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RESEARCH MEMORANDUM

AERODYNAMIC LOAD MEASUREMENTS OVER LEADING-EDGE AND TRAILING-EDGE PLAIN FLAPS ON A 6-PERCENT THICK SYMMETRICAL CIRCULAR-ARC AIRFOIL SECTION

By

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RESEARCH MEMORANDUM

AERODYNAMIC LOAD MEASUREMENTS OVER LEADING-EDGE AND TRAILING-EDGE PLAIN FLAPS ON A 6-PERCENT-THICK SYMMETRICAL CIRCULAR-ARC AIRFOIL SECTION

By William J. Underwood and Robert J. Nuber

SUMMARY

An investigation was made in the Langley two-dimensional low-turbulence tunnel at a Reynolds number of 2.1 million to determine the aerodynamic loads and moments over a 15-percent-chord drooped-nose flap and a 20-percent-chord plain trailing-edge flap on a 6-percent-thick symmetrical circular-arc airfoil section. Airfoil lift, flap normal-force, flap chord-force, and flap hinge-moment characteristics were determined for various deflections of the flaps either individually or in appropriate combinations.

The results of the investigation indicated that the drooped-nose flap section normal-force and hinge-moment coefficients increased rapidly in a positive direction with increasing section lift coefficient; but for a given lift coefficient, increasing the ~~downwash~~ downward deflection of either flap produced negative increments. The plain trailing-edge flap section normal-force and hinge-moment coefficients are of a similar magnitude to those for a plain flap on a subsonic type of airfoil. The maximum flap normal-force and hinge-moment coefficients were, respectively, 4.74 and 2.24 for the drooped-nose flap as compared with 1.48 and -0.61 for the plain trailing-edge flap.

INTRODUCTION

In an effort to extend the amount of available data on the aerodynamic characteristics of thin circular-arc airfoils which are expected to be used on supersonic airplanes, several investigations at low Mach and high Reynolds numbers have been made to determine the section characteristics of circular-arc airfoils equipped with leading-edge and trailing-edge flaps. The results of one such investigation, in which the airfoil lift, drag, and pitching-moment characteristics were obtained for two symmetrical circular-arc airfoils, 6 and 10 percent thick, equipped with leading-edge and trailing-edge flaps, are presented in

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reference 1. These data were obtained in the Langley two-dimensional low-turbulence pressure tunnel (TDT) and the Langley two-dimensional low-turbulence tunnel (LTT).

The present investigation is intended to furnish flap load and hinge-moment data applicable to the structural design of the 15-percent chord drooped-nose flap and the 20-percent-chord plain trailing-edge flap on the 6-percent-thick airfoil from reference 1.

The airfoil-lift and pressure-distribution diagrams presented in this paper were plotted from data obtained in the Langley two-dimensional low-turbulence tunnel with the high-lift devices deflected either individually or in appropriate combinations.

COEFFICIENTS AND SYMBOLS

c_l airfoil section lift coefficient $\left(\frac{l}{qc}\right)$

c_n flap section normal-force coefficient $\left(\frac{n}{qc_f}\right)$

c_c flap section chord-force coefficient $\left(\frac{x'}{qc_f}\right)$

c_h flap section hinge-moment coefficient $\left(\frac{h}{qc_f^2}\right)$

S pressure coefficient $\left(\frac{H_o - p}{q}\right)$

P normal-pressure coefficient $\left(\frac{\Delta p}{q}\right)$

l airfoil lift per unit span

n flap normal force per unit span, positive upward

x' flap chord force per unit span, positive toward trailing edge

h flap hinge moment per unit span, positive when trailing edge tends to deflect downward or leading edge upward

c airfoil chord

c_f flap chord

H_o free-stream total preesure

p local static pressure

q free-stream dynamic pressure

α_o airfoil section angle of attack, degrees

δ flap deflection, positive when deflected below chord line, degrees

x distance behind leading edge, inches

y distance above or below chord, inches

R Reynolds number

M Mach number

Subscripts:

N drooped-nose flap

F plain trailing-edge flap

MODEL AND TESTS

The model used in this investigation was the NACA 2S-(50)(03)-(50)(03) airfoil equipped with a 15-percent-chord drooped-nose flap and a 20-percent-chord plain trailing-edge flap. Ordinates and a sketch of the model are presented in table I and figure 1, respectively. This is the same model as described and reported in reference 1 with the exception of the pressure orifices which were installed for the present investigation. These orifices were located on the airfoil and flap surfaces (fig. 2) at the midspan in a single chordwise row. The chordwise positions of these orifices are given in the table in figure 2.

The investigation was conducted in the Langley two-dimensional low-turbulence tunnel at a Reynolds number of 2.1×10^6 and a Mach number of 0.15, and consisted of measurements of lift and surface pressures with the flaps deflected either individually or in appropriate combinations. The airfoil lift was measured and corrected to free-air

conditions by the methods described in reference 2. The normal- and chord-force pressure-distribution diagrams were mechanically integrated to obtain the flap section normal-force, chord-force, and hinge-moment coefficients.

Both the Reynolds number and the airfoil section lift coefficients were based on the chord of the airfoil with the flaps neutral. The flap coefficients were based on their respective chords and were determined parallel and perpendicular to the flap chords in their deflected positions.

RESULTS AND DISCUSSION

The local pressure coefficients that were determined from the orifice pressures at the various angles of attack are presented in table II for the following flap deflections:

Table II	(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)	(i)	(j)	(k)	(l)	(m)	(n)	(o)	(p)	(q)	(r)
δ_N, deg	0	5	9	21	27	0	0	0	0	0	5	5	5	9	9	9	21	27
δ_F, deg	0	0	0	0	0	5	10	22	42	60	5	10	22	10	22	42	42	60

Included in the table are the number and chordwise positions of the orifices corresponding to those shown in figure 2.

The flap section normal-force, chord-force, and hinge-moment characteristics with the flaps deflected are presented in figures 3 to 7. These results show that for a given flap configuration the normal force and moment on the drooped-nose flap increased rapidly in a positive direction with increasing lift coefficient while in comparison the normal force and moment on the plain trailing-edge flap remained almost constant. For a given lift coefficient, however, increasing the downward deflection of either flap produced negative increments in both the normal force and moment on the drooped-nose flap in contrast to the usual characteristic of the conventional trailing-edge flap where the increments of the normal force

and moment increase positively with increased trailing-edge flap deflection. Deflection of the drooped-nose flap had very little effect on normal-force and hinge-moment characteristics of the plain trailing-edge flap. The magnitude of the loads and moments on the plain trailing-edge flap are of a similar magnitude to those of the plain flap on an NACA 0009 airfoil (reference 3). As shown in figure 7 for the optimum maximum lift configuration ($\delta_N = 27^\circ$, $\delta_F = 60^\circ$) the maximum flap normal-force and hinge-moment coefficients were, respectively, 4.74 and 2.24 for the drooped-nose flap as compared with 1.48 and -0.61 for the plain trailing-edge flap.

The chord-force coefficients of both flaps are negative in sign with the exception of the drooped-nose flap chord forces at drooped-nose flap deflections of 21° and 27°. The chordwise forces due to skin friction have not been included in these resulte. This omission is considered to be of minor importance in view of the large magnitude of the normal-force coefficients. The chord force, however, especially for the drooped-nose fiap, should not be neglected when obtaining the resultant air load.

The variation of the maximum flap loads and hinge moments at or below maximum lift with increasing deflection of either the drooped-nose flap or plain trailing-edge flap are summarized in figures 8 and 9. It can be seen in figure 8 that deflecting the drooped-nose flap hae no appreciable effect on the maximum normal-force and hinge-moment coefficiente of the plain trailing-edge flap. Large increases in the corresponding coefficients of the drooped-nose flap, however, are evident ae the drooped-nose flap is deflected. In contrast, deflecting the plain trailing-edge flap increased the maximum normal-force and moment of both the drooped-nose flap and plain trailing-edge flap. The magnitudes of the maximum normal-force and moment coefficients of the plain trailing-edge flap are shown to increase more rapidly than the corresponding forces and moments of the drooped-nose flap regardless of the drooped-nose flap deflection (figs. 8 and 9).

Typical preesure-dietribution diagrams are presented in figures 10 and 11 where the flap pressure coefficients are plotted against the projected chordwise position of the flap orificee on the airfoil chord. This accounts for the shorter effective chord in figure 11 as the flaps were deflected. The load-distribution diagram for the optimum maximum lift configuration, presented in figure 12, shows the comparatively larger load over the drooped-nose flap than over the plain trailing-edge flap. This load over the drooped-nose flap is the result of the additional normal load that occurs as the airfoil-flap configuration departs from the ideal angle of attack or lift coefficient. Thin airfoil theory indicates that this additional normal load is infinite at the leading edge, but decreases rapidly with dietance along the chord to zero at the trailing edge. Actually, becauee of the bubble

of separation at the leading edge, the load has a finite value. A study of table II shows that this local separation, as indicated by approximately constant values of the pressure coefficients on the upper surface near the leading edge, occurs for all the configurations investigated at an angle of attack well below that for maximum lift.

SUMMARY OF RESULTS

The results of this investigation of the air loads over a 15-percent-chord drooped-nose flap and a 20-percent-chord plain trailing-edge flap on an NACA 2S-(50)(03)-(50)(03) airfoil section indicate that:

1. The drooped-nose flap section normal-force and hinge-moment coefficients increased rapidly in a positive direction with increasing lift coefficient; but for a given lift coefficient, increasing the downward deflection of either flap produced negative increments.

2. The plain trailing-edge flap section normal-force and hinge-moment coefficients are of a similar magnitude to those for a plain flap on a subsonic type of airfoil.

3. The maximum flap normal-force and hinge-moment coefficients were, respectively, 4.74 and 2.24 for the drooped-nose flap as compared with 1.48 and -0.61 for the plain trailing-edge flap.

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3. Street, William G., and Ames, Milton B., Jr.: Pressure-Distribution Investigation of an N.A.C.A. 0009 Airfoil with a 50-Percent-Chord Plain Flap and Three Tabe. NACA TN No. 734, 1939.

