute), C_D


EFERENCE NO. 591
Percent of Chord
N.A.C.A.
Name of section: Glenn Martin 11
Size of model: 47.24" x 7.874"
Wind velocity: 98 ft./sec.
Where tested: Göttingen
Date. 1922
Angle of Attack in Degrees.
Ratio of Lift to Drag
Center of Pressure in % of Chord from leading Edge
Lift Coefficient (Absolute), C_L
Drag Coefficient (Absolute), C_D

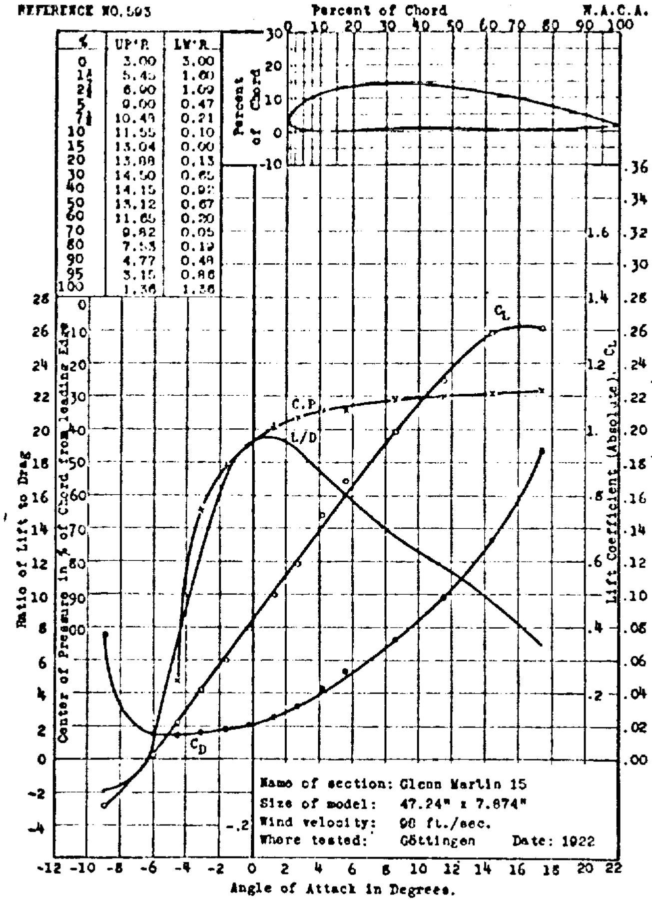
REFERENCE NO. 592

%	UP'R.	LW'R.
0	6.25	6.25
1¼	7.55	3.83
2½	8.93	3.20
5	10.95	2.54
7½	12.36	1.70
10	14.05	1.17
15	15.20	0.43
20	16.05	0.01
30	16.38	0.00
40	15.95	0.00
50	14.85	0.00
60	13.30	0.00
70	11.05	0.01
80	8.03	0.02
90	4.38	0.03
95	2.45	0.04
100	0.05	0.05



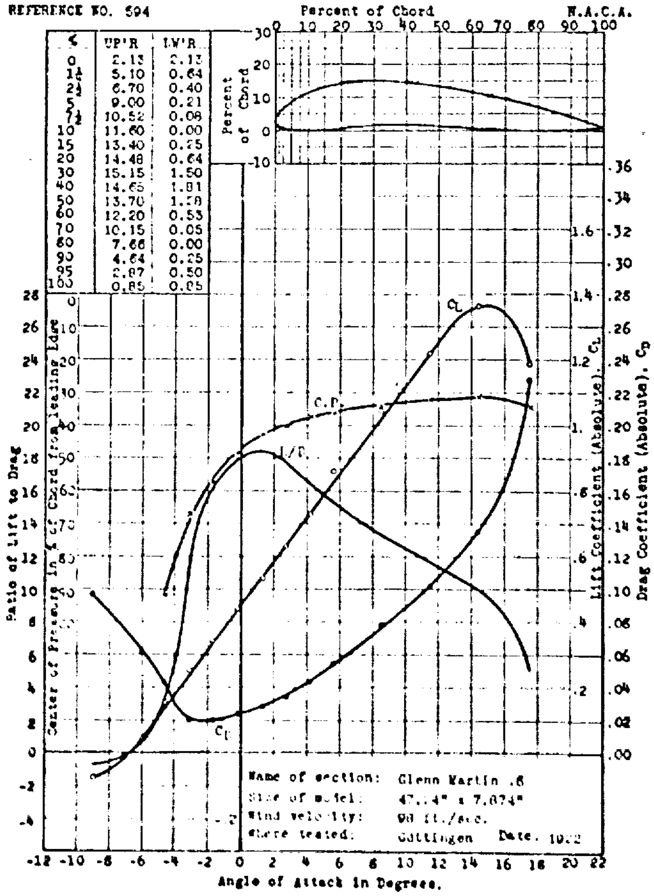
REFERENCE NO. 593

%	UP'R.	LW'R.
0	3.00	3.00
1¼	5.45	1.60
2½	6.90	1.09
5	9.00	0.47
7½	10.43	0.21
10	11.55	0.10
15	13.04	0.00
20	13.88	0.13
30	14.50	0.65
40	14.15	0.92
50	13.12	0.67
60	11.65	0.30
70	9.82	0.05
80	7.33	0.19
90	4.77	0.48
95	3.15	0.86
100	1.36	1.36



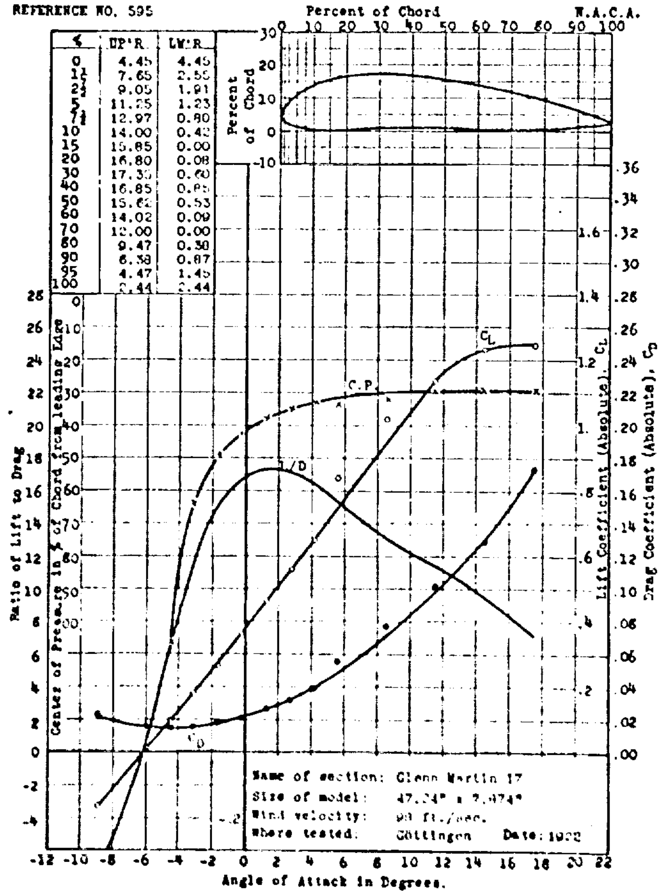
REFERENCE NO. 594

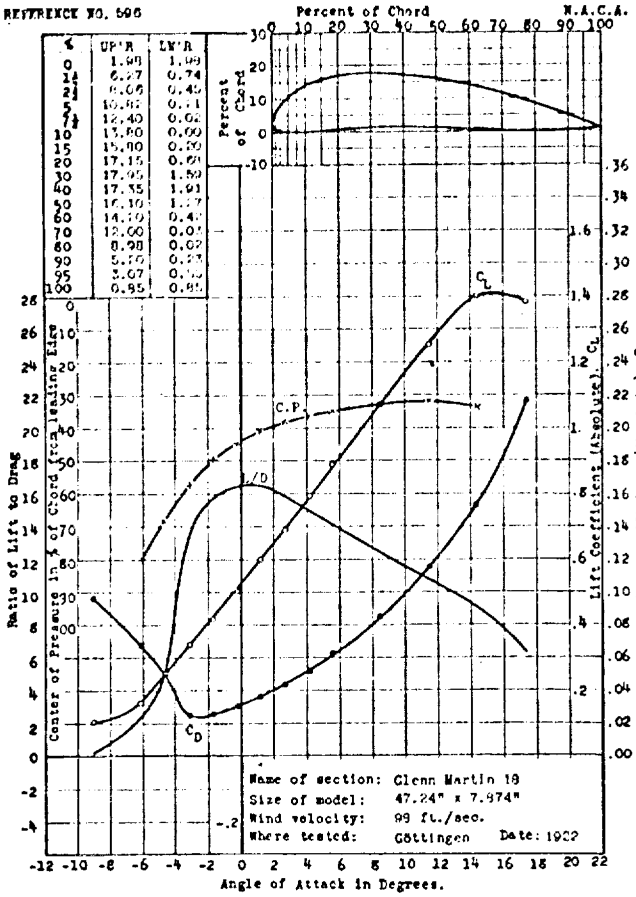
%	UP'R.	LW'R.
0	2.13	2.13
1¼	5.10	0.64
2½	6.70	0.40
5	9.00	0.21
7½	10.52	0.08
10	11.60	0.00
15	13.40	0.25
20	14.48	0.64
30	15.15	1.50
40	14.65	1.81
50	13.70	1.38
60	12.20	0.53
70	10.15	0.05
80	7.66	0.00
90	4.64	0.25
95	2.87	0.50
100	0.85	0.85



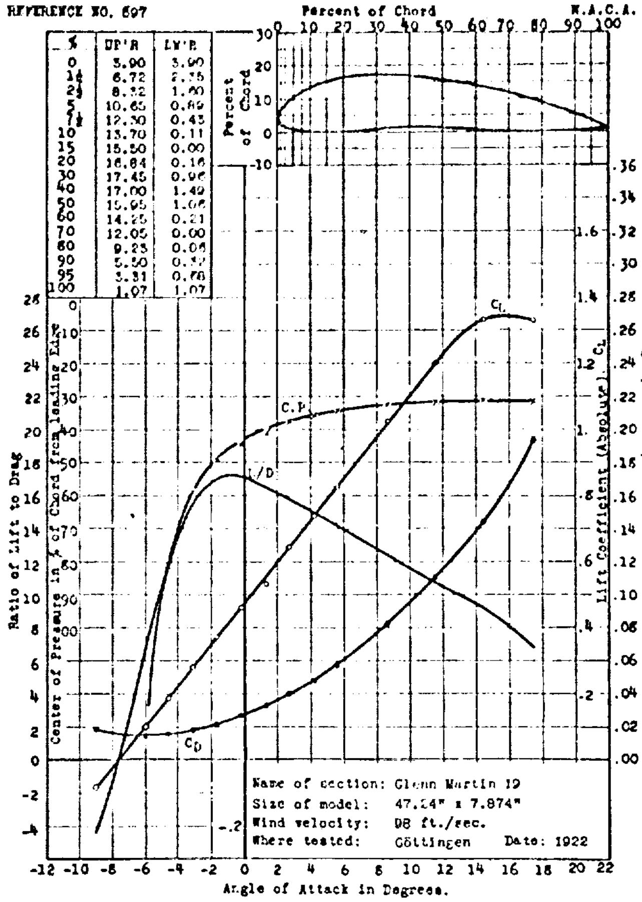
REFERENCE NO. 595

%	UP'R.	LW'R.
0	4.45	4.45
1¼	7.65	2.55
2½	9.05	1.91
5	11.25	1.23
7½	12.97	0.80
10	14.00	0.42
15	15.85	0.00
20	16.80	0.08
30	17.35	0.60
40	16.85	0.85
50	15.62	0.53
60	14.02	0.09
70	12.00	0.00
80	9.47	0.30
90	6.38	0.87
95	4.47	1.45
100	2.44	2.44