TABLE I
ORDINATES FOR THE NACA 2S-(50)(03)-(50)(03)
AIRFOIL

[Stations and ordinates given in percent of airfoil chord]

Upper surface		Lower surface	
Station	Ordinate	Station	Ordinate
0	0	0	0
5	.572	5	-.572
10	1.082	10	-1.082
15	1.533	15	-1.533
20	1.922	20	-1.922
25	2.252	25	-2.252
30	2.521	20	-2.521
35	2.731	35	-2.731
40	2.880	40	-2.880
45	2.970	45	-2.970
50	3.000	50	-3.000
55	2.970	55	-2.970
60	2.880	60	-2.880
65	2.731	65	-2.731
70	2.521	70	-2.521
75	2.252	75	-2.252
80	1.922	80	-1.922
85	1.533	85	-1.533
90	1.082	90	-1.082
95	.572	95	-.572
100	0	100	0
Radius of circular arc: 4.182 c			

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TABLE II.– PRESSURE COEFFICIENTS FOR THE NACA 2S(50)(03)–(50)(03) AIRFOIL AT DIFFERENT ANGLES OF ATTACK WITH A 0.15c DROOPED-NOSE AND A 0.20c PLAIN TRAILING-EDGE FLAP

$\left[R = 2.1 \times 10^6;\ M = 0.15\right]$

(a) $\delta_N = 0^\circ$; $\delta_F = 0^\circ$

Orifice number	x/c	Section angle of attack, α_o, deg								
		0	0.5	2.0	4.1	6.1	8.1	[a]9.1	10.2	12.2
1	0	0.17	0	0.11	0.78	1.36	1.42	1.33	1.25	1.24
2	1	.81	.94	1.96	2.13	2.14	1.94	1.82	1.73	1.64
3	2	.87	.96	1.72	2.14	2.15	1.94	1.83	1.73	1.64
4	3	.89	.98	1.39	2.15	2.15	1.95	1.83	1.74	1.64
5	5	.94	1.01	1.17	2.18	2.16	1.96	1.84	1.74	1.65
6	7.5	.98	1.04	1.19	2.19	2.18	1.97	1.85	1.75	1.65
7	10	1.01	1.06	1.21	1.88	2.21	1.98	1.86	1.75	1.65
8	12	1.04	1.10	1.22	1.59	2.22	2.00	1.87	1.76	1.66
9	15	1.03	1.02	1.14	1.38	2.18	2.00	1.87	1.77	1.67
[b]10	16.1	1.02	.98	.90	.79	.74	.69	.68	.68	.55
A	18.3	1.07	1.14	1.25	1.31	2.14	2.03	1.90	1.79	1.67
B	25	1.12	1.16	1.25	1.31	1.86	2.02	1.91	1.81	1.69
C	35	1.16	1.18	1.25	1.31	1.47	1.93	1.89	1.81	1.71
D	45	1.17	1.18	1.24	1.29	1.32	1.76	1.81	1.78	1.72
E	55	1.17	1.18	1.23	1.26	1.26	1.59	1.71	1.73	1.72
F	65	1.16	1.17	1.20	1.22	1.22	1.44	1.59	1.72	1.71
G	74	1.13	1.14	1.16	1.17	1.17	1.32	1.49	1.61	1.71
[b]17	77.03	1.10	1.10	1.10	1.10	1.11	1.23	1.37	1.49	1.61
[b]18	78.3	1.10	1.10	1.10	1.10	1.11	1.23	1.36	1.48	1.60
[b]19	80	1.10	1.10	1.12	1.13	1.14	1.26	1.42	1.54	1.67
20	85	1.06	1.08	1.09	1.09	1.09	1.22	1.38	1.53	1.69
21	90	1.02	1.03	1.04	1.04	1.05	1.18	1.34	1.49	1.66
22	95	.97	.97	.96	.97	1.01	1.15	1.29	1.44	1.60
23	97.5	.92	.92	.92	.93	.98	1.13	1.28	1.39	1.56
24	100	.82	.84	.85	.86	.94	1.11	1.24	1.35	1.50
11	1.3	.87	.77	.50	.26	.15	.11	.11	.12	.09
12	2.6	.89	.81	.59	.37	.26	.22	.21	.21	.19
13	5	.95	.89	.72	.52	.40	.35	.35	.35	.33
14	7.5	.98	.93	.78	.61	.50	.45	.44	.44	.42
15	11.4	1.01	.98	.85	.69	.59	.54	.55	.55	.53
H	18.1	1.05	1.02	.93	.79	.71	.66	.67	.67	.66
I	25	1.09	1.07	.99	.88	.79	.76	.77	.77	.77
J	35	1.12	1.11	1.04	.94	.88	.85	.87	.88	.88
K	45	1.15	1.13	1.07	1.00	.95	.93	.95	.97	.99
L	55	1.15	1.14	1.09	1.02	.99	.99	1.02	1.04	1.07
M	65	1.12	1.11	1.09	1.02	1.01	1.02	1.06	1.09	1.13
N	75	1.10	1.11	1.09	1.04	1.04	1.06	1.11	1.15	1.21
25	85	1.05	1.06	1.05	1.02	1.04	1.09	1.15	1.20	1.29
26	90	1.01	1.02	1.02	1.00	1.03	1.09	1.16	1.23	1.33
27	95	.94	.96	.96	.95	1.00	1.09	1.17	1.26	1.38
28	97.5	.89	.93	.93	.93	.78	1.09	1.19	1.29	1.42
[b]16	15	1.02	.99	.89	.77	.68	.64	.63	.63	.62
[b]29	80.3	1.07	1.07	1.06	1.03	1.02	1.08	1.13	1.20	1.28

[a]Angle of attack for maximum lift.
[b]Internal pressure.

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TABLE II.- PRESSURE COEFFICIENTS - Continued

(b) $\delta_N = 5^\circ$, $\delta_F = 0^\circ$

Orifice number	x/c	Section angle of attack, α_o, deg							
		-2.0	0	2.0	4.1	6.1	8.1	9.1	[a]10.2
1	0	1.78	1.83	0.02	0.34	1.26	1.67	1.56	1.39
2	1	.28	.49	.99	2.14	2.47	2.37	2.15	1.97
3	2	.42	.63	1.01	2.16	2.48	2.37	2.15	1.97
4	3	.50	.69	1.03	2.08	2.49	2.38	2.16	1.98
5	5	.62	.80	1.08	1.46	2.53	2.40	2.18	1.98
6	7.5	.74	.90	1.15	1.37	2.56	2.42	2.19	2.00
7	10	.83	.98	1.19	1.37	2.29	2.50	2.21	2.02
8	12	.93	1.07	1.27	1.45	1.92	2.46	2.24	2.04
9	15	1.07	1.19	1.38	1.54	1.67	2.42	2.25	2.05
[b]10	16.1	1.29	.88	.81	.69	.60	.55	.53	.53
A	18.3	1.03	1.15	1.33	1.49	1.55	2.29	2.23	2.05
B	25	1.05	1.15	1.28	1.41	1.48	2.02	2.14	2.03
C	35	1.09	1.16	1.27	1.37	1.44	1.63	1.93	1.94
D	45	1.11	1.17	1.26	1.33	1.39	1.42	1.69	1.82
E	55	1.13	1.18	1.24	1.30	1.34	1.33	1.49	1.67
F	65	1.12	1.15	1.20	1.25	1.27	1.26	1.36	1.54
G	74	1.11	1.13	1.17	1.19	1.21	1.20	1.27	1.44
[b]17	77.03	1.09	1.09	1.10	1.11	1.12	1.14	1.18	1.33
[b]18	78.3	1.09	1.09	1.10	1.11	1.12	1.13	1.18	1.32
19	80	1.07	1.09	1.13	1.15	1.17	1.16	1.22	1.37
20	85	1.07	1.07	1.09	1.10	1.12	1.13	1.18	1.34
21	90	1.04	1.03	1.04	1.05	1.06	1.08	1.15	1.29
22	95	.99	.97	.97	.98	.99	1.04	1.12	1.26
23	97.5	.94	.93	.92	.93	.95	1.01	1.10	1.23
24	100	.87	.85	.85	.87	.90	.98	1.07	1.20
11	1.3	1.80	1.71	.72	.38	.19	.11	.11	.11
12	2.6	1.81	1.19	.75	.48	.31	.21	.20	.21
13	5	1.83	1.04	.82	.60	.44	.35	.34	.34
14	7.5	1.81	1.04	.84	.65	.52	.42	.41	.41
15	11.4	1.61	.99	.84	.69	.57	.49	.48	.47
H	18.1	1.23	.99	.85	.64	.65	.67	.68	.69
I	25	1.12	1.07	.96	.85	.76	.69	.68	.69
J	35	1.17	1.11	1.02	.94	.86	.80	.79	.80
K	45	1.20	1.14	1.07	.99	.93	.88	.88	.89
L	55	1.19	1.15	1.09	1.03	.97	.94	.94	.96
M	65	1.16	1.13	1.09	1.05	1.00	.98	.98	1.01
N	75	1.12	1.11	1.08	1.05	1.01	1.01	1.03	1.07
25	85	1.07	1.06	1.05	1.03	1.01	1.03	1.06	1.11
26	90	1.04	1.02	1.02	1.01	1.00	1.03	1.06	1.12
27	95	.98	.96	.96	.96	.97	1.01	1.06	1.15
28	97.5	.94	.91	.93	.94	.94	1.00	1.06	1.16
[b]16	15	1.29	.88	.80	.69	.58	.50	.50	.50
[b]29	80.3	1.08	1.06	1.05	1.04	1.01	1.01	1.05	1.10

[a]Angle of attack for maximum lift.
[b]Internal pressures.

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TABLE II.– PRESSURE COEFFICIENTS – Continued

(c) $\delta_N = 9^\circ$, $\delta_F = 0^\circ$

Orifice number	x/c	Section angle of attack, α_o, deg								
		-2.0	0	2.0	4.1	6.1	8.1	10.2	[a]11.2	12.2
1	0	1.70	1.62	1.00	0.04	0.28	1.89	1.92	1.65	0.88
2	1	.18	.35	.69	1.55	2.42	2.81	2.45	2.19	1.98
3	2	.33	.51	.80	1.19	2.45	2.82	2.46	2.20	1.99
4	3	.40	.58	.85	1.20	2.46	2.83	2.46	2.20	1.99
5	5	.55	.71	.96	1.26	2.36	2.86	2.48	2.21	2.00
6	7.5	.69	.85	1.06	1.33	1.68	2.90	2.51	2.24	2.01
7	10	.80	.96	1.17	1.40	1.53	2.74	2.53	2.26	2.03
8	12	.94	1.10	1.31	1.53	1.64	2.35	2.53	2.27	2.04
9	15	1.25	1.43	1.66	1.90	1.94	1.96	2.49	2.27	2.06
[b]10	16.1	1.18	.92	.63	.62	.51	.42	.38	.39	.40
A	18.3	1.07	1.20	1.34	1.53	1.67	1.75	2.37	2.21	2.03
B	25	1.06	1.16	1.29	1.43	1.55	1.62	2.17	2.14	2.01
C	35	1.09	1.17	1.27	1.37	1.47	1.53	1.83	1.97	1.94
D	45	1.11	1.18	1.25	1.33	1.40	1.45	1.57	1.78	1.85
E	55	1.12	1.18	1.24	1.29	1.34	1.38	1.42	1.62	1.75
F	65	1.12	1.16	1.20	1.24	1.28	1.30	1.31	1.49	1.65
G	74	1.11	1.13	1.16	1.18	1.21	1.23	1.23	1.39	1.56
[b]17	77.03	1.07	1.09	1.10	1.11	1.12	1.12	1.16	1.29	1.44
[b]18	78.3	1.07	1.09	1.10	1.11	1.12	1.12	1.16	1.28	1.43
19	80	1.07	1.09	1.12	1.15	1.17	1.18	1.20	1.33	1.49
20	85	1.06	1.07	1.09	1.10	1.11	1.12	1.16	1.29	1.47
21	90	1.04	1.03	1.04	1.04	1.05	1.06	1.12	1.26	1.43
22	95	.99	.98	.96	.96	.98	1.00	1.09	1.22	1.39
23	97.5	.95	.92	.91	.91	.93	.96	1.07	1.20	1.36
24	100	.89	.85	.85	.87	.88	.92	1.04	1.17	1.30
11	1.3	1.71	1.62	.93	.53	.28	.14	.10	.10	.11
12	2.6	1.72	1.64	.90	.59	.37	.24	.19	.19	.20
13	5	1.72	1.62	.89	.66	.49	.35	.30	.30	.31
14	7.5	1.74	1.47	.87	.68	.53	.42	.36	.37	.37
15	11.4	1.75	1.13	.80	.66	.54	.45	.41	.41	.41
H	18.1	1.74	.92	.81	.69	.59	.52	.48	.48	.49
I	25	1.45	1.01	.94	.83	.73	.66	.61	.62	.63
J	35	1.15	1.09	1.01	.91	.84	.77	.74	.75	.77
K	45	1.12	1.12	1.06	.98	.91	.85	.83	.85	.87
L	55	1.14	1.13	1.08	1.01	.96	.90	.90	.92	.96
M	65	1.13	1.12	1.09	1.04	.99	.96	.95	.98	1.02
N	75	1.11	1.10	1.07	1.04	1.01	.99	.99	1.04	1.09
25	85	1.06	1.06	1.04	1.01	1.00	1.00	1.03	1.08	1.15
26	90	1.02	1.02	1.01	.99	.99	.99	1.04	1.10	1.18
27	95	.97	.95	.95	.95	.95	.96	1.04	1.11	1.21
28	97.5	.94	.92	.91	.93	.93	.95	1.04	1.12	1.24
[b]16	15	1.73	.91	.63	.62	.50	.42	.39	.39	.39
[b]29	80.3	1.07	1.06	1.05	1.02	1.00	1.00	1.03	1.09	1.16

[a]Angle of attack for maximum lift.
[b]Internal pressures.