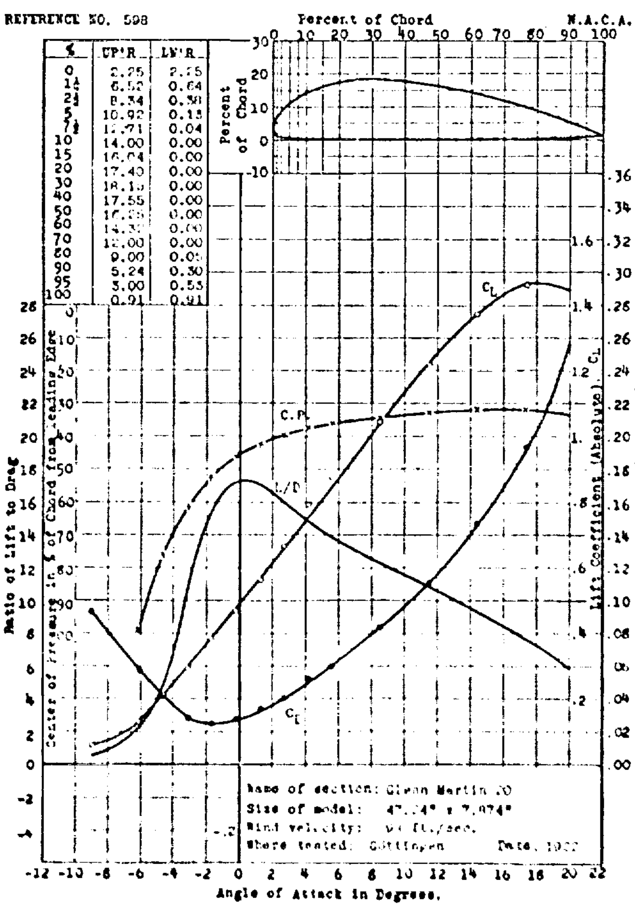




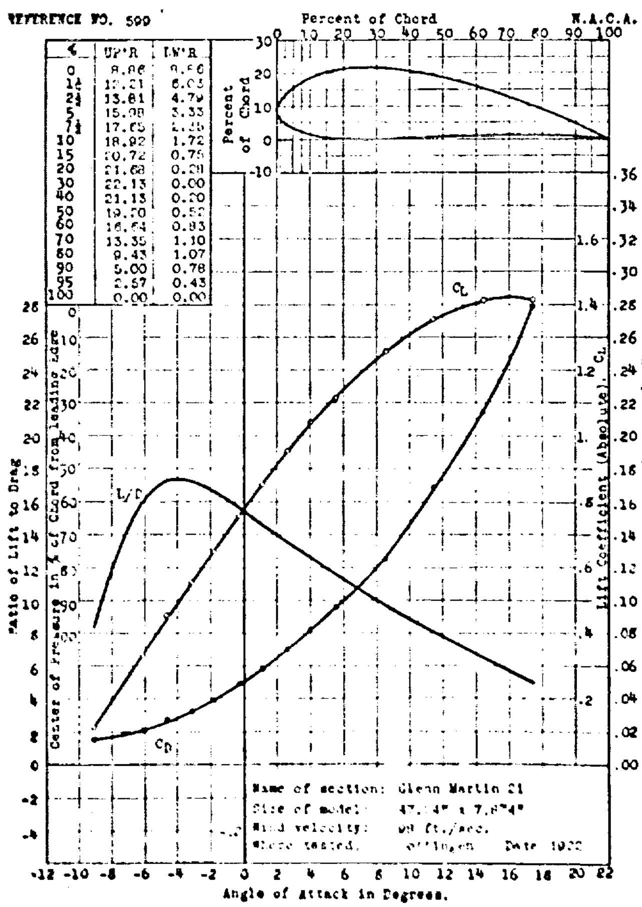
%	UP'R	LW'R
0	1.99	1.99
1¼	6.27	0.74
2½	8.06	0.45
5	10.87	0.11
7½	12.40	0.02
10	13.80	0.00
15	15.90	0.20
20	17.15	0.69
30	17.95	1.59
40	17.35	1.91
50	16.10	1.27
60	14.10	0.47
70	12.00	0.05
80	8.98	0.02
90	5.70	0.23
95	3.07	[illegible]
100	0.95	0.85



%	UP'R	LW'R
0	3.90	3.90
1¼	6.72	2.35
2½	8.32	1.80
5	10.65	0.69
7½	12.30	0.43
10	13.70	0.11
15	15.50	0.00
20	16.84	0.16
30	17.45	0.96
40	17.00	1.49
50	15.95	1.06
60	14.25	0.21
70	12.05	0.00
80	9.25	0.06
90	5.50	0.37
95	3.31	0.78
100	1.07	1.07



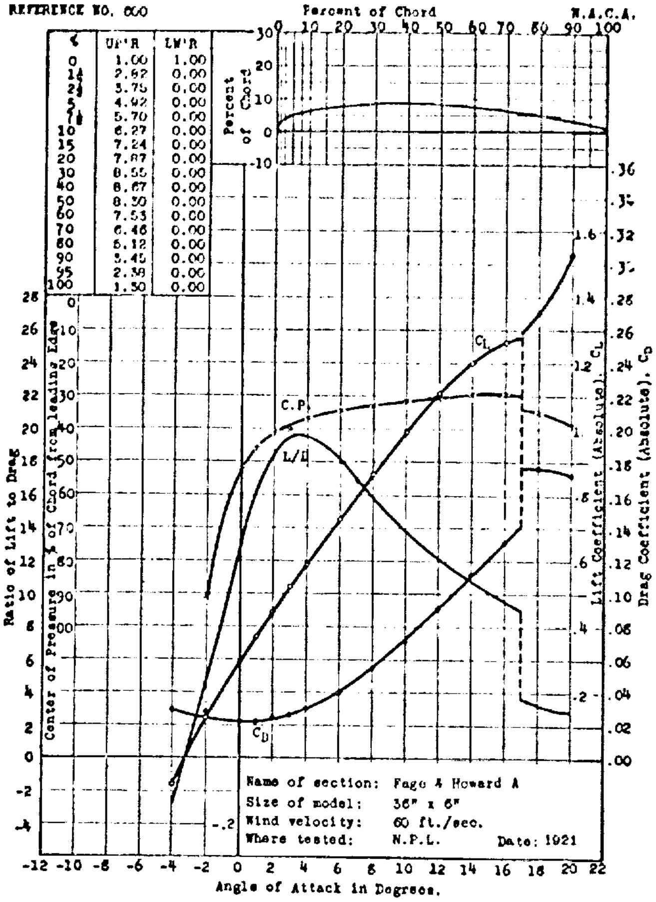
%	UP'R	LW'R
0	2.75	2.75
1¼	6.52	0.64
2½	8.34	0.38
5	10.92	0.13
7½	12.71	0.04
10	14.00	0.00
15	16.04	0.00
20	17.40	0.00
30	18.15	0.00
40	17.55	0.00
50	16.25	0.00
60	14.37	0.00
70	12.00	0.00
80	9.00	0.05
90	5.24	0.30
95	3.00	0.53
100	0.91	0.91



%	UP'R	LW'R
0	8.86	[illegible]
1¼	12.21	6.05
2½	13.81	4.79
5	15.08	3.33
7½	17.65	2.35
10	18.92	1.72
15	20.72	0.75
20	21.68	0.28
30	22.13	0.00
40	21.13	0.20
50	19.70	0.52
60	16.64	0.83
70	13.35	1.10
80	9.43	1.07
90	5.00	0.78
95	2.57	0.43
100	0.00	0.00

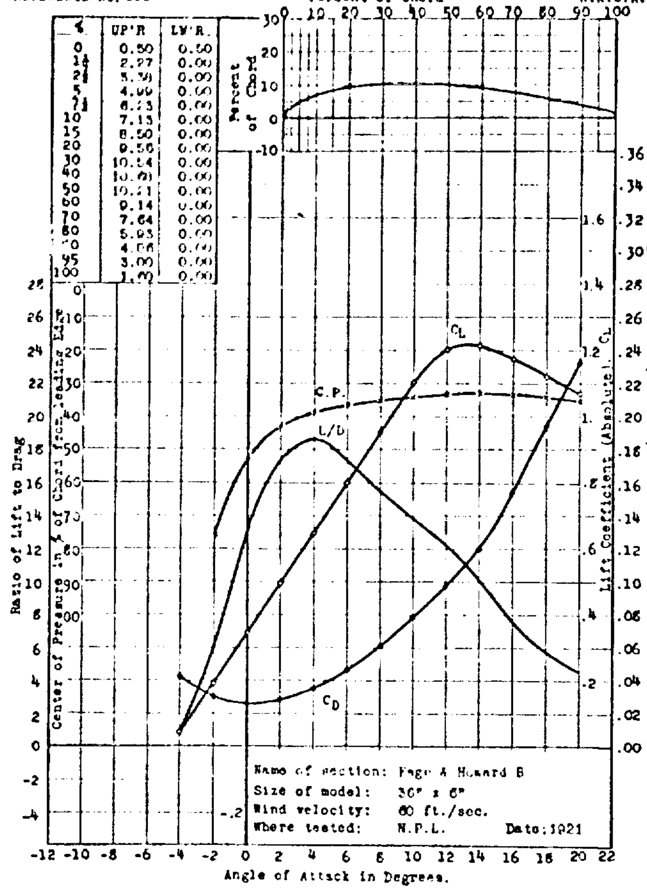
REFERENCE NO. 600

%	UP'R	LW'R
0	1.00	1.00
1¼	2.62	0.00
2½	3.75	0.00
5	4.92	0.00
7½	5.70	0.00
10	6.27	0.00
15	7.24	0.00
20	7.87	0.00
30	8.55	0.00
40	8.67	0.00
50	8.30	0.00
60	7.53	0.00
70	6.46	0.00
80	5.12	0.00
90	3.45	0.00
95	2.38	0.00
100	1.50	0.00



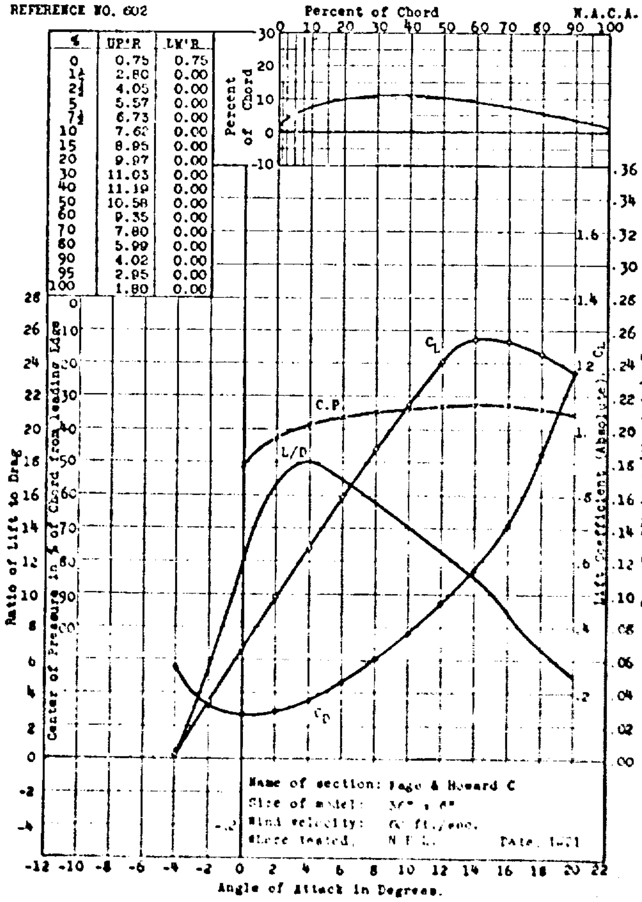
REFERENCE NO. 601

%	UP'R	LW'R
0	0.50	0.50
1¼	2.27	0.00
2½	3.38	0.00
5	4.90	0.00
7½	6.23	0.00
10	7.13	0.00
15	8.50	0.00
20	9.56	0.00
30	10.14	0.00
40	10.60	0.00
50	10.21	0.00
60	9.14	0.00
70	7.64	0.00
80	5.93	0.00
90	4.06	0.00
95	3.00	0.00
100	1.00	0.00



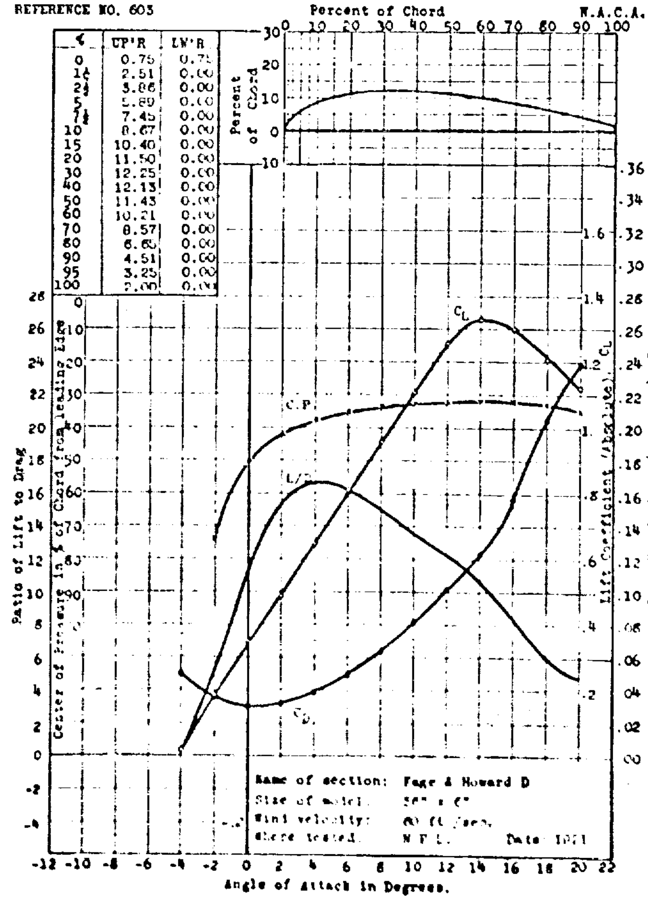
REFERENCE NO. 602

%	UP'R	LW'R
0	0.75	0.75
1¼	2.80	0.00
2½	4.05	0.00
5	5.57	0.00
7½	6.73	0.00
10	7.62	0.00
15	8.95	0.00
20	9.97	0.00
30	11.03	0.00
40	11.19	0.00
50	10.58	0.00
60	9.35	0.00
70	7.80	0.00
80	5.99	0.00
90	4.02	0.00
95	2.95	0.00
100	1.80	0.00

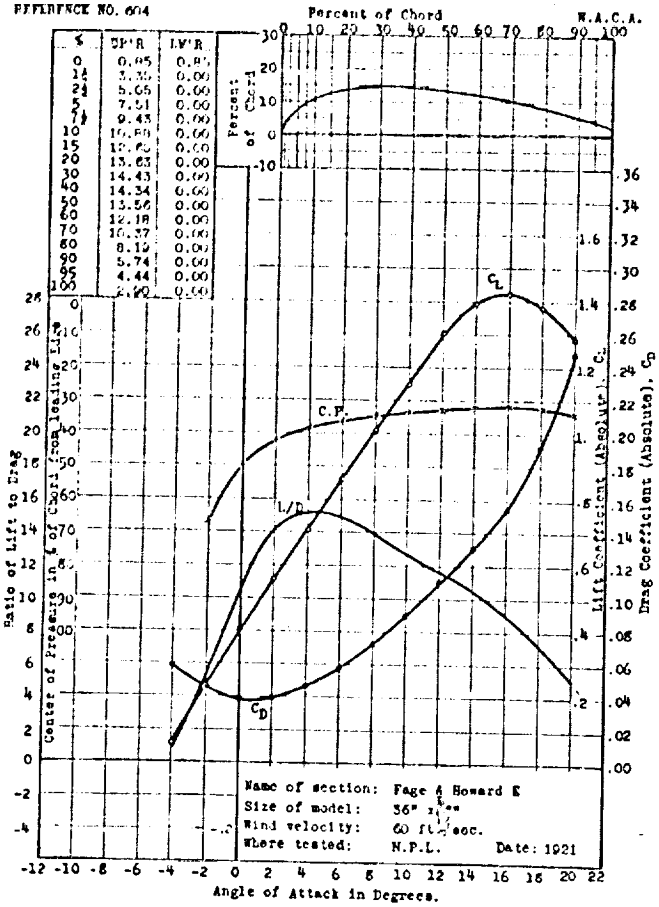


REFERENCE NO. 603

%	UP'R	LW'R
0	0.75	0.75
1¼	2.51	0.00
2½	3.86	0.00
5	5.89	0.00
7½	7.45	0.00
10	8.67	0.00
15	10.40	0.00
20	11.50	0.00
30	12.25	0.00
40	12.13	0.00
50	11.43	0.00
60	10.21	0.00
70	8.57	0.00
80	6.65	0.00
90	4.51	0.00
95	3.25	0.00
100	2.00	0.00



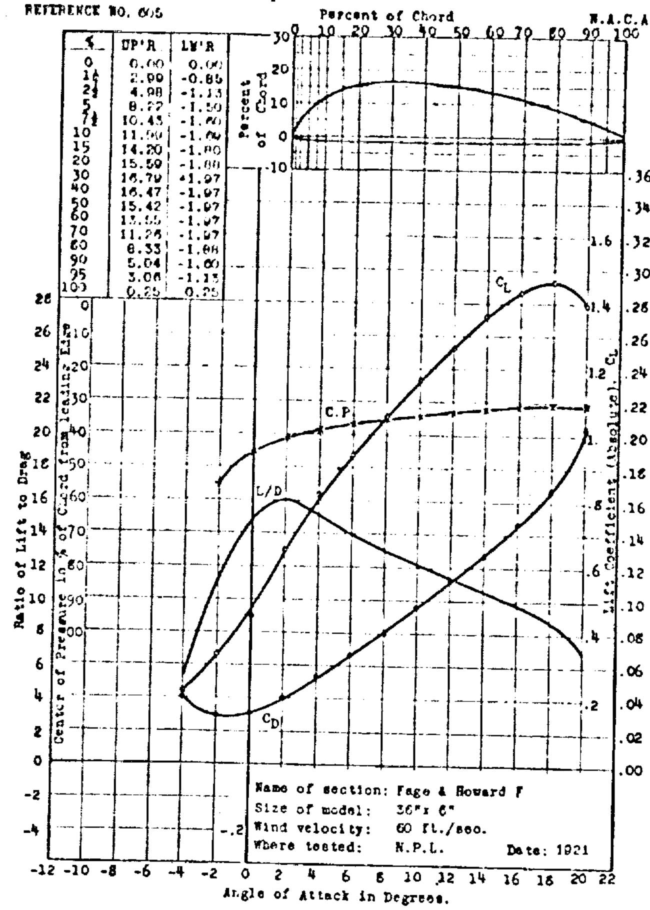
REFERENCE NO. 604



%	UP'R	LW'R
0	0.85	0.85
1½	3.35	0.00
2½	5.05	0.00
5	7.51	0.00
7½	9.43	0.00
10	10.80	0.00
15	12.65	0.00
20	13.63	0.00
30	14.43	0.00
40	14.34	0.00
50	13.56	0.00
60	12.18	0.00
70	10.37	0.00
80	8.19	0.00
90	5.74	0.00
95	4.44	0.00
100	2.20	0.00

Name of section: Fage & Howard E
Size of model: 36" x 6"
Wind velocity: 60 ft./sec.
Where tested: N.P.L. Date: 1921

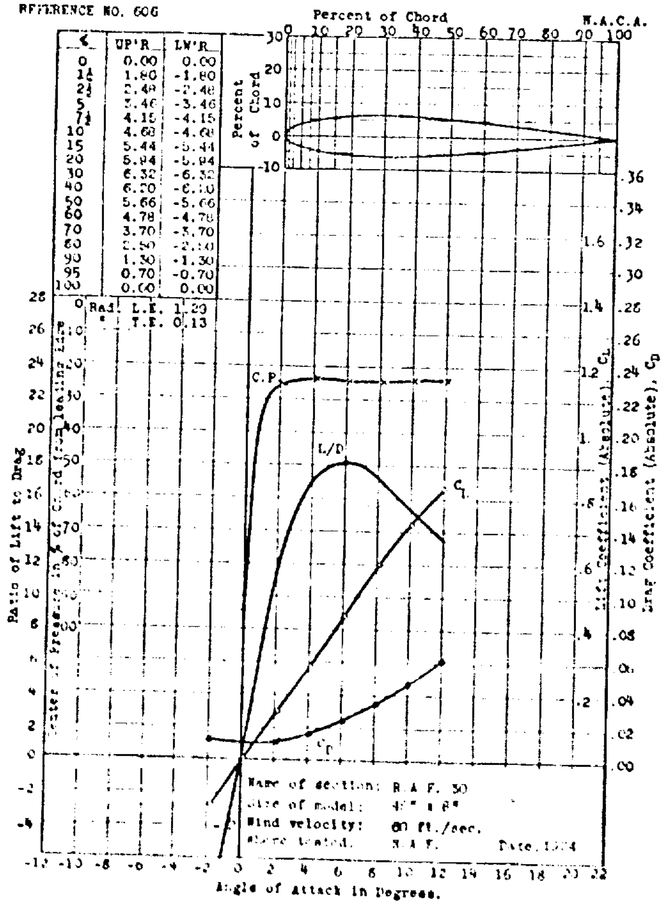
REFERENCE NO. 605



%	UP'R	LW'R
0	0.00	0.00
1½	2.99	-0.85
2½	4.98	-1.13
5	8.22	-1.50
7½	10.45	-1.60
10	11.90	-1.70
15	14.20	-1.80
20	15.59	-1.88
30	16.79	-1.97
40	16.47	-1.97
50	15.42	-1.97
60	13.55	-1.97
70	11.26	-1.97
80	8.33	-1.88
90	5.04	-1.60
95	3.06	-1.13
100	0.25	0.25

Name of section: Fage & Howard F
Size of model: 36" x 6"
Wind velocity: 60 ft./sec.
Where tested: N.P.L. Date: 1921

REFERENCE NO. 606

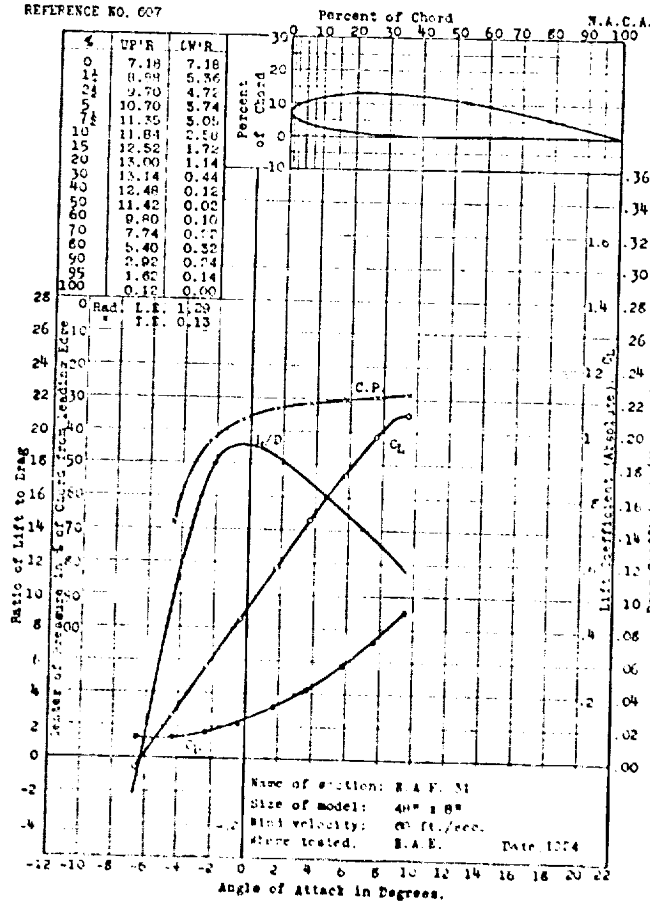


%	UP'R	LW'R
0	0.00	0.00
1½	1.80	-1.80
2½	2.48	-2.48
5	3.46	-3.46
7½	4.15	-4.15
10	4.68	-4.68
15	5.44	-5.44
20	5.94	-5.94
30	6.32	-6.32
40	6.20	-6.20
50	5.66	-5.66
60	4.78	-4.78
70	3.70	-3.70
80	2.50	-2.50
90	1.30	-1.30
95	0.70	-0.70
100	0.00	0.00