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TABLE II.- PRESSURE COEFFICIENTS - Continued

(d) $\delta_N = 21^\circ$, $\delta_F = 0^\circ$

Orifice number	x/c	Section angle of attack, α_o, deg								
		0	2.0	4.1	6.1	8.1	10.2	12.2	[a]14.2	16.2
1	0	1.54	1.31	1.17	0.47	0.16	1.18	2.46	3.44	2.57
2	1	.09	.23	.45	.83	2.20	2.82	3.41	3.82	3.02
3	2	.23	.39	.61	.94	1.65	2.86	3.43	3.84	3.04
4	3	.31	.48	.70	1.00	1.38	2.88	3.45	3.86	3.05
5	5	.47	.65	.87	1.14	1.45	2.67	3.50	3.89	3.08
6	7.5	.71	.87	1.09	1.36	1.64	1.88	3.42	3.94	3.12
7	10	.86	1.05	1.26	1.50	1.80	1.89	2.64	3.77	3.01
8	12	1.10	1.31	1.53	1.78	2.20	2.22	2.24	3.08	2.74
9	15	1.86	2.13	2.40	2.67	3.07	3.18	2.83	2.70	2.55
10	16.1	1.99	2.33	2.74	3.03	3.21	3.10	2.86	2.45	2.15
A	18.3	1.36	1.54	1.75	1.98	2.22	2.38	2.42	2.40	2.30
B	25	1.24	1.38	1.51	1.66	1.83	1.97	2.03	2.07	2.10
C	35	1.21	1.31	1.42	1.51	1.63	1.72	1.77	1.79	1.91
D	45	1.21	1.28	1.36	1.43	1.51	1.58	1.60	1.61	1.80
E	55	1.20	1.26	1.32	1.37	1.43	1.47	1.47	1.47	1.65
F	65	1.18	1.21	1.26	1.29	1.34	1.36	1.35	1.35	1.56
G	74	1.15	1.17	1.20	1.22	1.25	1.26	1.24	1.26	1.50
[b]17	77.03	1.09	1.10	1.11	1.12	1.14	1.15	1.14	1.17	1.39
[b]18	78.3	1.09	1.10	1.11	1.12	1.13	1.13	1.13	1.17	1.38
19	80	1.12	1.14	1.16	1.19	1.20	1.20	1.19	1.20	1.43
20	85	1.09	1.10	1.11	1.12	1.12	1.13	1.12	1.17	1.42
21	90	1.05	1.05	1.05	1.05	1.06	1.07	1.07	1.13	1.39
22	95	.99	.98	.98	.98	.98	1.01	1.03	1.11	1.35
23	97.5	.95	.93	.93	.93	.94	.98	1.01	1.10	1.33
24	100	.89	.87	.87	.88	.90	.94	.98	1.07	1.29
11	1.3	1.54	1.31	1.14	.73	.38	.20	.07	.03	.06
12	2.6	1.55	1.32	1.15	.70	.44	.28	.16	.10	.12
13	5	1.55	1.33	1.13	.66	.49	.35	.25	.19	.20
14	7.5	1.56	1.33	1.05	.62	.47	.37	.28	.23	.24
15	11.4	1.57	1.34	.90	.49	.42	.33	.26	.23	.24
H	18.1	1.58	1.37	.68	.47	.39	.32	.26	.24	.25
I	25	1.61	1.23	.72	.67	.58	.51	.45	.40	.42
J	35	1.50	.91	.85	.79	.72	.65	.59	.55	.57
K	45	1.21	.93	.94	.88	.82	.75	.69	.67	.69
L	55	1.04	.99	.99	.94	.88	.83	.78	.76	.80
M	65	1.02	1.02	1.01	.97	.93	.87	.84	.83	.89
N	75	1.01	1.03	1.02	.99	.96	.93	.90	.90	.98
25	85	1.00	1.01	1.00	.98	.97	.96	.94	.96	1.06
26	90	.98	.99	.99	.98	.96	.96	.96	.99	1.11
27	95	.95	.95	.95	.94	.95	.96	.96	1.02	1.16
28	97.5	.93	.93	.92	.92	.93	.95	.98	1.04	1.20
[b]16	15	1.58	1.35	.78	.33	.32	.34	.28	.24	.24
[b]29	80.3	1.01	1.02	1.01	.99	.97	.95	.93	.95	1.05

[a]Angle of attack for maximum lift.
[b]Internal pressures.

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TABLE II.- PRESSURE COEFFICIENTS - Continued

(e) $\delta_N = 27^\circ$, $\delta_F = 0^\circ$

Orifice number	x/c	Section angle of attack, α_o, deg								
		0	2.0	4.1	6.1	8.1	10.2	12.2	[a]15.2	18.3
1	0	1.58	1.39	1.14	1.20	0.04	0.35	1.59	3.39	3.41
2	1	.04	.12	.29	.52	1.02	2.41	3.08	3.88	3.69
3	2	.15	.26	.46	.69	1.09	2.29	3.11	3.89	3.71
4	3	.23	.36	.55	.79	1.15	1.88	3.14	3.91	3.72
5	5	.39	.54	.74	.97	1.30	1.53	3.03	3.97	3.76
6	7.5	.60	.75	1.00	1.22	1.52	1.77	2.30	4.01	3.82
7	10	.81	.99	1.21	1.45	1.76	2.02	2.10	3.25	3.54
8	12	1.10	1.31	1.55	1.82	2.16	2.34	2.56	2.64	2.84
9	15	2.04	2.35	2.73	3.14	3.68	4.01	4.10	3.47	2.63
10	16.1	2.26	2.60	3.00	3.43	4.10	4.42	4.43	3.76	2.72
A	18.3	1.38	1.55	1.74	1.95	2.21	2.42	2.59	2.64	2.19
B	25	1.28	1.39	1.54	1.69	1.85	1.99	2.12	2.18	1.85
C	35	1.23	1.32	1.43	1.53	1.64	1.74	1.83	1.86	1.62
D	45	1.23	1.29	1.37	1.45	1.53	1.59	1.64	1.65	1.52
E	55	1.22	1.26	1.32	1.38	1.44	1.47	1.52	1.49	1.49
F	65	1.20	1.23	1.26	1.30	1.34	1.36	1.37	1.35	1.46
G	74	1.16	1.18	1.20	1.23	1.26	1.26	1.27	1.25	1.43
[b]17	77.03	1.10	1.10	1.11	1.13	1.14	1.15	1.15	1.18	1.38
[b]18	78.3	1.10	1.10	1.11	1.12	1.12	1.14	1.13	1.17	1.37
19	80	1.14	1.15	1.17	1.19	1.21	1.20	1.21	1.20	1.42
20	85	1.11	1.10	1.11	1.12	1.12	1.12	1.13	1.17	1.42
21	90	1.07	1.05	1.05	1.06	1.06	1.06	1.07	1.13	1.42
22	95	1.01	.99	.98	.98	.97	.98	1.01	1.11	1.42
23	97.5	.97	.94	.93	.92	.93	.96	.99	1.11	1.40
24	100	.94	.88	.87	.88	.89	.92	.98	1.09	1.36
11	1.3	1.58	1.39	1.12	1.15	.56	.29	.15	.04	.03
12	2.6	1.58	1.39	1.12	1.10	.56	.35	.20	.11	.09
13	5	1.59	1.40	1.13	.84	.53	.38	.29	.18	.18
14	7.5	1.59	1.40	1.13	.67	.50	.37	.29	.21	.19
15	11.4	1.60	1.41	1.15	.54	.37	.34	.26	.19	.20
H	18.1	1.61	1.42	1.17	.47	.36	.30	.24	.20	.20
I	25	1.64	1.46	.99	.63	.56	.48	.42	.37	.36
J	35	1.65	1.27	.77	.78	.70	.62	.58	.51	.52
K	45	1.53	.99	.87	.87	.80	.73	.69	.64	.66
L	55	1.30	.95	.94	.92	.87	.81	.77	.73	.77
M	65	1.19	.98	.98	.96	.92	.87	.84	.80	.87
N	75	1.02	1.00	1.00	.98	.95	.91	.90	.88	.97
25	85	.99	.99	.99	.98	.96	.94	.94	.95	1.07
26	90	.98	.98	.98	.98	.95	.95	.95	.98	1.13
27	95	.95	.95	.95	.95	.94	.94	.96	1.01	1.21
28	97.5	.94	.92	.92	.92	.92	.93	.96	1.04	1.26
[b]16	15	1.58	1.40	1.14	.45	.20	.21	.23	.18	.18
29	80.3	1.01	1.00	1.00	.99	.96	.94	.93	.93	1.05

[a]Angle of attack for maximum lift.
[b]Internal pressures.