Rad. L.E. 1.29
T.E. 0.13

Name of section: R.A.F. 30
Size of model: 40" x 8"
Wind velocity: 60 ft./sec.
Where tested. R.A.E. Date 1924

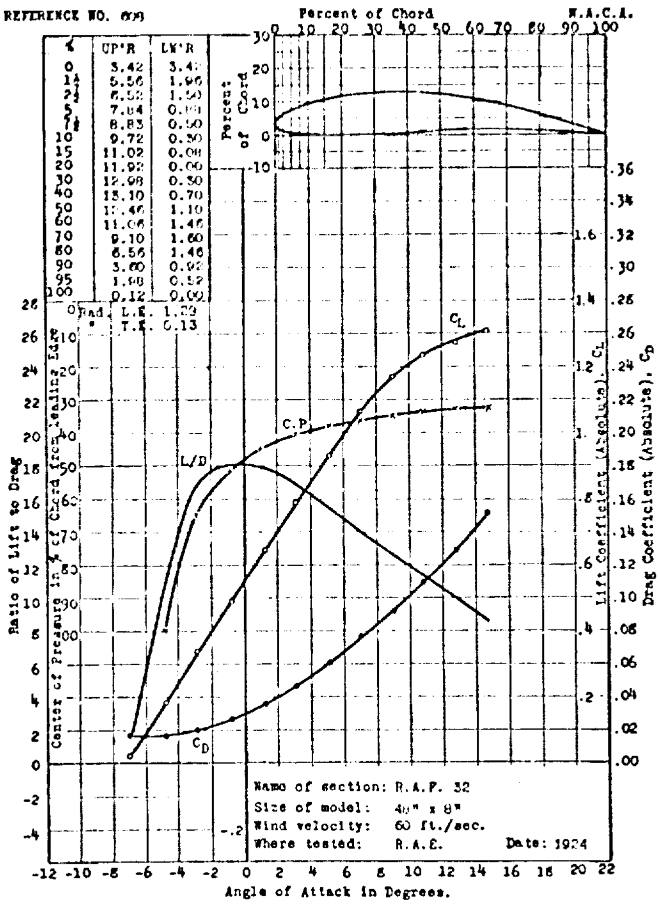
REFERENCE NO. 607

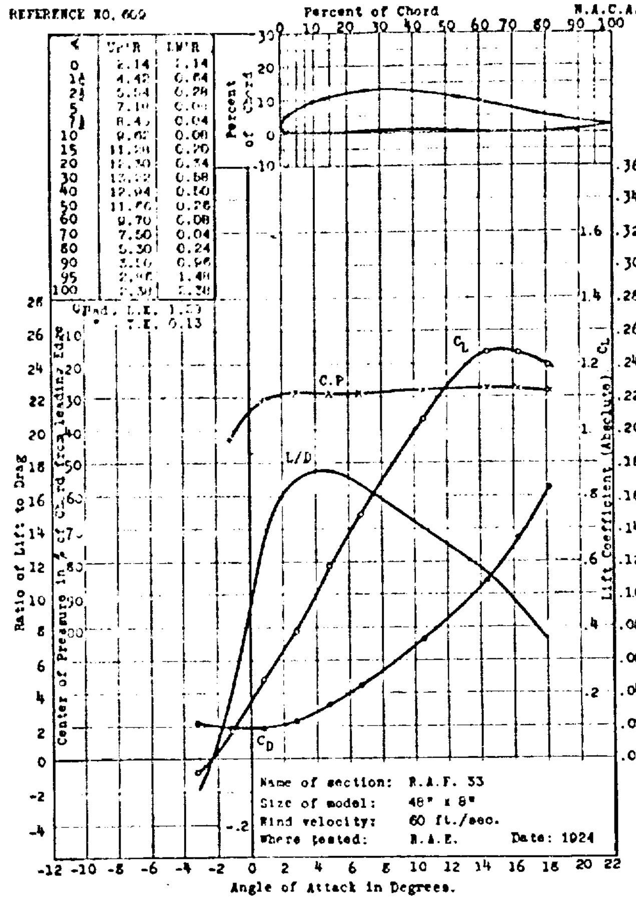


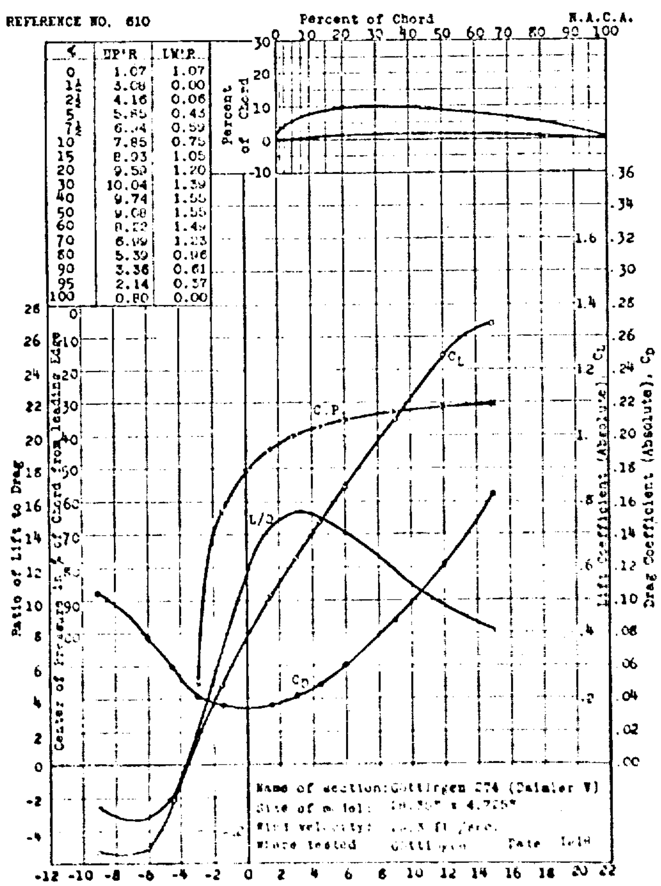
%	UP'R	LW'R
0	7.18	7.18
1½	8.99	5.36
2½	9.70	4.72
5	10.70	3.74
7½	11.35	3.05
10	11.84	2.50
15	12.52	1.72
20	13.00	1.14
30	13.14	0.44
40	12.48	0.12
50	11.42	0.02
60	9.80	0.10
70	7.74	0.22
80	5.40	0.32
90	2.92	0.24
95	1.62	0.14
100	0.12	0.00

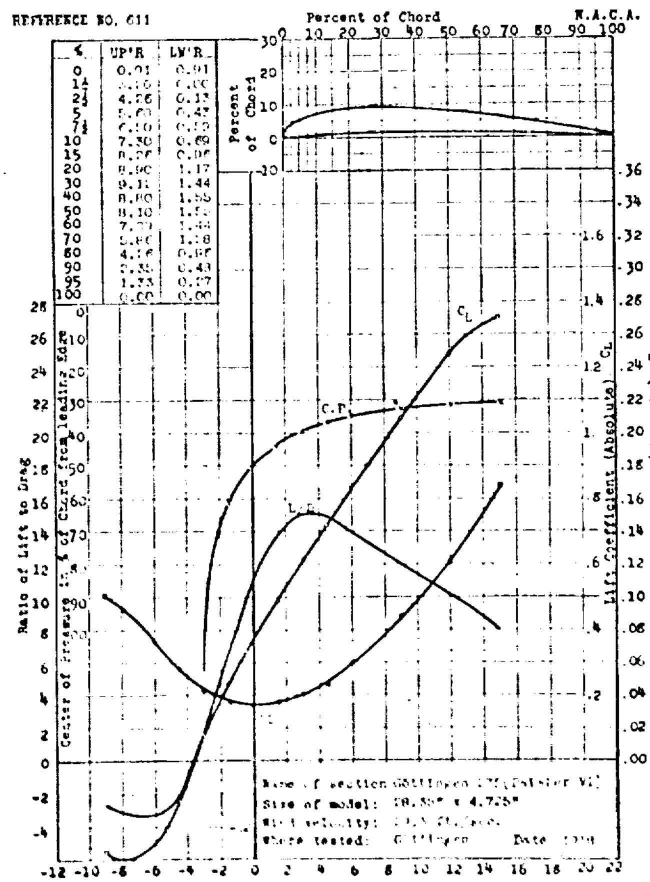
Rad. L.E. 1.29
T.E. 0.13

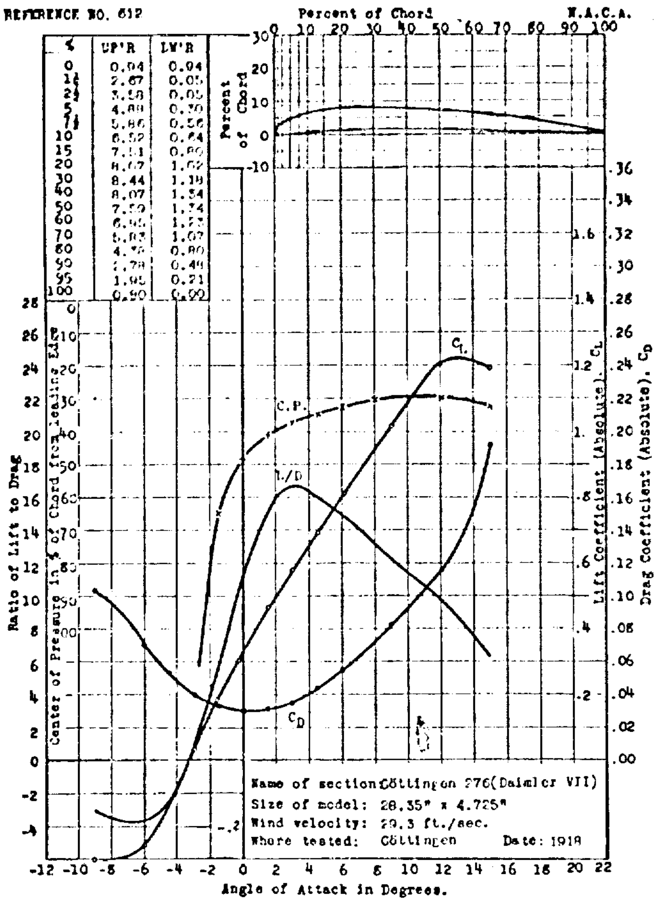
Name of section: R.A.F. 31
Size of model: 40" x 8"
Wind velocity: 60 ft./sec.
Where tested. R.A.E. Date 1924


REFERENCE NO. 609
N.A.C.A.
Percent of Chord
UP'R
LW'R
Rad. L.E. 1.29
T.E. 0.13
C_L
C.P.
L/D
C_D
Name of section: R.A.F. 32
Size of model: 40" x 8"
Wind velocity: 60 ft./sec.
Where tested: R.A.E.
Date: 1924
Angle of Attack in Degrees.
Ratio of Lift to Drag
Center of Pressure in % of Chord from leading Edge
Lift Coefficient (Absolute), C_L
Drag Coefficient (Absolute), C_D