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TABLE II.– PRESSURE COEFFICIENTS – Continued

(f) $\delta_N = 0^\circ$, $\delta_F = 5^\circ$

Orifice number	x/c	Section angle of attack, α_o, deg							
		-4.1	-2.0	0	2.0	4.1	6.1	[a]8.1	10.2
1	0	1.65	1.60	0.30	0.38	0.79	1.40	1.56	0.93
2	1	.29	.57	1.06	2.10	2.23	2.15	1.92	1.72
3	2	.43	.68	1.06	2.12	2.25	2.16	1.93	1.73
4	3	.50	.74	1.06	2.12	2.25	2.16	1.93	1.73
5	5	.61	.82	1.08	1.97	2.27	2.18	1.94	1.74
6	7.5	.71	.89	1.11	1.46	2.29	2.20	1.95	1.74
7	10	.78	.94	1.13	1.28	2.29	2.23	1.97	1.75
8	12	.83	.98	1.15	1.27	2.21	2.25	1.99	1.77
9	15	.87	.98	1.06	1.15	2.01	2.27	2.01	1.78
[b]10	16.1	1.08	1.01	.93	.86	.91	.88	.83	.79
A	18.3	.91	1.05	1.19	1.34	1.72	2.26	2.02	1.79
B	25	.98	1.10	1.21	1.34	1.42	2.15	2.03	1.81
C	35	1.05	1.15	1.24	1.34	1.37	1.83	1.99	1.82
D	45	1.11	1.18	1.25	1.34	1.36	1.53	1.88	1.81
E	55	1.15	1.20	1.26	1.33	1.35	1.37	1.74	1.77
F	65	1.17	1.22	1.25	1.31	1.32	1.29	1.59	1.72
G	74	1.21	1.24	1.26	1.29	1.28	1.24	1.47	1.68
[b]17	77.03	1.19	1.20	1.19	1.20	1.18	1.15	1.31	1.51
[b]18	78.3	1.19	1.20	1.18	1.19	1.17	1.14	1.31	1.50
19	80	1.36	1.39	1.37	1.39	1.36	1.26	1.39	1.59
20	85	1.16	1.17	1.19	1.20	1.20	1.17	1.36	1.61
21	90	1.09	1.09	1.08	1.10	1.10	1.12	1.32	1.58
22	95	1.00	.99	.99	1.00	1.02	1.07	1.29	1.53
23	97.5	.94	.93	.94	.95	.98	1.05	1.26	1.50
24	100	.85	.84	.89	.90	.93	1.02	1.24	1.44
11	1.3	1.89	1.07	.65	.36	.19	.12	.09	.10
12	2.6	1.91	1.05	.72	.47	.31	.22	.17	.20
13	5	1.90	1.06	.82	.60	.45	.36	.33	.34
14	7.5	1.76	1.07	.86	.68	.54	.45	.43	.43
15	11.4	1.27	1.07	.91	.75	.63	.55	.52	.53
H	18.1	1.21	1.10	.97	.84	.73	.65	.64	.65
I	25	1.23	1.12	1.01	.91	.81	.75	.74	.75
J	35	1.23	1.13	1.05	.96	.88	.83	.83	.85
K	45	1.21	1.13	1.07	1.00	.93	.89	.90	.94
L	55	1.18	1.11	1.06	1.01	.95	.93	.95	1.00
M	65	1.11	1.07	1.04	1.00	.96	.94	.97	1.03
N	75	1.04	1.00	.98	.95	.92	.91	.96	1.05
25	85	.99	.96	.95	.94	.93	.94	1.01	1.11
26	90	.98	.96	.96	.96	.95	.98	1.06	1.20
27	95	.94	.93	.95	.95	.95	1.00	1.12	1.27
28	97.5	.91	.90	.93	.94	.95	1.00	1.15	1.32
[b]16	15	1.12	1.02	.93	.82	.73	.66	.63	.63
[b]29	80.3	1.05	1.04	1.02	1.01	1.00	.98	1.09	1.23

[a]Angle of attack for maximum lift.
[b]Internal pressures.

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TABLE II.– PRESSURE COEFFICIENTS – Continued

(g) $\delta_N = 0^\circ$, $\delta_F = 10^\circ$

Orifice number	x/c	Section angle of attack, α_o, deg						
		-4.1	-2.0	0	2.0	4.1	[a]6.1	8.1
1	0	1.39	0.91	0.58	0.79	1.23	1.56	1.66
2	1	.45	.85	1.98	2.24	2.30	2.17	1.91
3	2	.58	.90	1.80	2.26	2.30	2.17	1.92
4	3	.65	.93	1.48	2.27	2.31	2.18	1.92
5	5	.75	.98	1.20	2.29	2.33	2.19	1.92
6	7.5	.83	1.02	1.21	2.29	2.36	2.21	1.94
7	10	.89	1.06	1.24	2.02	2.39	2.23	1.95
8	12	.94	1.09	1.26	1.70	2.40	2.25	1.97
9	15	.96	1.06	1.12	1.46	2.37	2.28	1.99
[b]10	16.1	1.04	.99	.88	.83	.87	.81	.77
A	18.3	1.03	1.16	1.31	1.40	2.26	2.28	2.00
B	25	1.09	1.19	1.31	1.40	1.91	2.27	2.02
C	35	1.16	1.23	1.33	1.42	1.52	2.11	2.00
D	45	1.21	1.27	1.34	1.42	1.42	1.85	1.93
E	55	1.26	1.31	1.36	1.42	1.41	1.61	1.83
F	65	1.30	1.32	1.36	1.42	1.39	1.45	1.71
G	74	1.37	1.37	1.38	1.42	1.39	1.35	1.60
[b]17	77.03	1.40	1.34	1.31	1.34	1.28	1.21	1.40
[b]18	78.3	1.44	1.38	1.36	1.39	1.32	1.26	1.47
19	80	1.75	1.64	1.58	1.62	1.50	1.33	1.50
20	85	1.33	1.27	1.25	1.30	1.28	1.26	1.49
21	90	1.16	1.13	1.14	1.16	1.17	1.22	1.46
22	95	1.01	1.05	1.08	1.06	1.09	1.18	1.42
23	97.5	.94	1.02	1.06	1.03	1.06	1.16	1.39
24	100	.85	1.00	1.04	1.00	1.03	1.14	1.36
11	1.3	1.85	.82	.47	.24	.14	.09	.09
12	2.6	1.50	.84	.57	.37	.24	.19	.19
13	5	1.10	.90	.69	.50	.39	.32	.31
14	7.5	1.11	.94	.75	.59	.47	.41	.41
15	11.4	1.10	.96	.81	.66	.56	.50	.50
H	18.1	1.11	.99	.87	.75	.66	.62	.61
I	25	1.13	1.02	.93	.82	.75	.70	.71
J	35	1.12	1.04	.96	.88	.82	.79	.80
K	45	1.10	1.04	.98	.91	.87	.84	.87
L	55	1.05	1.01	.98	.91	.88	.87	.91
M	65	.97	.96	.95	.90	.87	.87	.91
N	75	.88	.86	.84	.81	.79	.81	.87
25	85	.84	.85	.84	.82	.82	.84	.92
26	90	.89	.91	.91	.88	.89	.93	1.02
27	95	.89	.94	.96	.93	.94	1.00	1.13
28	97.5	.88	.96	.98	.95	.96	1.04	1.20
[b]16	15	1.04	.98	.85	.74	.67	.61	.60
[b]29	80.3	1.27	1.23	1.20	1.20	1.15	1.10	1.27

[a]Angle of attack for maximum lift.
[b]Internal pressures.

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TABLE II.- PRESSURE COEFFICIENTS - Continued

(h) $\delta_N = 0^\circ$, $\delta_F = 22^\circ$

Orifice number	x/c	Section angle of attack, α_o, deg						
		-4.1	-2.0	0	2.0	4.1	[a]5.1	6.1
1	0	0.74	0.34	0.61	1.08	1.64	2.00	1.98
2	1	.75	1.78	2.19	2.36	2.35	2.27	2.14
3	2	.83	1.23	2.21	2.37	2.36	2.28	2.14
4	3	.86	1.16	2.23	2.38	2.36	2.28	2.14
5	5	.93	1.18	2.22	2.40	2.37	2.29	2.15
6	7.5	.99	1.21	1.92	2.43	2.39	2.32	2.17
7	10	1.04	1.23	1.54	2.46	2.42	2.34	2.19
8	12	1.08	1.24	1.36	2.44	2.44	2.36	2.21
9	15	1.05	1.10	1.23	2.32	2.47	2.38	2.23
[b]10	16.1	.96	.87	.80	.85	.79	.77	.75
A	18.3	1.16	1.31	1.40	2.14	2.48	2.39	2.24
B	25	1.20	1.32	1.42	1.66	2.46	2.41	2.26
C	35	1.26	1.36	1.43	1.48	2.25	2.32	2.23
D	45	1.31	1.38	1.44	1.48	1.93	2.12	2.13
E	55	1.36	1.41	1.45	1.49	1.67	1.88	1.97
F	65	1.39	1.42	1.45	1.48	1.53	1.67	1.79
G	74	1.42	1.43	1.44	1.47	1.48	1.54	1.65
[b]17	77.03	1.27	1.25	1.24	1.26	1.28	1.29	1.38
18	78.3	1.42	1.42	1.44	1.47	1.51	1.51	1.58
19	80	1.41	1.41	1.42	1.45	1.54	1.49	1.55
20	85	1.39	1.39	1.40	1.41	1.37	1.41	1.51
21	90	1.43	1.42	1.43	1.42	1.33	1.39	1.50
22	95	1.45	1.43	1.42	1.40	1.29	1.37	1.47
23	97.5	1.44	1.42	1.39	1.37	1.28	1.35	1.46
24	100	1.37	1.36	1.34	1.31	1.25	1.32	1.41
11	1.3	.91	.53	.28	.14	.07	.06	.06
12	2.6	.90	.62	.40	.25	.16	.14	.15
13	5	.94	.72	.53	.39	.29	.27	.28
14	7.5	.96	.78	.61	.47	.37	.37	.36
15	11.4	.96	.82	.67	.56	.46	.45	.45
H	18.1	.99	.87	.74	.65	.55	.55	.55
I	25	1.00	.90	.80	.72	.64	.64	.64
J	35	1.00	.92	.83	.77	.70	.70	.72
K	45	.98	.91	.85	.79	.73	.74	.76
L	55	.93	.88	.83	.78	.74	.75	.77
M	65	.83	.80	.77	.73	.70	.72	.73
N	75	.68	.64	.62	.59	.55	.57	.60
25	85	.67	.65	.63	.60	.59	.61	.64
26	90	.83	.82	.79	.78	.75	.78	.82
27	95	.99	.99	.96	.94	.90	.94	1.00
28	97.5	1.09	1.09	1.07	1.04	1.00	1.04	1.11
[b]16	15	.95	.85	.73	.65	.57	.56	.56
[b]29	80.3	1.26	1.23	1.21	1.23	1.24	1.25	1.33

[a]Angle of attack for maximum lift.
[b]Internal pressures.

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TABLE II.– PRESSURE COEFFICIENTS – Continued

(i) $\delta_N = 0^\circ$, $\delta_F = 42^\circ$

Orifice number	x/c	Section angle of attack, α_o, deg					
		-4.1	-2.0	0	2.0	[a]4.1	6.1
1	0	0.34	1.18	2.07	2.38	2.30	2.05
2	1	1.94	2.19	2.38	2.45	2.32	2.07
3	2	1.53	2.21	2.40	2.45	2.33	2.08
4	3	1.26	2.23	2.40	2.46	2.34	2.08
5	5	1.20	2.23	2.42	2.47	2.34	2.09
6	7.5	1.21	2.22	2.46	2.49	2.36	2.10
7	10	1.25	1.53	2.48	2.52	2.37	2.11
8	12	1.28	1.36	2.43	2.54	2.39	2.12
9	15	1.14	1.25	2.27	2.56	2.41	2.14
[b]10	16.1	.83	.75	.76	.70	.67	.65
A	18.3	1.34	1.40	2.02	2.57	2.43	2.14
B	25	1.37	1.43	1.61	2.52	2.46	2.16
C	35	1.42	1.48	1.51	2.22	2.44	2.19
D	45	1.46	1.50	1.54	1.85	2.31	2.18
E	55	1.50	1.52	1.56	1.64	2.11	2.12
F	65	1.54	1.54	1.56	1.55	1.89	2.00
G	74	1.60	1.56	1.56	1.54	1.74	1.92
[b]17	77.03	1.58	1.51	1.49	1.50	1.65	1.91
18	78.3	1.89	1.76	1.69	1.69	1.66	1.81
19	80	1.59	1.51	1.47	1.49	1.60	1.81
20	85	1.59	1.51	1.48	1.49	1.58	1.78
21	90	1.61	1.53	1.50	1.50	1.57	1.77
22	95	1.64	1.53	1.51	1.51	1.56	1.74
23	97.5	1.62	1.53	1.50	1.50	1.54	1.71
24	100	1.56	1.50	1.47	1.47	1.50	1.67
11	1.3	.46	.27	.14	.06	.03	.04
12	2.6	.57	.38	.24	.15	.11	.12
13	5	.68	.51	.36	.27	.22	.24
14	7.5	.71	.57	.45	.35	.31	.31
15	11.4	.74	.64	.53	.43	.39	.40
H	18.1	.79	.69	.60	.52	.48	.51
I	25	.82	.73	.66	.58	.54	.57
J	35	.80	.75	.68	.63	.61	.64
K	45	.79	.73	.68	.63	.62	.66
L	55	.71	.68	.63	.60	.59	.64
M	65	.58	.55	.52	.53	.51	.54
N	75	.42	.39	.34	.33	.33	.35
25	85	.34	.34	.31	.30	.31	.33
26	90	.56	.54	.54	.53	.53	.56
27	95	.84	.81	.79	.78	.79	.87
28	97.5	1.02	.93	.91	.91	.95	1.06
[b]16	15	.79	.69	.59	.53	.49	.50
[b]29	80.3	1.33	1.27	1.25	1.24	1.36	1.56

[a]Angle of attack for maximum lift.
[b]Internal pressures.

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TABLE II.- PRESSURE COEFFICIENTS - Continued.

(j) $\delta_N = 0^\circ$, $\delta_F = 60^\circ$

Orifice number	x/c	Section angle of attack, α_o, deg							
		-6.1	-4.1	-2.0	0	1.0	2.0	[a]3.0	4.1
1	0	0.29	1.36	2.23	2.45	2.52	2.50	2.44	2.30
2	1	1.87	2.26	2.46	2.52	2.55	2.52	2.47	2.30
3	2	1.36	2.29	2.48	2.52	2.56	2.53	2.47	2.30
4	3	1.20	2.30	2.49	2.53	2.57	2.54	2.48	2.30
5	5	1.19	2.31	2.51	2.55	2.58	2.55	2.49	2.31
6	7.5	1.21	2.08	2.54	2.56	2.60	2.56	2.49	2.32
7	10	1.25	1.67	2.56	2.60	2.62	2.59	2.52	2.34
8	12	1.28	1.44	2.49	2.62	2.64	2.61	2.54	2.35
9	15	1.13	1.31	2.31	2.64	2.67	2.63	2.57	2.37
[b]10	16.1	.78	.70	.73	.69	.67	.63	.62	.66
A	18.3	1.34	1.47	2.00	2.63	2.68	2.64	2.57	2.38
B	25	1.39	1.51	1.62	2.47	2.67	2.67	2.61	2.41
C	35	1.45	1.56	1.58	1.99	2.46	2.61	2.61	2.42
D	45	1.51	1.61	1.62	1.69	2.09	2.40	2.51	2.37
E	55	1.58	1.66	1.66	1.61	1.80	2.10	2.31	2.26
F	65	1.64	1.69	1.68	1.61	1.66	1.85	2.06	2.10
G	74	1.66	1.68	1.65	1.59	1.60	1.70	1.86	1.96
17	77.03	2.19	2.12	1.97	2.07	2.08	2.03	2.07	2.04
18	78.3	1.92	1.87	1.81	1.75	1.72	1.70	1.80	1.89
19	80	2.00	1.93	1.82	1.65	1.61	1.64	1.75	1.87
20	85	1.86	1.83	1.72	1.58	1.58	1.61	1.72	1.81
21	90	1.86	1.83	1.72	1.59	1.59	1.62	1.71	1.79
22	95	1.85	1.81	1.71	1.58	1.59	1.61	1.69	1.76
23	97.5	1.82	1.78	1.69	1.57	1.58	1.60	1.66	1.74
24	100	1.79	1.75	1.65	1.55	1.55	1.57	1.64	1.71
11	1.3	.47	.24	.13	.07	.03	.02	.02	.02
12	2.6	.56	.35	.23	.14	.11	.09	.08	.09
13	5	.65	.47	.35	.26	.22	.19	.18	.19
14	7.5	.69	.53	.42	.34	.30	.26	.25	.26
15	11.4	.71	.57	.49	.41	.37	.35	.33	.35
H	18.1	.74	.64	.56	.48	.46	.42	.42	.44
I	25	.75	.67	.59	.53	.51	.48	.48	.49
J	35	.72	.66	.60	.55	.53	.51	.51	.53
K	45	.66	.63	.57	.53	.52	.50	.50	.52
L	55	.55	.51	.49	.49	.48	.47	.46	.47
M	65	.37	.35	.35	.34	.34	.33	.33	.34
N	75	.34	.31	.27	.21	.20	.19	.19	.20
25	85	.31	.28	.18	.11	.12	.14	.13	.15
26	90	.32	.30	.28	.28	.29	.29	.29	.30
27	95	.61	.59	.58	.56	.56	.56	.57	.60
28	97.5	.86	.84	.80	.77	.77	.78	.79	.83
[b]16	15	.75	.64	.57	.50	.47	.44	.43	.45
[b]29	80.3	.59	.56	.50	.49	.47	.46	.47	.51

[a]Angle of attack for maximum lift.

[b]Internal pressures

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TABLE II.– PRESSURE COEFFICIENTS – Continued

(k) $\delta_N = 5^\circ$, $\delta_F = 5^\circ$

Orifice number	x/c	Section angle of attack, α_0, deg								
		-4.1	-2.0	0	2.0	4.1	6.1	8.1	[a]10.2	12.2
1	0	1.77	1.78	1.10	0.54	0.73	1.76	1.83	1.53	1.23
2	1	.20	.36	.71	1.77	2.35	2.58	2.27	1.93	1.72
3	2	.34	.51	.80	1.23	2.37	2.59	2.29	1.94	1.72
4	3	.42	.58	.85	1.19	2.39	2.60	2.29	1.94	1.73
5	5	.55	.71	.94	1.23	2.36	2.62	2.31	1.96	1.74
6	7.5	.69	.82	1.03	1.28	1.80	2.64	2.34	1.97	1.75
7	10	.77	.91	1.10	1.32	1.53	2.64	2.37	1.99	1.76
8	12	.88	1.00	1.17	1.39	1.47	2.50	2.40	2.01	1.77
9	15	1.10	1.09	1.20	1.39	1.44	2.23	2.40	2.03	1.79
[b]10	16.1	1.73	.97	.86	.78	.70	.70	.68	.64	.62
A	18.3	.99	1.10	1.26	1.46	1.57	1.87	2.36	2.03	1.80
B	25	1.02	1.12	1.25	1.39	1.50	1.59	2.26	2.03	1.82
C	35	1.08	1.16	1.26	1.36	1.45	1.50	1.98	1.99	1.82
D	45	1.13	1.18	1.27	1.35	1.42	1.45	1.69	1.90	1.82
E	55	1.17	1.21	1.27	1.34	1.39	1.41	1.49	1.80	1.80
F	65	1.19	1.22	1.27	1.31	1.35	1.36	1.37	1.67	1.76
G	74	1.22	1.23	1.27	1.30	1.32	1.32	1.30	1.58	1.76
[b]17	77.03	1.21	1.18	1.20	1.20	1.21	1.20	1.18	1.42	1.59
[b]18	78.3	1.20	1.18	1.20	1.19	1.20	1.18	1.18	1.40	1.58
19	80	1.39	1.38	1.39	1.28	1.40	1.36	1.28	1.49	1.66
20	85	1.17	1.18	1.20	1.20	1.21	1.21	1.22	1.48	1.69
21	90	1.10	1.09	1.09	1.09	1.11	1.12	1.17	1.44	1.67
22	95	1.02	1.00	.99	1.00	1.02	1.04	1.14	1.40	1.62
23	97.5	.96	.94	.94	.96	.97	1.00	1.12	1.38	1.58
24	100	.88	.89	.90	.92	.93	.96	1.10	1.34	1.53
11	1.3	1.78	1.80	.94	.53	.28	.14	.10	.11	.11
12	2.6	1.79	1.82	.93	.61	.39	.25	.20	.20	.21
13	5	1.81	1.70	.94	.70	.51	.38	.33	.33	.33
14	7.5	1.82	1.36	.94	.74	.57	.46	.40	.40	.41
15	11.4	1.83	1.05	.90	.75	.62	.51	.46	.47	.48
H	18.1	1.71	1.01	.90	.77	.67	.58	.54	.55	.56
I	25	1.36	1.09	1.00	.88	.78	.70	.66	.68	.69
J	35	1.15	1.13	1.05	.95	.87	.80	.77	.79	.82
K	45	1.13	1.14	1.07	.99	.92	.86	.84	.88	.91
L	55	1.12	1.12	1.07	1.00	.95	.90	.90	.94	.99
M	65	1.09	1.08	1.05	1.00	.95	.91	.92	.98	1.04
N	75	1.03	1.01	.98	.95	.92	.90	.91	.99	1.07
25	85	.99	.99	.96	.94	.92	.91	.95	1.05	1.15
26	90	.98	.98	.97	.96	.95	.95	1.00	1.12	1.23
27	95	.95	.95	.95	.95	.95	.96	1.03	1.18	1.33
28	97.5	.92	.94	.93	.94	.94	.96	1.05	1.22	1.38
[b]16	15	1.68	.96	.82	.73	.62	.55	.51	.51	.51
[b]29	80.3	1.07	1.04	1.04	1.02	1.01	.99	.99	1.12	1.28

[a]Angle of attack for maximum lift.

[b]Internal pressures.