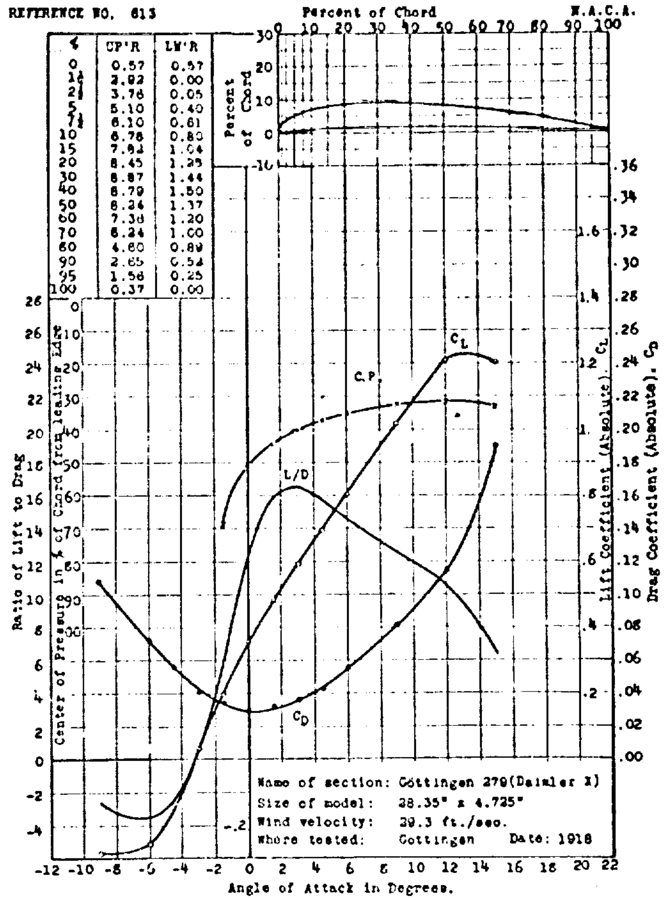

REFERENCE NO. 669
N.A.C.A.
Percent of Chord
LW'R
T.E. 0.13
C_L
C.P.
L/D
C_D
Name of section: R.A.F. 33
Size of model: 48" x 8"
Wind velocity: 60 ft./sec.
Where tested: R.A.E.
Date: 1924
Angle of Attack in Degrees.
Ratio of Lift to Drag
Lift Coefficient (Absolute)
Drag Coefficient (Absolute), C_D


REFERENCE NO. 610
N.A.C.A.
Percent of Chord
UP'R
LW'R
C_L
C.P.
L/D
C_D
Name of section: Göttingen 274 (Daimler V)
Angle of Attack in Degrees.
Ratio of Lift to Drag
Lift Coefficient (Absolute)
Drag Coefficient (Absolute), C_D

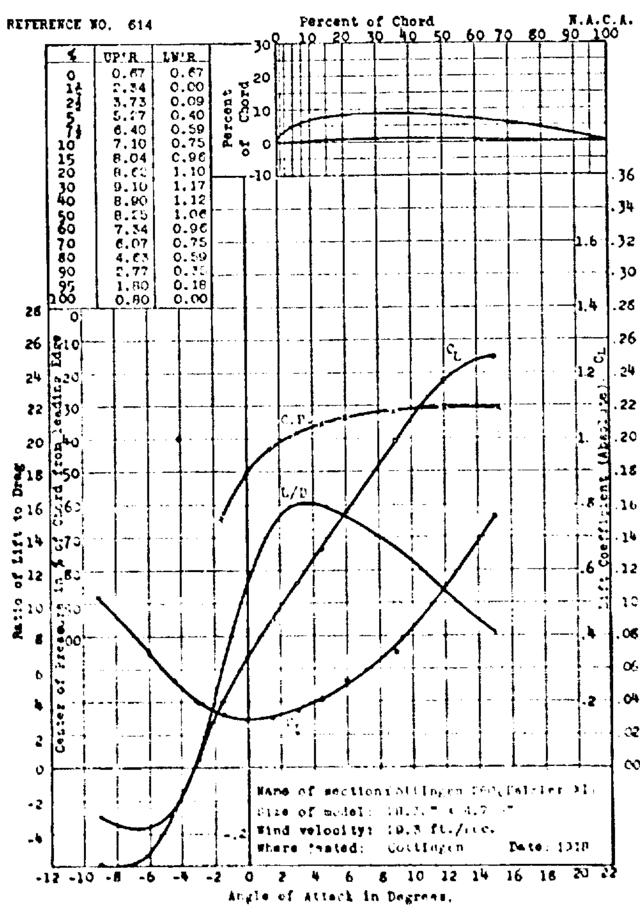

REFERENCE NO. 611
N.A.C.A.
Percent of Chord
UP'R
LW'R
C_L
C.P.
L/D
Size of model:
Where tested:
Date
Angle of Attack in Degrees.
Ratio of Lift to Drag
Lift Coefficient (Absolute)
Drag Coefficient (Absolute), C_D



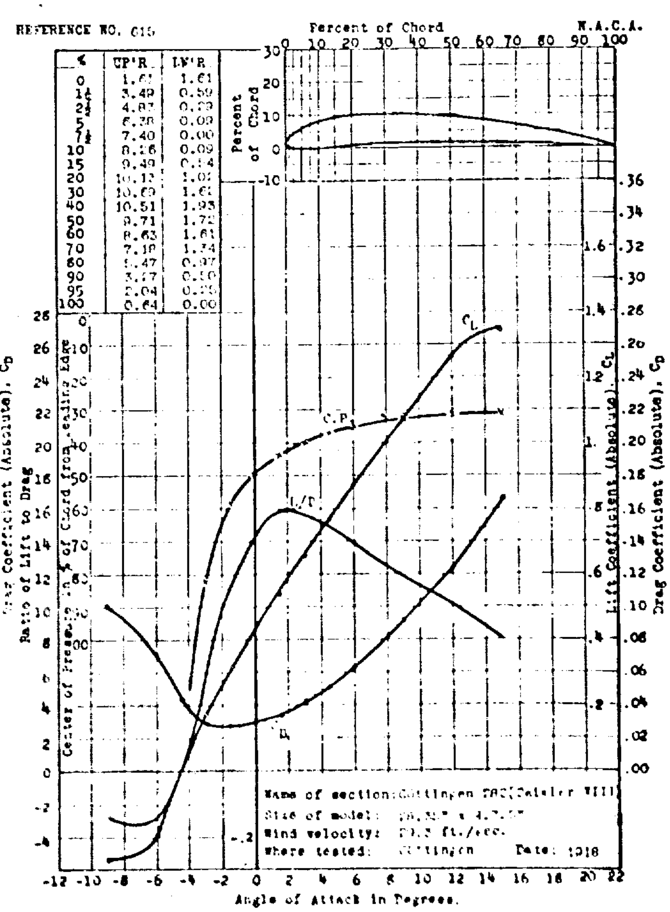
%	UP'R	LW'R
0	0.94	0.94
1¼	2.67	0.05
2½	3.58	0.05
5	4.88	0.30
7½	5.86	0.56
10	6.52	0.64
15	[illegible]	[illegible]
20	[illegible]	1.02
30	8.44	1.18
40	8.07	1.34
50	7.50	[illegible]
60	[illegible]	[illegible]
70	[illegible]	1.07
80	[illegible]	0.80
90	[illegible]	0.49
95	[illegible]	0.21
100	0.90	0.00



%	UP'R	LW'R
0	0.57	0.57
1¼	2.82	0.00
2½	3.76	0.05
5	5.10	0.40
7½	6.10	0.61
10	6.78	0.80
15	7.94	1.04
20	8.45	1.25
30	8.87	1.44
40	8.79	1.50
50	8.26	1.37
60	7.38	1.20
70	6.24	1.00
80	4.80	0.89
90	2.65	0.54
95	1.56	0.25
100	0.37	0.00



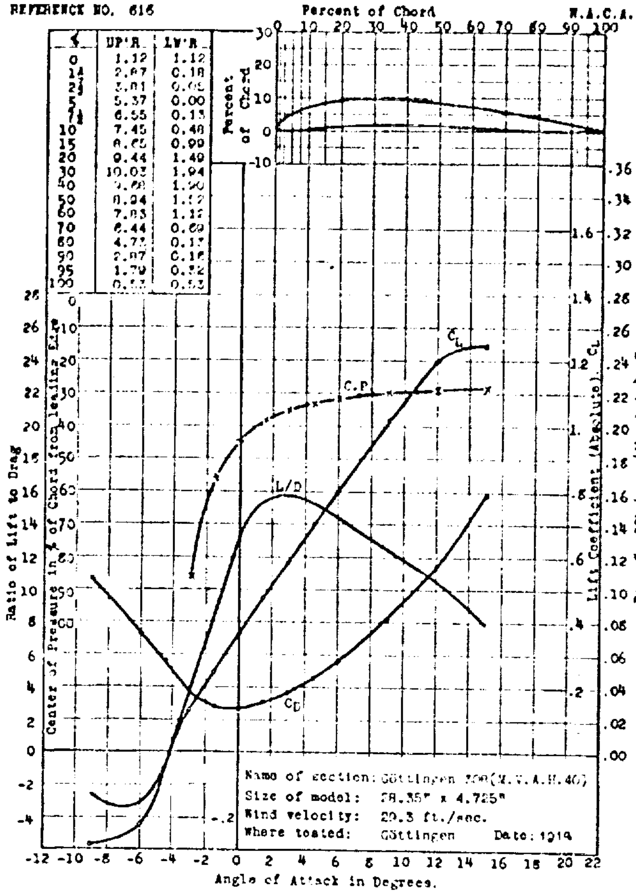
%	UP'R	LW'R
0	0.67	0.67
1¼	2.34	0.00
2½	3.73	0.09
5	5.27	0.40
7½	6.40	0.59
10	7.10	0.75
15	8.04	0.96
20	[illegible]	1.10
30	9.10	1.17
40	8.90	1.12
50	[illegible]	1.06
60	7.34	0.96
70	6.07	0.75
80	4.63	0.59
90	2.77	[illegible]
95	1.80	0.18
100	0.80	0.00



%	UP'R	LW'R
0	[illegible]	1.61
1¼	3.49	0.59
2½	4.87	[illegible]
5	[illegible]	[illegible]
7½	7.40	0.00
10	[illegible]	0.09
15	9.49	[illegible]
20	[illegible]	[illegible]
30	[illegible]	[illegible]
40	10.51	1.93
50	9.71	[illegible]
60	8.63	[illegible]
70	[illegible]	[illegible]
80	[illegible]	[illegible]
90	[illegible]	[illegible]
95	2.04	[illegible]
100	0.64	0.00

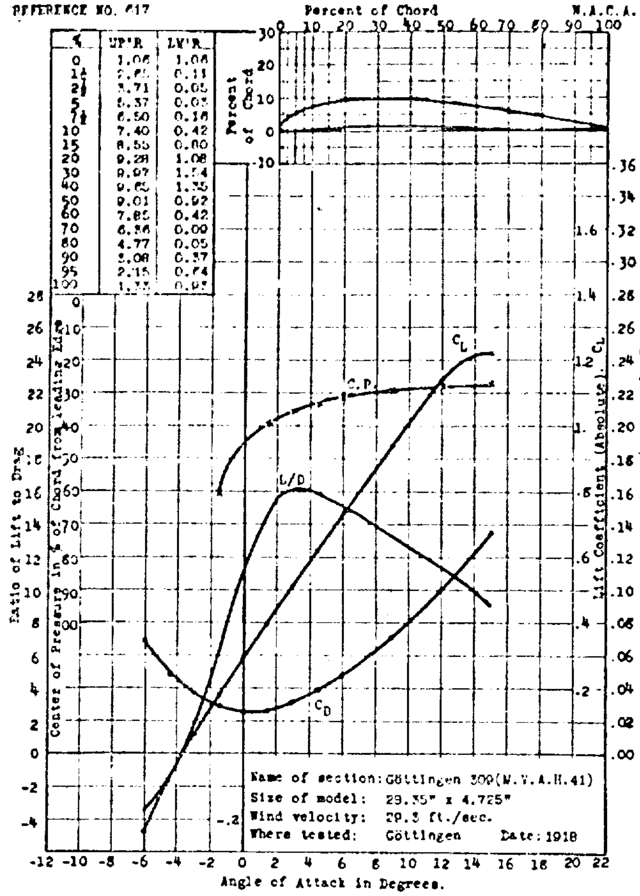
REFERENCE NO. 616

%	UP'R.	LW'R.
0	1.12	1.12
1¼	2.67	0.18
2½	3.81	0.02
5	5.37	0.00
7½	6.55	0.13
10	7.45	0.48
15	8.65	0.99
20	9.44	1.49
30	10.03	1.94
40	9.68	1.90
50	8.94	1.12
60	7.83	1.12
70	6.44	0.69
80	4.72	0.17
90	2.87	0.16
95	1.79	0.32
100	[illegible]	0.53



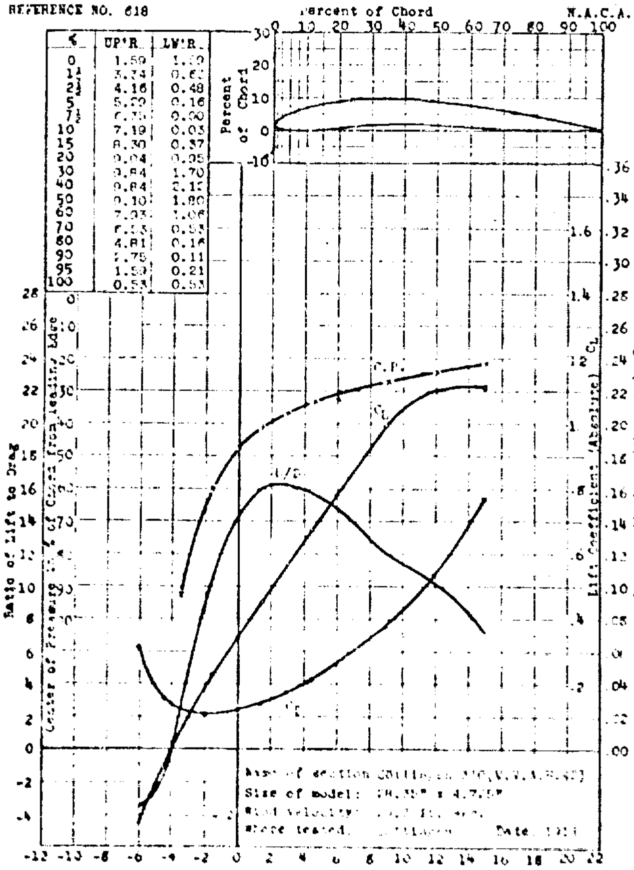
REFERENCE NO. 617

%	UP'R.	LW'R.
0	1.06	1.06
1¼	[illegible]	0.11
2½	3.71	0.05
5	5.37	0.03
7½	6.50	0.18
10	7.40	0.42
15	8.55	0.80
20	9.28	1.08
30	9.97	1.54
40	9.65	1.35
50	9.01	0.92
60	7.85	0.42
70	6.36	0.00
80	4.77	0.05
90	3.08	0.37
95	2.15	0.64
100	[illegible]	[illegible]



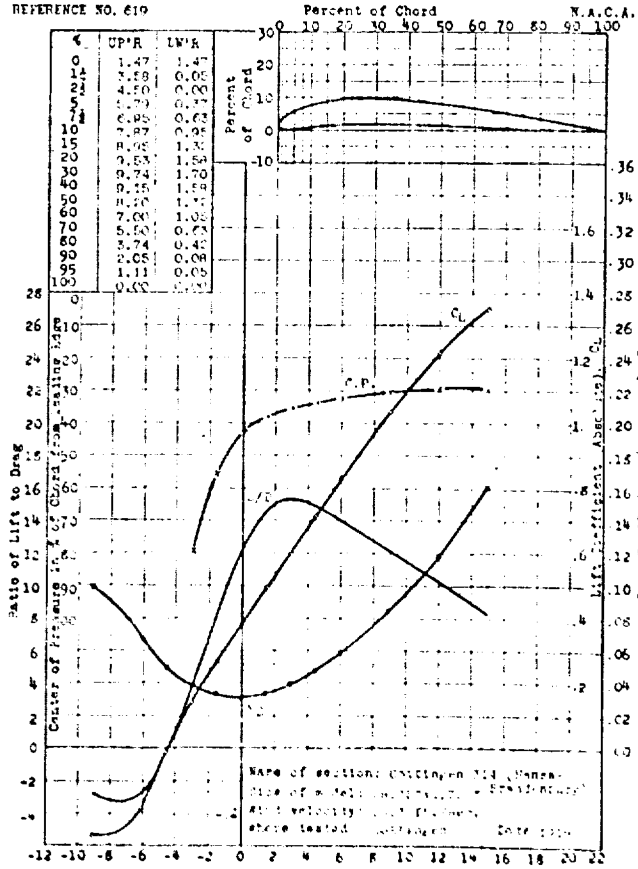
REFERENCE NO. 618

%	UP'R.	LW'R.
0	1.59	[illegible]
1¼	3.34	[illegible]
2½	4.16	0.48
5	[illegible]	0.16
7½	[illegible]	0.00
10	7.19	0.03
15	8.30	0.37
20	[illegible]	[illegible]
30	[illegible]	1.70
40	[illegible]	[illegible]
50	[illegible]	1.80
60	[illegible]	[illegible]
70	[illegible]	[illegible]
80	4.81	[illegible]
90	[illegible]	0.11
95	1.59	0.21
100	0.53	0.53



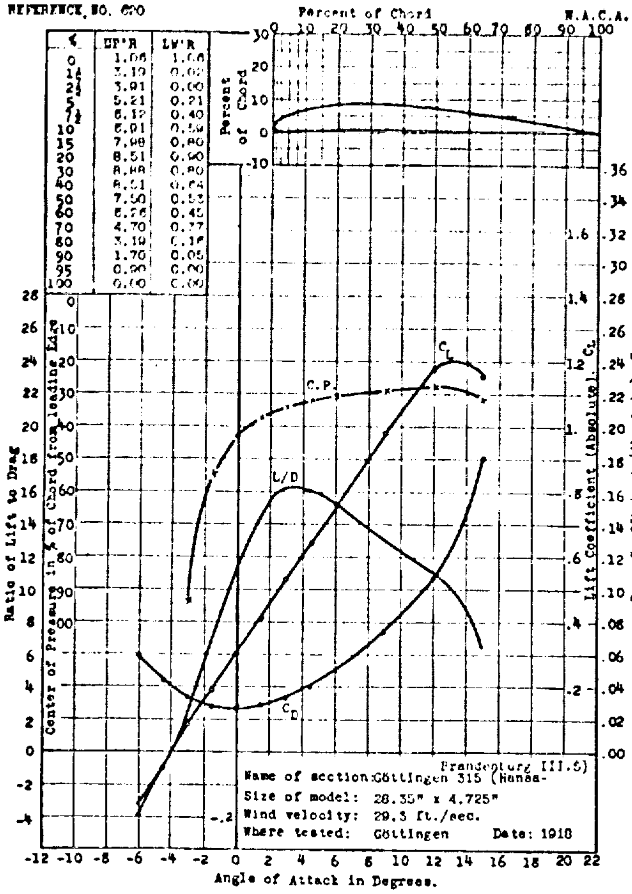
REFERENCE NO. 619

%	UP'R.	LW'R.
0	1.47	1.47
1¼	3.58	0.05
2½	4.50	0.00
5	[illegible]	[illegible]
7½	6.85	0.63
10	7.87	0.95
15	8.95	[illegible]
20	9.53	1.58
30	9.74	1.70
40	9.15	1.59
50	[illegible]	[illegible]
60	7.00	1.05
70	5.50	0.63
80	3.74	0.42
90	2.05	0.08
95	1.11	0.05
100	[illegible]	[illegible]



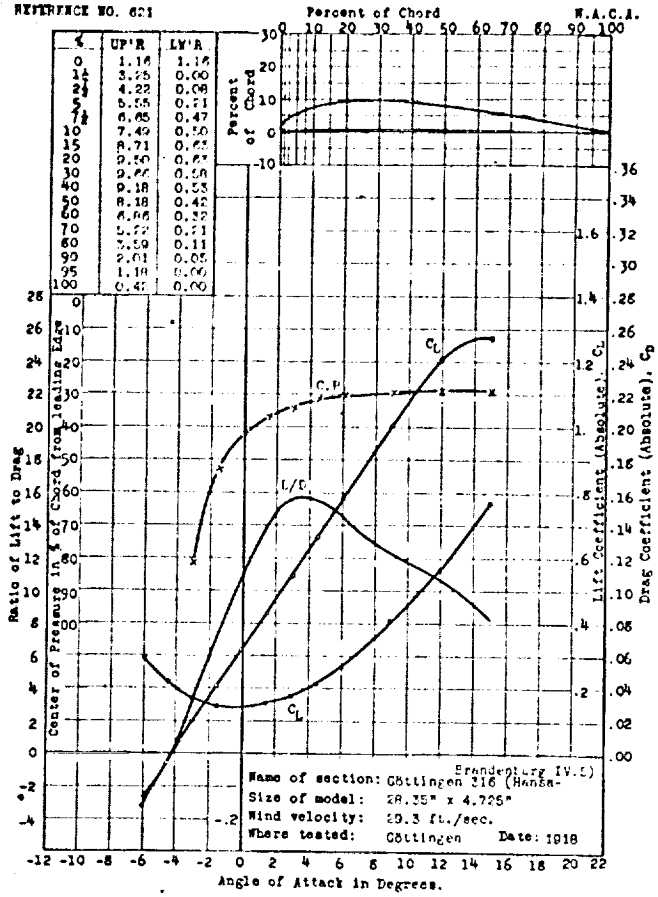
REFERENCE NO. 620

ξ	UP'R	LW'R
0	1.06	1.06
1¼	3.19	0.02
2½	3.91	0.00
5	5.21	0.21
7½	6.12	0.40
10	6.91	0.59
15	7.98	0.80
20	8.51	0.90
30	8.88	0.80
40	8.51	0.64
50	7.50	0.53
60	6.26	0.45
70	4.70	0.27
80	3.19	0.16
90	1.70	0.05
95	0.90	0.00
100	0.00	0.00



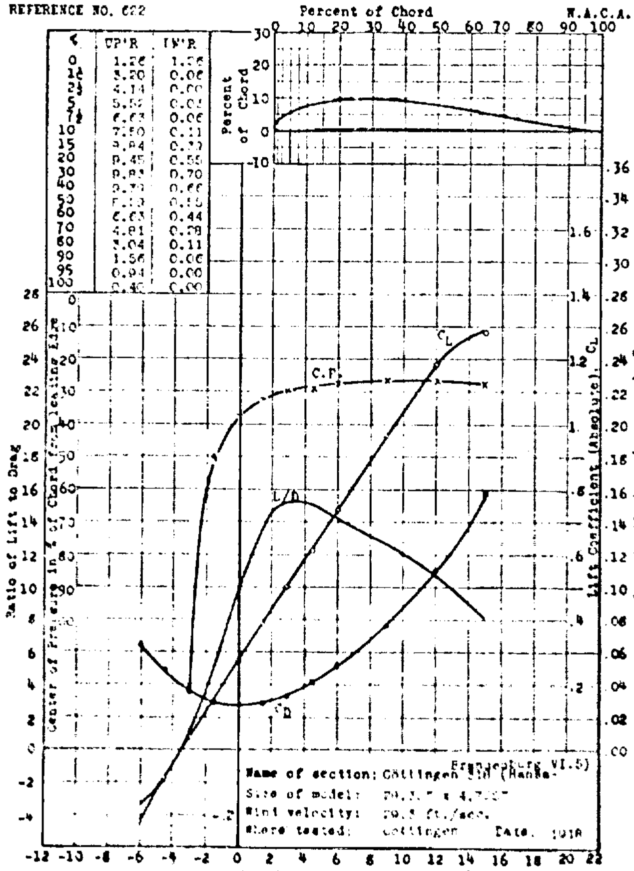
REFERENCE NO. 621

ξ	UP'R	LW'R
0	1.16	1.16
1¼	3.25	0.00
2½	4.22	0.08
5	5.55	0.21
7½	6.65	0.47
10	7.49	0.50
15	8.71	0.63
20	9.50	0.67
30	9.66	0.58
40	9.18	0.53
50	8.18	0.42
60	6.66	0.32
70	5.22	0.21
80	3.59	0.11
90	2.01	0.05
95	1.18	0.00
100	0.45	0.00



REFERENCE NO. 622

ξ	UP'R	LW'R
0	1.26	1.26
1¼	3.20	0.06
2½	4.14	0.00
5	5.52	0.01
7½	6.63	0.06
10	7.50	0.11
15	8.84	0.33
20	9.45	0.55
30	9.83	0.70
40	[illegible]	0.66
50	[illegible]	[illegible]
60	6.63	0.44
70	4.81	0.28
80	3.04	0.11
90	1.56	0.06
95	0.94	0.00
100	0.40	0.00