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TABLE II.- PRESSURE COEFFICIENTS - Continued

(1) $\delta_N = 5^\circ$, $\delta_F = 10^\circ$

Orifice number	x/c	Section angle of attack, α_o, deg							
		-4.1	-2.0	0	2.0	4.1	6.1	[a]8.1	10.2
1	0	1.64	1.72	0.70	0.37	1.10	1.59	1.84	1.59
2	1	.29	.51	1.00	2.18	2.57	2.54	2.19	1.91
3	2	.44	.64	1.02	2.20	2.59	2.55	2.20	1.91
4	3	.52	.71	1.05	2.12	2.60	2.56	2.20	1.92
5	5	.64	.83	1.10	1.59	2.63	2.58	2.22	1.92
6	7.5	.77	1.00	1.17	1.41	2.66	2.66	2.25	1.94
7	10	.87	1.07	1.23	1.41	2.37	2.66	2.27	1.96
8	12	.96	1.10	1.31	1.48	1.96	2.66	2.29	1.97
9	15	1.15	1.15	1.34	1.46	1.67	2.61	2.31	1.99
[b]10	16.1	1.17	.89	.82	.73	.67	.70	.66	.63
A	18.3	1.08	1.21	1.40	1.56	1.62	2.43	2.31	2.00
B	25	1.11	1.22	1.35	1.49	1.57	2.08	2.27	2.01
C	35	1.16	1.25	1.35	1.45	1.54	1.67	2.14	1.99
D	45	1.21	1.28	1.36	1.44	1.50	1.52	1.93	1.94
E	55	1.26	1.31	1.36	1.43	1.48	1.47	1.72	1.86
F	65	1.29	1.32	1.36	1.41	1.45	1.42	1.56	1.77
G	74	1.37	1.37	1.38	1.40	1.44	1.39	1.45	1.70
[b]17	77.03	1.37	1.34	1.31	1.31	1.32	1.27	1.28	1.50
[b]18	78.3	1.42	1.38	1.34	1.34	1.37	1.32	1.33	1.55
19	80	1.71	1.61	1.55	1.54	1.59	1.47	1.39	1.60
20	85	1.32	1.27	1.24	1.26	1.29	1.27	1.34	1.59
21	90	1.15	1.13	1.16	1.17	1.17	1.19	1.31	1.57
22	95	1.02	1.06	1.11	1.11	1.09	1.12	1.27	1.53
23	97.5	.95	1.03	1.09	1.10	1.06	1.10	1.26	1.50
24	100	.88	1.01	1.07	1.07	1.02	1.07	1.23	1.45
11	1.3	1.70	1.61	.71	.37	.18	.10	.09	.10
12	2.6	1.71	1.11	.74	.47	.29	.20	.18	.19
13	5	1.73	1.02	.79	.58	.42	.33	.30	.31
14	7.5	1.70	1.01	.82	.63	.49	.40	.38	.38
15	11.4	1.47	.95	.80	.66	.54	1.46	.44	.45
H	18.1	1.09	.94	.81	.70	.60	.53	.52	.53
I	25	1.04	1.01	.90	.80	.71	.64	.64	.66
J	35	1.07	1.04	.95	.87	.79	.74	.74	.77
K	45	1.10	1.05	.98	.91	.83	.80	.81	.84
L	55	1.04	1.02	.97	.91	.85	.83	.85	.90
M	65	.98	.98	.94	.89	.84	.83	.85	.91
N	75	.89	.88	.84	.82	.78	.78	.81	.88
25	85	.87	.87	.85	.83	.80	.79	.85	.95
26	90	.90	.92	.92	.90	.87	.88	.95	1.06
27	95	.91	.95	.97	.96	.93	.95	1.04	1.18
28	97.5	.90	.98	1.00	.99	.95	.98	1.10	1.26
[b]16	15	1.16	.91	.78	.66	.56	.51	.49	.50
[b]29	80.3	1.25	1.22	1.19	1.18	1.19	1.15	1.16	1.34

[a]Angle of attack for maximum lift.
[b]Internal pressures.

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TABLE II.- PRESSURE COEFFICIENTS - Continued

(m) $\delta_N = 5^\circ$, $\delta_F = 22^\circ$

Orifice number	x/c	Section angle of attack, α_o, deg							
		-4.1	-2.0	0	2.0	4.1	6.1	[a]7.1	8.1
1	0	1.09	0.71	0.34	0.73	1.09	1.43	1.90	1.74
2	1	.43	.86	2.06	2.48	2.68	2.40	2.24	2.09
3	2	.57	.92	.83	2.50	2.69	2.40	2.25	2.09
4	3	.64	.96	1.47	2.51	2.70	2.41	2.25	2.10
5	5	.76	1.03	1.26	2.53	2.72	2.42	2.26	2.11
6	7.5	.88	1.11	1.28	2.16	2.76	2.46	2.29	2.13
7	10	.97	1.18	1.38	1.81	2.79	2.49	2.31	2.15
8	12	1.06	1.25	1.44	1.56	2.73	2.51	2.34	2.17
9	15	1.11	1.26	1.42	1.49	2.55	2.53	2.36	2.19
[b]10	16.1	.89	.84	.72	.66	.69	.64	.63	.62
A	18.3	1.18	1.35	1.53	1.64	2.20	2.53	2.36	2.20
B	25	1.20	1.33	1.46	1.59	1.80	2.49	2.35	2.21
C	35	1.24	1.36	1.44	1.55	1.61	2.31	2.27	2.18
D	45	1.29	1.38	1.45	1.54	1.57	2.03	2.12	2.10
E	55	1.33	1.40	1.44	1.52	1.55	1.78	1.93	1.98
F	65	1.36	1.41	1.44	1.49	1.51	1.60	1.75	1.85
G	74	1.39	1.42	1.43	1.45	1.48	1.50	1.61	1.73
[b]17	77.03	1.27	1.28	1.24	1.26	1.28	1.28	1.36	1.47
18	78.3	1.39	1.42	1.40	1.43	1.47	1.50	1.56	1.66
19	80	1.38	1.40	1.39	1.40	1.43	1.49	1.53	1.62
20	85	1.37	1.39	1.37	1.38	1.40	1.39	1.48	1.60
21	90	1.40	1.43	1.40	1.42	1.40	1.37	1.47	1.59
22	95	1.42	1.43	1.40	1.42	1.39	1.34	1.44	1.56
23	97.5	1.40	1.42	1.39	1.40	1.37	1.33	1.43	1.54
24	100	1.36	1.37	1.34	1.36	1.31	1.29	1.39	1.49
11	1.3	1.72	.78	.43	.22	.10	.06	.07	.07
12	2.6	1.87	.79	.52	.34	.20	.14	.14	.15
13	5	1.16	.82	.61	.45	.33	.26	.26	.27
14	7.5	.99	.83	.65	.52	.40	.33	.34	.34
15	11.4	.94	.80	.67	.56	.45	.39	.40	.40
H	18.1	.91	.79	.69	.61	.51	.46	.46	.47
I	25	.98	.88	.76	.71	.62	.56	.57	.59
J	35	.99	.91	.83	.77	.69	.64	.66	.68
K	45	.97	.91	.84	.79	.73	.69	.71	.73
L	55	.92	.87	.82	.79	.73	.70	.73	.75
M	65	.83	.80	.76	.74	.71	.67	.69	.72
N	75	.68	.64	.62	.60	.55	.53	.56	.60
25	85	.69	.63	.63	.62	.59	.58	.61	.64
26	90	.84	.82	.80	.79	.76	.75	.79	.84
27	95	.99	.99	.97	.96	.93	.91	.97	1.04
28	97.5	1.09	1.09	1.07	1.07	1.02	1.02	1.09	1.16
[b]16	15	.86	.78	.65	.56	.50	.45	.45	.45
[b]29	80.3	1.24	1.24	1.22	1.22	1.22	1.24	1.31	1.41

[a]Angle of attack for maximum lift.
[b]Internal pressures.

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TABLE II.- PRESSURE COEFFICIENTS - Continued

(n) $\delta_N = 9^\circ$, $\delta_F = 10^\circ$

Orifice number	x/c	Angle of attack, α_o, deg								
		-4.1	-2.0	0	2.0	4.1	6.1	8.1	[a]9.1	12.2
1	0	0.94	1.22	0.93	0.47	0.62	1.01	1.85	1.98	1.67
2	1	.20	.39	.73	1.76	2.52	2.94	2.67	2.41	1.87
3	2	.35	.53	.84	1.23	2.54	2.95	2.68	2.41	1.87
4	3	.44	.61	.89	1.22	2.56	2.96	2.69	2.42	1.87
5	5	.57	.75	1.00	1.28	2.49	3.00	2.70	2.43	1.88
6	7.5	.73	.94	1.13	1.39	1.70	3.03	2.73	2.45	1.88
7	10	.84	1.07	1.23	1.45	1.61	2.90	2.75	2.47	1.90
8	12	.99	1.15	1.37	1.59	1.69	2.50	2.75	2.49	1.91
9	15	1.32	1.51	1.76	1.98	2.03	2.08	2.73	2.50	1.93
[b]10	16.1	1.64	.82	.60	.59	.48	.40	.35	.36	.38
A	18.3	1.12	1.23	1.40	1.59	1.75	1.83	2.58	2.43	1.92
B	25	1.11	1.23	1.37	1.50	1.64	1.71	2.34	2.34	1.93
C	35	1.16	1.25	1.36	1.45	1.57	1.64	1.93	2.12	1.92
D	45	1.21	1.28	1.37	1.43	1.53	1.58	1.66	1.88	1.90
E	55	1.26	1.31	1.38	1.43	1.50	1.54	1.52	1.68	1.86
F	65	1.29	1.33	1.38	1.40	1.47	1.49	1.44	1.53	1.80
G	74	1.36	1.38	1.41	1.40	1.46	1.46	1.39	1.44	1.79
[b]17	77.03	1.25	1.23	1.23	1.20	1.21	1.19	1.13	1.16	1.44
[b]18	78.03	1.34	1.32	1.33	1.30	1.32	1.31	1.25	1.29	1.61
19	80	1.74	1.73	1.73	1.64	1.69	1.62	1.43	1.40	1.68
20	85	1.29	1.28	1.28	1.24	1.29	1.29	1.27	1.33	1.70
21	90	1.13	1.12	1.13	1.15	1.16	1.17	1.21	1.29	1.69
22	95	1.02	1.03	1.07	1.11	1.09	1.10	1.17	1.27	1.65
23	97.5	.98	1.00	1.05	1.10	1.06	1.07	1.14	1.25	1.61
24	100	.95	.98	1.02	1.06	1.04	1.04	1.12	1.22	1.55
11	1.3	1.61	1.58	.88	.50	.25	.11	.07	.08	.11
12	2.6	1.61	1.59	.85	.57	.35	.21	.16	.17	.19
13	5	1.63	1.53	.85	.64	.46	.33	.28	.28	.31
14	7.5	1.64	1.30	.83	.66	.51	.39	.34	.34	.37
15	11.4	1.65	.98	.76	.63	.51	.42	.37	.37	.40
H	18.1	1.64	.87	.77	.66	.56	.49	.45	.45	.48
I	25	1.38	.95	.88	.78	.69	.64	.57	.58	.62
J	35	1.07	1.00	.94	.85	.78	.71	.67	.68	.74
K	45	1.03	1.02	.96	.89	.83	.77	.74	.76	.83
L	55	1.01	1.00	.96	.90	.85	.80	.79	.81	.89
M	65	.91	.95	.93	.89	.85	.82	.80	.83	.92
N	75	.91	.87	.84	.81	.78	.75	.76	.79	.90
25	85	.88	.85	.83	.81	.78	.76	.79	.82	.96
26	90	.92	.90	.89	.89	.87	.85	.88	.92	1.11
27	95	.93	.93	.94	.95	.92	.91	.96	1.02	1.25
28	97.5	.94	.94	.96	.98	.95	.95	1.01	1.08	1.34
[b]16	15	1.64	.81	.60	.58	.47	.39	.35	.36	.38
[b]29	80.3	1.20	1.17	1.17	1.14	1.15	1.12	1.07	1.10	1.36

[a]Angle of attack for maximum lift.

[b]Internal pressures.

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TABLE II.- PRESSURE COEFFICIENTS - Continued

(o) $\delta_N = 9^\circ$, $\delta_F = 22^\circ$

Orifice number	x/c	Section angle of attack, α_o, deg						
		-4.1	-2.0	0	2.0	4.1	6.1	[a]8.1
1	0	1.44	1.42	0.48	0.55	1.18	2.23	2.29
2	1	.33	.60	1.11	2.36	2.84	2.92	2.44
3	2	.47	.73	1.15	2.39	2.85	2.94	2.45
4	3	.55	.80	1.16	2.36	2.87	2.94	2.46
5	5	.69	.92	1.24	1.92	2.91	2.96	2.47
6	7.5	.86	1.08	1.31	1.55	2.96	3.01	2.50
7	10	.96	1.17	1.42	1.57	2.46	3.02	2.51
8	12	1.11	1.32	1.56	1.72	2.00	3.00	2.52
9	15	1.48	1.71	1.97	2.10	1.92	2.90	2.54
[b]10	16.1	1.19	.62	1.16	.49	.41	.34	.33
A	18.3	1.24	1.38	1.59	1.75	1.81	2.63	2.51
B	25	1.23	1.36	1.51	1.64	1.72	2.23	2.44
C	35	1.26	1.37	1.48	1.58	1.66	1.81	2.29
D	45	1.30	1.39	1.47	1.55	1.61	1.66	2.08
E	55	1.35	1.42	1.47	1.54	1.57	1.60	1.88
F	65	1.37	1.42	1.47	1.50	1.52	1.55	1.72
G	74	1.40	1.43	1.46	1.47	1.47	1.51	1.61
[b]17	77.03	1.25	1.26	1.26	1.24	1.23	1.28	1.34
18	78.3	1.41	1.43	1.43	1.44	1.44	1.52	1.57
19	80	1.41	1.42	1.41	1.41	1.40	1.50	1.55
20	85	1.39	1.40	1.39	1.39	1.37	1.40	1.48
21	90	1.42	1.44	1.42	1.41	1.39	1.38	1.46
22	95	1.43	1.44	1.43	1.41	1.39	1.36	1.44
23	97.5	1.41	1.42	1.42	1.40	1.38	1.34	1.42
24	100	1.35	1.36	1.37	1.36	1.33	1.29	1.39
11	1.3	1.47	.97	.58	.31	.15	.06	.06
12	2.6	1.47	.92	.63	.41	.25	.14	.14
13	5	1.49	.89	.68	.50	.36	.25	.24
14	7.5	1.48	.85	.68	.54	.41	.33	.30
15	11.4	1.38	.78	.65	.53	.43	.36	.34
H	18.1	1.05	.77	.66	.58	.49	.42	.41
I	25	.91	.87	.77	.69	.61	.54	.53
J	35	.95	.90	.82	.76	.69	.63	.62
K	45	.95	.90	.84	.79	.73	.68	.68
L	55	.92	.87	.83	.78	.73	.70	.70
M	65	.85	.80	.77	.74	.71	.67	.68
N	75	.73	.65	.62	.60	.57	.53	.58
25	85	.73	.65	.64	.62	.60	.57	.60
26	90	.85	.82	.80	.79	.77	.74	.78
27	95	1.00	.98	.98	.96	.94	.91	.96
28	97.5	1.09	1.09	1.09	1.08	1.05	1.02	1.08
[b]16	15	1.18	.62	.60	.50	.40	.34	.33
[b]29	80.3	1.24	1.23	1.23	1.20	1.18	1.23	1.29

[a]Angle of attack for maximum lift.
[b]Internal pressures.

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TABLE II.- PRESSURE COEFFICIENTS – Continued

(p) $\delta_N = 9^\circ$, $\delta_F = 42^\circ$

Orifice number	x/c	Section angle of attack, α_o, deg						
		-4.1	-2.0	0	2.0	4.1	[a]6.1	8.1
1	0	1.00	0.34	0.52	1.47	2.41	2.57	2.25
2	1	.63	1.21	2.38	2.84	3.08	2.63	2.26
3	2	.77	1.17	2.41	2.86	3.09	2.63	2.27
4	3	.83	1.18	2.39	2.88	3.10	2.64	2.27
5	5	.95	1.26	1.99	2.92	3.12	2.65	2.28
6	7.5	1.08	1.33	1.63	2.94	3.17	2.66	2.28
7	10	1.21	1.45	1.59	2.41	3.18	2.68	2.30
8	12	1.36	1.60	1.75	1.96	3.10	2.71	2.32
9	15	1.77	2.02	2.14	1.95	2.86	2.74	2.34
[b]10	16.1	.58	.56	.45	.37	.32	.28	.29
A	18.3	1.44	1.57	1.79	1.84	2.45	2.70	2.33
B	25	1.41	1.60	1.69	1.77	2.01	2.66	2.34
C	35	1.45	1.55	1.65	1.70	1.77	2.49	2.32
D	45	1.47	1.56	1.63	1.67	1.71	2.26	2.24
E	55	1.52	1.58	1.62	1.65	1.67	2.00	2.14
F	65	1.56	1.60	1.61	1.62	1.63	1.80	2.01
G	74	1.61	1.64	1.62	1.59	1.60	1.68	1.90
[b]17	77.03	1.61	1.61	1.55	1.50	1.51	1.62	1.87
18	78.3	1.92	1.90	1.78	1.70	1.68	1.68	1.81
19	80	1.64	1.62	1.54	1.47	1.47	1.59	1.78
20	85	1.64	1.62	1.55	1.48	1.48	1.56	1.75
21	90	1.65	1.64	1.56	1.49	1.49	1.56	1.75
22	95	1.66	1.65	1.57	1.50	1.50	1.55	1.72
23	97.5	1.65	1.64	1.56	1.49	1.49	1.54	1.70
24	100	1.61	1.60	1.54	1.47	1.47	1.51	1.67
11	1.3	.89	.52	.28	.14	.05	.03	.04
12	2.6	.86	.57	.38	.23	.14	.11	.12
13	5	.83	.62	.47	.33	.24	.21	.22
14	7.5	.80	.63	.50	.38	.29	.26	.27
15	11.4	.72	.59	.50	.40	.33	.31	.31
H	18.1	.71	.60	.53	.45	.38	.36	.37
I	25	.79	.70	.62	.55	.49	.46	.48
J	35	.80	.73	.67	.60	.56	.53	.55
K	45	.78	.72	.68	.62	.58	.56	.59
L	55	.70	.67	.63	.59	.56	.55	.58
M	65	.57	.55	.53	.49	.48	.48	.52
N	75	.44	.37	.35	.32	.31	.29	.33
25	85	.38	.33	.32	.29	.29	.29	.32
26	90	.56	.55	.54	.52	.50	.50	.55
27	95	.84	.82	.80	.77	.76	.77	.83
28	97.5	1.03	1.01	.99	.94	.93	.94	1.04
[b]16	15	.57	.56	.45	.37	.32	.28	.29
[b]29	80.3	1.36	1.35	1.29	1.25	1.25	1.31	1.51

[a]Angle of attack for maximum lift.
[b]Internal pressures.

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TABLE II.- PRESSURE COEFFICIENTS - Continued

(q) $\delta_N = 21^\circ$, $\delta_F = 42^\circ$

Orifice number	x/c	Section angle of attack, α_o, deg								
		-4.1	-2.0	0	2.0	4.1	6.1	8.1	[a]10.2	12.2
1	0	1.19	0.94	1.02	0.28	0.88	2.09	3.24	3.87	2.84
2	1	.17	.43	.72	1.78	2.70	3.32	3.94	4.21	3.17
3	2	.32	.58	.85	1.28	2.73	3.35	3.97	4.22	3.18
4	3	.40	.67	.93	1.29	2.73	3.37	3.98	4.24	3.19
5	5	.57	.84	1.09	1.42	2.20	3.42	4.03	4.27	3.22
6	7.5	.80	1.05	1.20	1.56	1.93	2.42	4.10	4.32	3.27
7	10	.98	1.25	1.49	1.79	1.96	2.21	3.60	4.35	3.28
8	12	1.25	1.52	1.75	2.09	2.29	2.26	2.77	3.97	3.14
9	15	1.95	2.23	2.35	2.97	3.18	3.08	2.78	3.26	2.95
10	16.1	2.03	2.34	2.45	2.67	2.80	2.74	2.62	2.56	2.37
A	18.3	1.56	1.97	2.58	2.41	2.59	2.67	2.70	2.76	2.69
B	25	1.44	1.63	1.77	1.97	2.13	2.23	2.32	2.40	2.52
C	35	1.43	1.59	1.71	1.82	1.93	2.00	2.06	2.10	2.33
D	45	1.45	1.58	1.67	1.76	1.83	1.87	1.92	1.93	2.16
E	55	1.49	1.60	1.67	1.73	1.77	1.79	1.81	1.80	2.03
F	65	1.51	1.62	1.66	1.70	1.72	1.71	1.70	1.68	1.91
G	74	1.56	1.66	1.68	1.70	1.68	1.64	1.61	1.59	1.83
[b]17	77.03	1.55	1.65	1.64	1.57	1.60	1.54	1.50	1.51	1.78
18	78.3	1.82	1.96	1.90	1.87	1.80	1.68	1.62	1.60	1.80
19	80	1.58	1.65	1.62	1.61	1.57	1.49	1.46	1.46	1.73
20	85	1.59	1.65	1.62	1.61	1.58	1.49	1.46	1.45	1.70
21	90	1.60	1.67	1.65	1.63	1.59	1.50	1.47	1.47	1.69
22	95	1.59	1.67	1.66	1.64	1.60	1.51	1.48	1.47	1.67
23	97.5	1.58	1.66	1.64	1.62	1.59	1.50	1.47	1.47	1.66
24	100	1.57	1.62	1.60	1.60	1.55	1.49	1.46	1.45	1.63
11	1.3	1.19	.94	.73	.39	.20	.09	.03	.01	.02
12	2.6	1.19	.95	.68	.43	.27	.17	.09	.05	.07
13	5	1.20	.95	.63	.45	.33	.24	.17	.12	.14
14	7.5	1.20	.95	.57	.44	.34	.26	.20	.16	.18
15	11.4	1.21	.94	.45	.39	.30	.24	.19	.17	.18
H	18.1	1.23	.85	.40	.34	.28	.24	.20	.18	.19
I	25	1.26	.65	.56	.49	.43	.38	.33	.29	.31
J	35	1.16	.65	.64	.57	.51	.46	.42	.39	.41
K	45	.96	.68	.66	.60	.55	.51	.47	.44	.47
L	55	.82	.65	.62	.57	.54	.51	.47	.45	.48
M	65	.74	.56	.53	.49	.47	.44	.42	.40	.43
N	75	.68	.45	.37	.34	.32	.29	.28	.27	.29
25	85	.63	.43	.33	.36	.29	.27	.26	.26	.28
26	90	.69	.60	.53	.51	.50	.48	.47	.46	.50
27	95	.85	.83	.80	.78	.77	.73	.72	.71	.78
28	97.5	1.00	1.02	1.00	.98	.95	.92	.89	.88	.98
[b]16	15	1.23	.90	.37	.28	.31	.28	.22	.18	.20
[b]29	80.3	1.34	1.37	1.37	1.35	1.33	1.27	1.24	1.24	1.45

[a]Angle of attack for maximum lift.