REFERENCE NO. 623

ξ	UP'R	LW'R
0	1.06	1.06
1¼	3.13	0.03
2½	3.99	0.00
5	5.31	0.16
7½	[illegible]	0.30
10	7.10	0.50
15	8.29	0.75
20	8.95	1.06
30	9.56	1.78
40	9.30	1.64
50	8.50	1.49
60	7.42	1.25
70	5.84	0.96
80	4.14	0.58
90	2.23	0.25
95	1.22	0.10
100	0.30	0.00

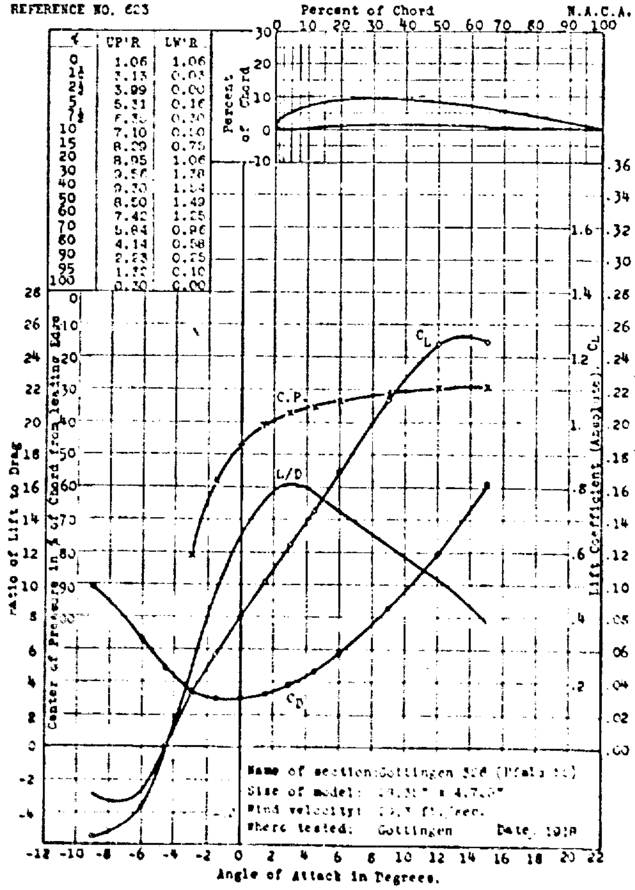
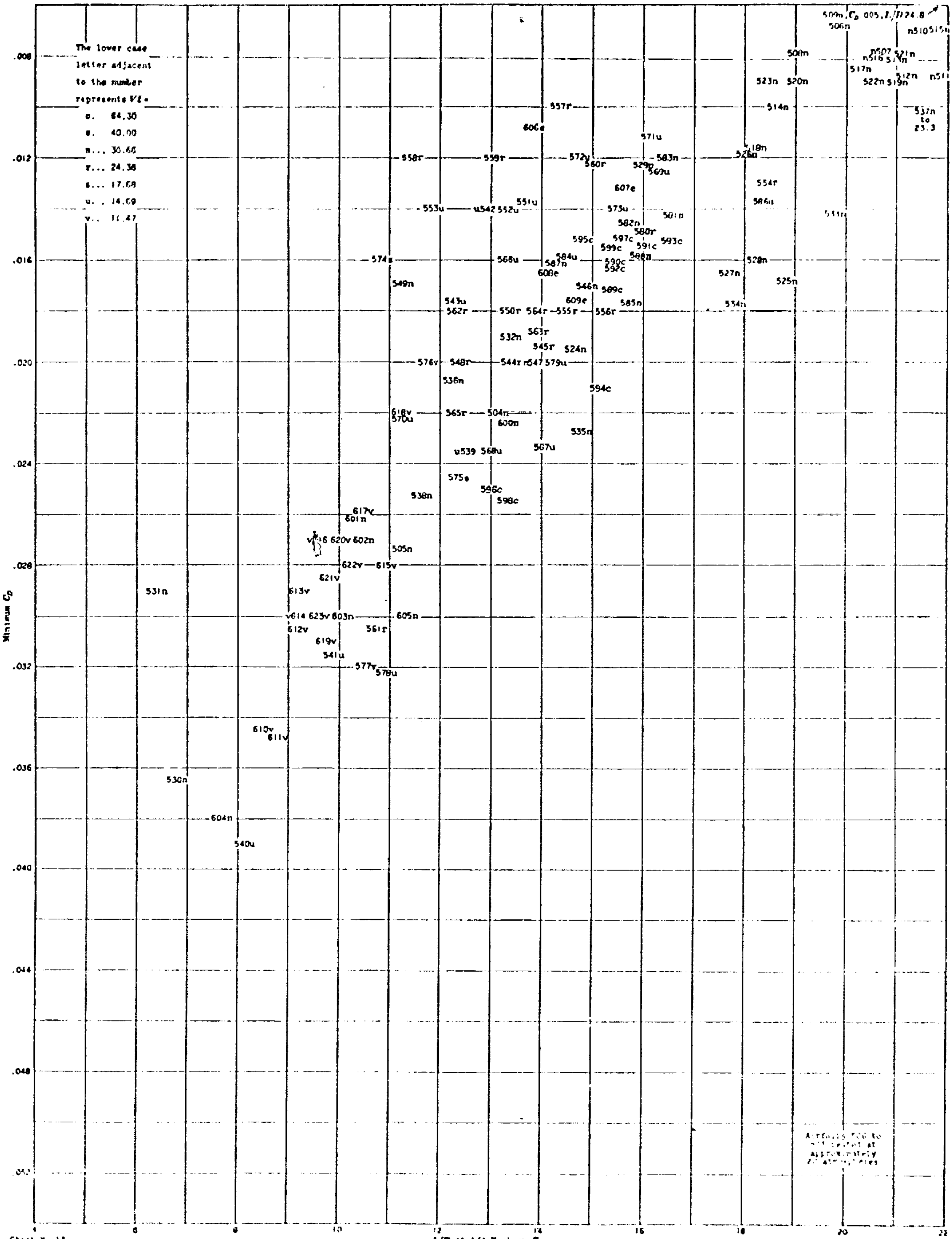


TABLE OF ORDINATES NOT GIVEN ON INDIVIDUAL CHARACTERISTIC SHEETS

[Ordinates for dotted section at tip where ratio of ordinate to chord differs from that of section at center of span]

Stations in per cent of chord	Ref. 545 Göttingen 387 (tapered)		Ref. 548 Dayton Wright T-1 (tapered)		Ref. 574 R-3		Ref. 576 Glenn Martin 2 (modified)		Ref. 578 U. S. A. 35		Ref. 580 U. S. A. 45	
	Upper	Lower	Upper	Lower	Upper	Lower	Upper	Lower	Upper	Lower	Upper	Lower
0	2. 55	2. 55	2. 04	2. 04	0. 64	0. 64	1. 39	1. 39	2. 76	2. 76	0. 98	0. 98
1.25	4. 43	1. 07	3. 25	1. 08	1. 39	. 00	3. 35	. 50	5. 14	1. 03	2. 40	. 15
2.50	5. 37	. 70	3. 79	. 79	1. 86	-. 21	4. 49	. 29	6. 09	. 61	3. 12	-. 13
5	6. 70	. 42	4. 60	. 42	2. 67	-. 51	6. 20	. 04	7. 53	. 27	4. 44	-. 42
7.50	7. 53	. 23	5. 25	. 21	3. 22	-. 79	7. 35	. 01	8. 64	. 14	5. 35	-. 65
10	8. 20	. 12	5. 74	. 10	3. 75	-1. 00	8. 41	. 00	9. 46	. 06	6. 12	-. 77
15	9. 15	. 03	6. 46	. 00	4. 40	-1. 35	9. 70	. 06	10. 56	. 00	7. 21	-. 98
20	9. 75	. 00	6. 87	. 05	4. 80	-1. 66	10. 40	. 18	11. 27	. 05	7. 69	-1. 08
30	10. 10	. 03	7. 08	. 21	5. 27	-2. 04	10. 69	1. 00	11. 72	. 16	7. 58	-1. 25
40	9. 73	. 17	6. 91	. 40	5. 27	-2. 04	10. 29	. 85	11. 36	. 28	6. 89	-1. 21
50	8. 83	. 32	6. 45	. 37	5. 00	-2. 00	9. 69	. 71	10. 28	. 38	6. 12	-1. 21
60	7. 59	. 38	5. 66	. 21	4. 46	-1. 87	8. 52	. 29	8. 85	. 43	5. 04	-1. 08
70	6. 00	. 37	4. 66	. 04	3. 68	-1. 46	7. 10	. 04	7. 07	. 41	3. 90	-. 90
80	4. 30	. 33	3. 42	. 00	2. 86	-1. 00	5. 31	. 00	5. 00	. 35	2. 71	-. 65
90	2. 37	. 18	1. 96	. 06	1. 86	-. 57	3. 21	. 11	2. 76	. 21	1. 38	-. 35
95	1. 30	. 10	1. 12	. 12	1. 34	-. 07	2. 00	. 15	1. 52	. 12	. 75	-. 19
100	. 13	. 00	. 29	. 21	. 45	. 45	. 61	. 61	. 27	. 00	. 00	. 00
Rad. L. E.	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	. 957	. 625



The lower case letter adjacent to the number represents VI =
c. 64.30
e. 40.00
n... 30.66
r... 24.36
s... 17.68
u. , 14.69
v.. 11.47
Minimum C_D
L/D at 1/4 Maximum C_L
Chart No. 13

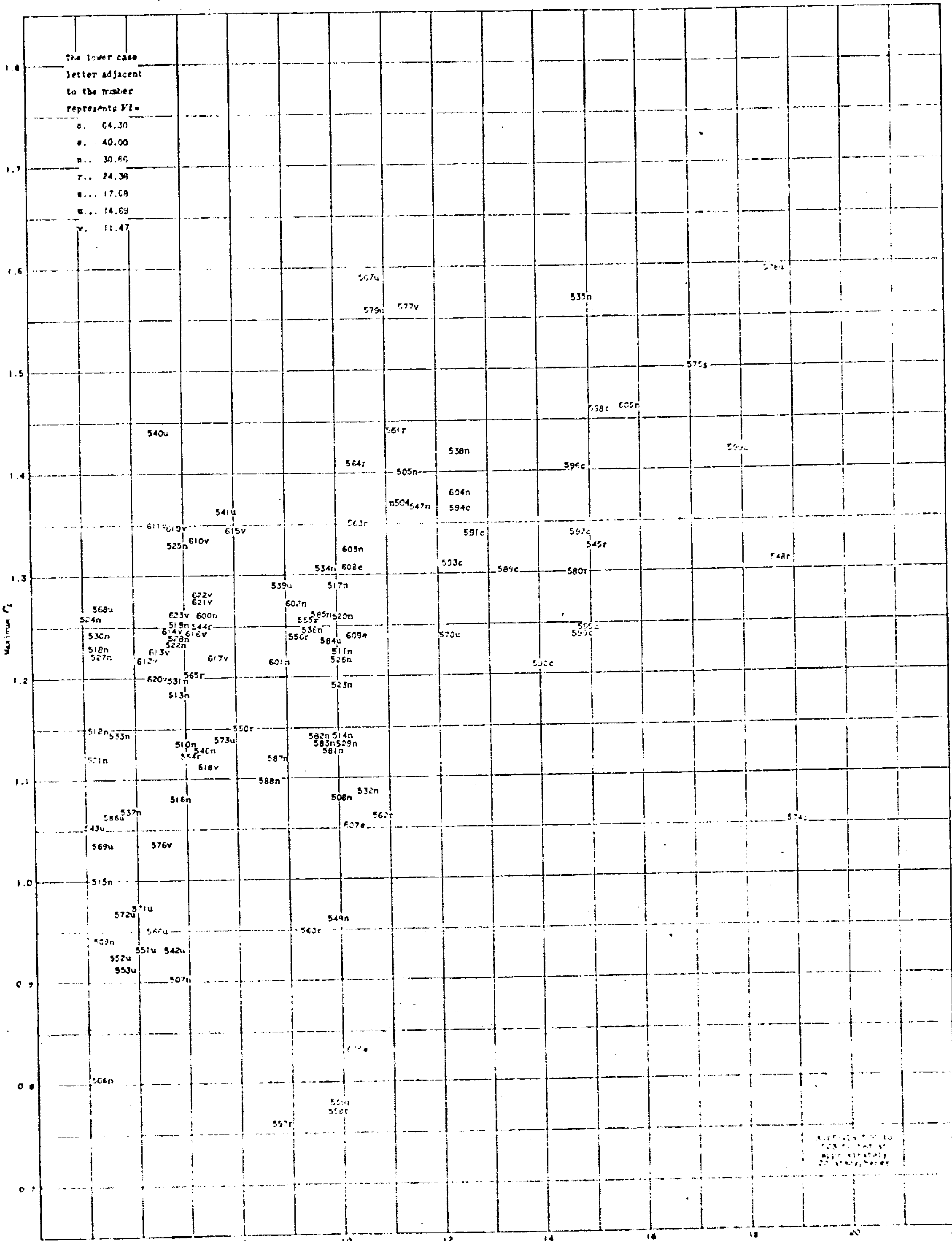

The lower case letter adjacent to the number represents VI=
c.. 64.30
e.. 40.00
n.. 30.60
r.. 24.38
s... 17.68
u... 14.69
v.. 11.47
Maximum C_L
Mean Spar Depth

Chart No. 14

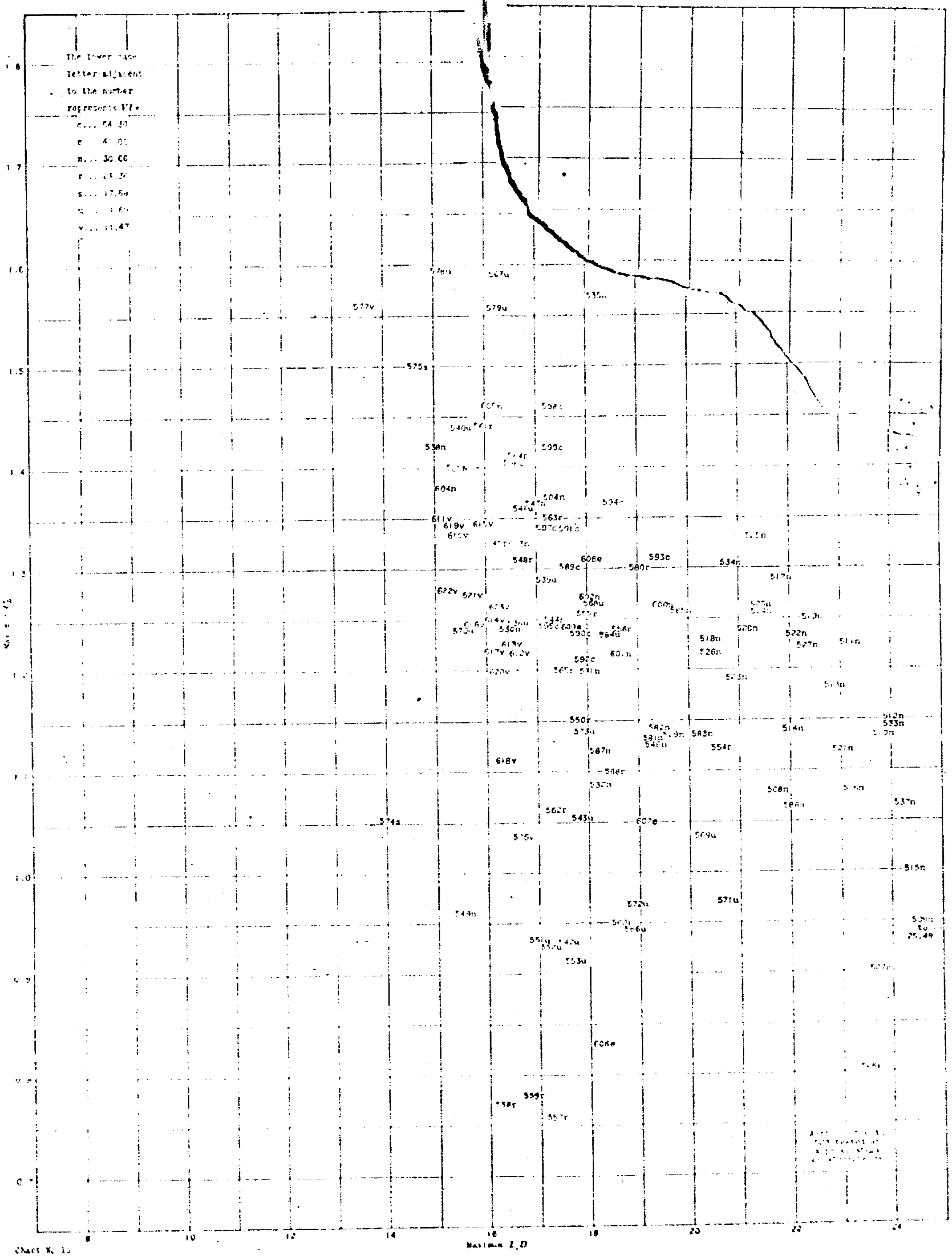


Chart X, 15

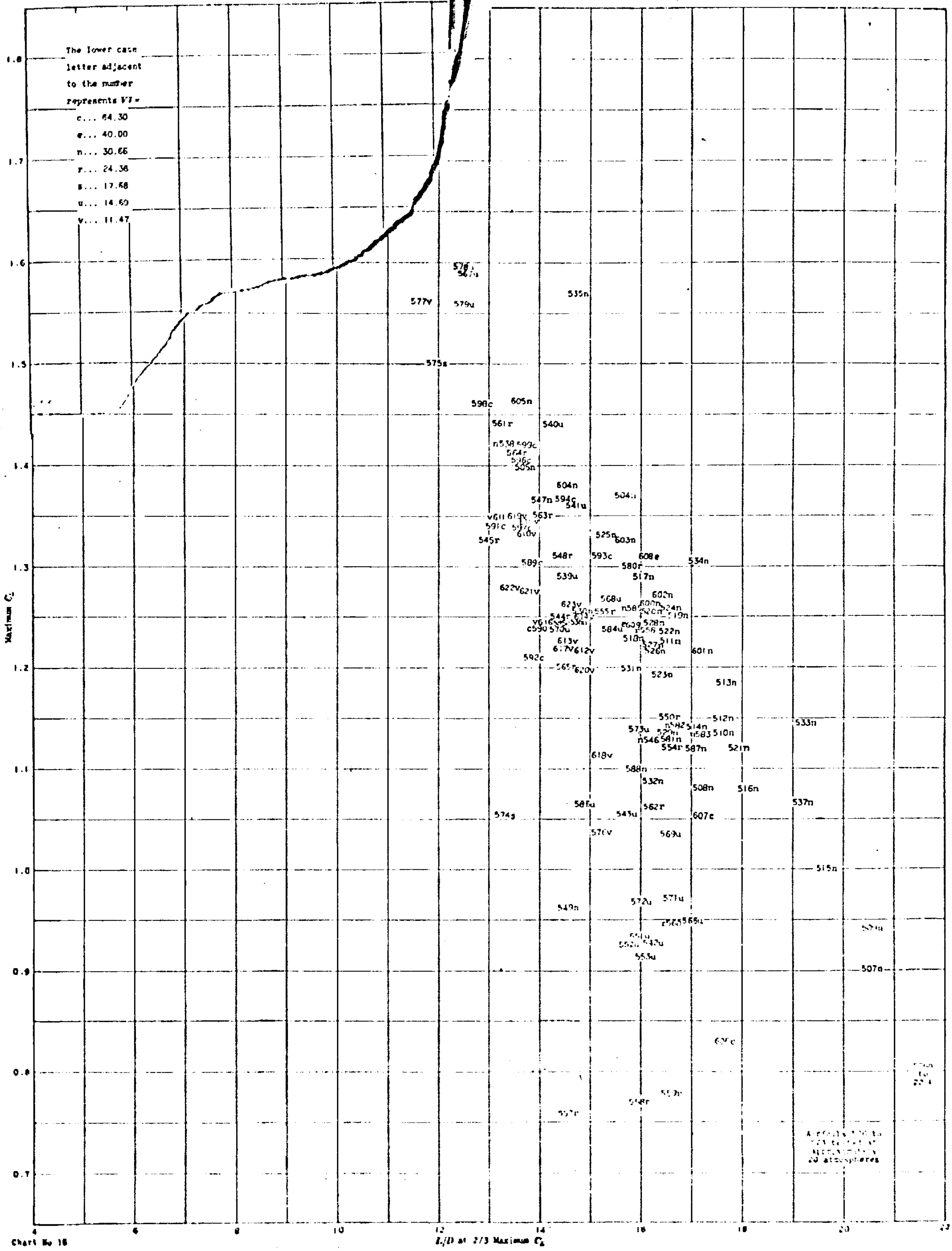
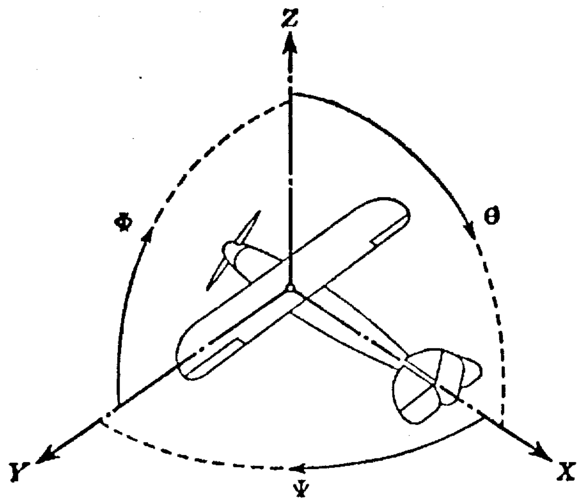

The lower case letter adjacent to the number represents VI =
c... 64.30
e... 40.00
n... 30.66
r... 24.38
s... 17.68
u... 14.60
v... 11.47
Maximum C_L
L/D at 2/3 Maximum C_L
Airfoils 500 to 623 tested at approximately 20 atmospheres

Chart No 18

(231)



Positive directions of axes and angles (forces and moments) are shown by arrows

Axis		Force (parallel to axis) symbol	Moment about axis			Angle		Velocities	
Designation	Symbol		Designation	Symbol	Positive direction	Designation	Symbol	Linear (component along axis)	Angular
Longitudinal	X	X	rolling	L	$Y \longrightarrow Z$	roll	Φ	u	p
Lateral	Y	Y	pitching	M	$Z \longrightarrow X$	pitch	Θ	v	q
Normal	Z	Z	yawing	N	$X \longrightarrow Y$	yaw	Ψ	w	r

Absolute coefficients of moment

$$C_L = \frac{L}{qbS} \quad C_M = \frac{M}{qcS} \quad C_N = \frac{N}{qfS}$$

Angle of set of control surface (relative to neutral position), δ. (Indicate surface by proper subscript.)

4. PROPELLER SYMBOLS

D, Diameter.
p_e, Effective pitch
p_g, Mean geometric pitch.
p_s, Standard pitch.
p_t, Zero thrust.
p_q, Zero torque.
p/D, Pitch ratio.
V', Inflow velocity.
V_s, Slip stream velocity.

T, Thrust.
Q, Torque.
P, Power.
(If "coefficients" are introduced all units used must be consistent.)
η, Efficiency $= T\,V/P$.
n, Revolutions per sec., r. p. s.
N, Revolutions per minute., R. P. M.
Φ, Effective helix angle $= \tan^{-1}\left(\frac{V}{2\pi rn}\right)$

5. NUMERICAL RELATIONS

1 HP = 76.04 kg m/sec. = 550 lb./ft./sec.
1 kg/m/sec. = 0.01315 HP.
1 mi./hr. = 0.44704 m/sec.
1 m/sec. = 2.23693 mi./hr.

1 lb. = 0.4535924277 kg.
1 kg = 2.2046224 lb.
1 mi. = 1609.35 m = 5280 ft.
1 m = 3.2808333 ft.