[b]Internal pressures.

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TABLE II.- PRESSURE COEFFICIENTS - Concluded

(r) $\delta_N = 27^\circ$, $\delta_F = 60^\circ$

Orifice number	x/c	Section angle of attack, α_o, deg								
		-4.1	-2.0	0	2.0	4.1	6.1	8.1	[a]10.2	12.2
1	0	0.42	0.75	0.29	0.18	1.30	2.73	4.07	4.79	4.55
2	1	.21	.46	.82	2.13	2.87	3.56	4.26	4.80	4.32
3	2	.36	.62	.95	1.51	2.91	3.59	4.28	4.82	4.33
4	3	.45	.72	1.02	1.35	2.93	3.61	4.31	4.83	4.35
5	5	.64	.90	1.20	1.50	2.49	3.67	4.36	4.87	4.37
6	7.5	.94	1.18	1.48	1.80	2.13	3.00	4.36	4.92	4.40
7	10	1.13	1.42	1.71	2.02	2.18	2.40	3.62	4.73	4.41
8	12	1.48	1.81	2.13	2.47	2.69	2.68	2.91	3.82	3.97
9	15	2.69	3.21	3.68	4.20	4.44	4.33	3.88	3.49	3.33
10	16.1	2.99	3.54	4.16	4.68	4.88	4.70	4.26	3.72	3.21
A	18.3	1.78	2.05	2.30	2.57	2.79	2.93	3.02	3.06	2.86
B	25	1.63	1.83	2.02	2.20	2.35	2.46	2.57	2.63	2.54
C	35	1.59	1.74	1.88	2.00	2.11	2.19	2.26	2.30	2.25
D	45	1.61	1.72	1.83	1.92	1.99	2.05	2.08	2.10	2.05
E	55	1.64	1.74	1.82	1.88	1.92	1.94	1.96	1.94	1.91
F	65	1.71	1.74	1.80	1.87	1.86	1.85	1.84	1.81	1.80
G	74	1.84	1.69	1.76	1.90	1.83	1.70	1.69	1.67	1.71
17	77.03	2.29	2.16	2.14	2.13	2.06	2.02	2.05	2.08	1.99
18	78.3	1.88	1.91	1.89	1.88	1.85	1.80	1.78	1.67	1.68
19	80	1.79	1.95	1.94	1.92	1.87	1.80	1.72	1.61	1.66
20	85	1.81	1.86	1.85	1.83	1.78	1.72	1.65	1.60	1.65
21	90	1.81	1.85	1.83	1.82	1.78	1.70	1.66	1.60	1.64
22	95	1.82	1.83	1.82	1.80	1.77	1.70	1.65	1.60	1.64
23	97.5	1.82	1.81	1.81	1.78	1.76	1.69	1.64	1.59	1.63
24	100	1.82	1.75	1.76	1.76	1.72	1.66	1.61	1.58	1.62
11	1.3	.96	.75	.58	.30	.15	.04	.01	0	0
12	2.6	.96	.75	.54	.34	.21	.12	.06	.02	.03
13	5	.97	.75	.50	.36	.25	.18	.12	.08	.09
14	7.5	.98	.74	.45	.34	.25	.19	.14	.11	.11
15	11.4	.98	.73	.31	.30	.23	.17	.13	.11	.11
H	18.1	1.00	.67	.29	.24	.20	.16	.13	.12	.12
I	25	1.02	.51	.44	.37	.33	.28	.24	.22	.22
J	35	.91	.51	.50	.45	.40	.35	.32	.30	.30
K	45	.75	.53	.50	.45	.42	.37	.35	.33	.34
L	55	.63	.48	.44	.41	.38	.35	.33	.32	.33
M	65	.58	.40	.32	.29	.29	.26	.25	.25	.25
N	75	.52	.32	.26	.23	.22	.19	.18	.17	.18
25	85	.47	.28	.22	.20	.18	.15	.14	.14	.14
26	90	.49	.38	.29	.26	.25	.24	.23	.23	.24
27	95	.65	.62	.57	.55	.53	.51	.50	.48	.51
28	97.5	.84	.84	.81	.79	.77	.73	.71	.69	.72
[b]16	15	.98	.67	.18	.15	.19	.15	.12	.10	.10
[b]29	80.3	.68	.49	.49	.46	.46	.44	.42	.41	.42

[a]Angle of attack for maximum lift.
[b]Internal pressures.

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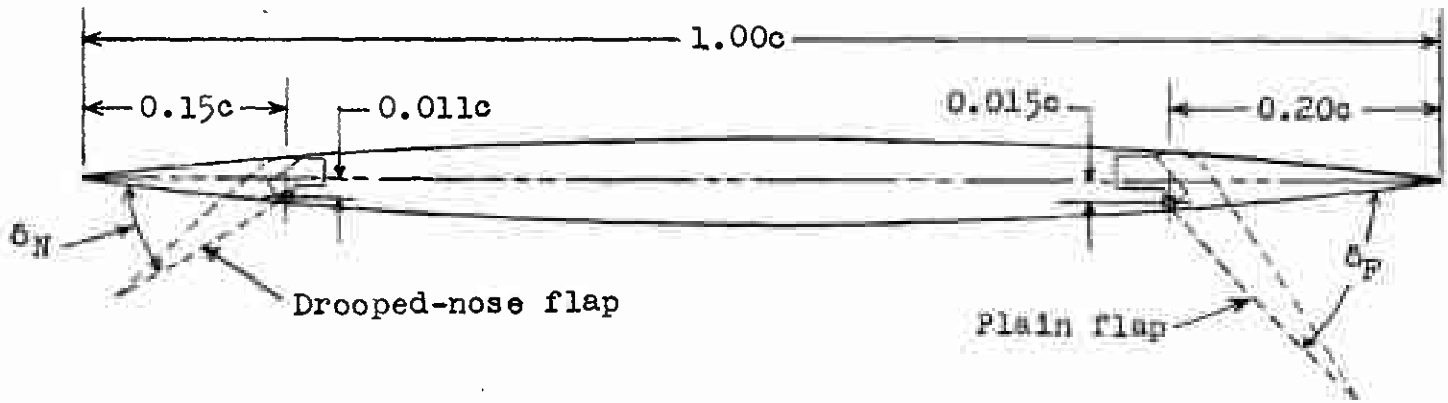

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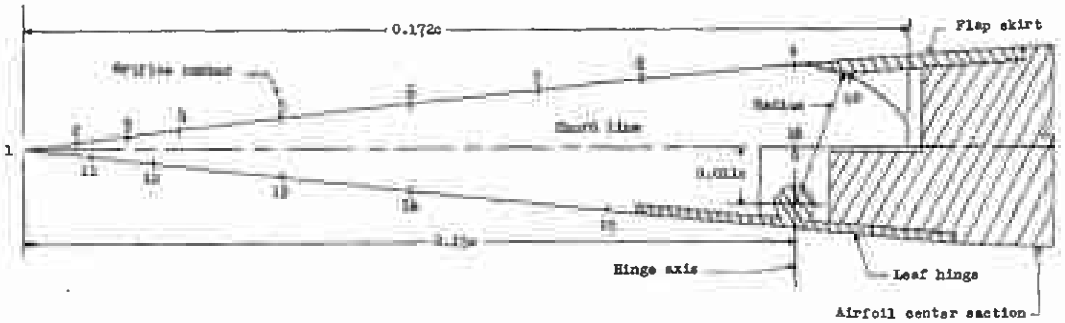
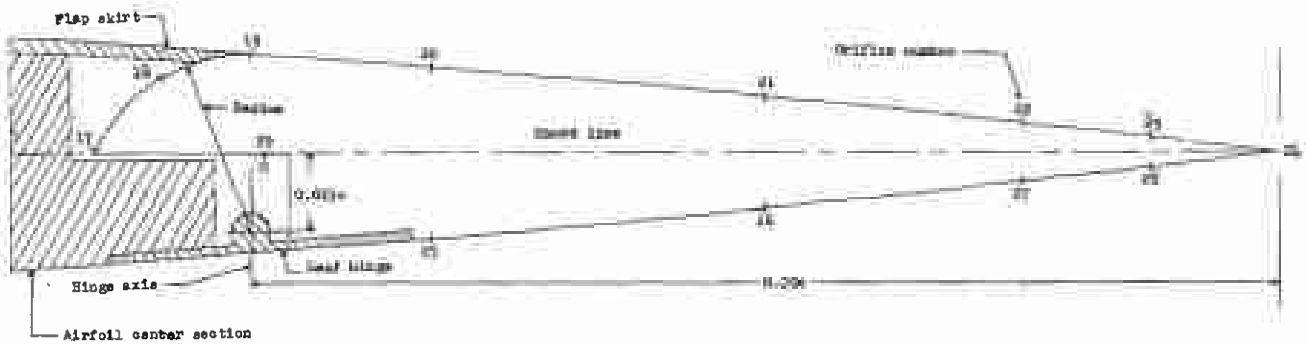
Figure 1.- Profile of NACA 2S-(50)(03)-(50)(03) airfoil with leading-edge and trailing-edge high-lift devices.



Drooped-nose flap

Drooped-Nose Flap

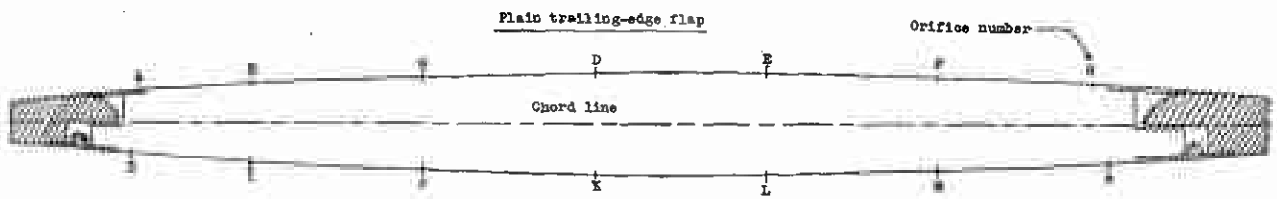
Orifice number	x/c	y/c
1	0	0
2	1	.11
3	2	.23
4	3	.35
5	5	.57
6	7.5	.84
7	10	1.08
8	12	1.28
9	15	1.47
10	16.1	1.17
11	1.3	-.15
12	2.6	-.30
13	5	-.57
14	7.5	-.83
15	11.4	-1.21
16	15	-.11



Plain trailing-edge flap

Plain Trailing-Edge Flap

Orifice number	x/c	y/c
17	77.03	0.25
18	78.3	1.54
19	80	1.87
20	85	1.53
21	90	1.08
22	95	.57
23	97.5	.29
24	100	0
25	85	-1.53
26	90	-1.08
27	95	-.57
28	97.5	-.29
29	80.3	-.15



Airfoil center section

Airfoil Center Section

Orifice number	x/c
A	18.3
B	25
C	35
D	45
E	55
F	65
G	74
H	18.1
I	25
J	35
K	45
L	55
M	65
N	75

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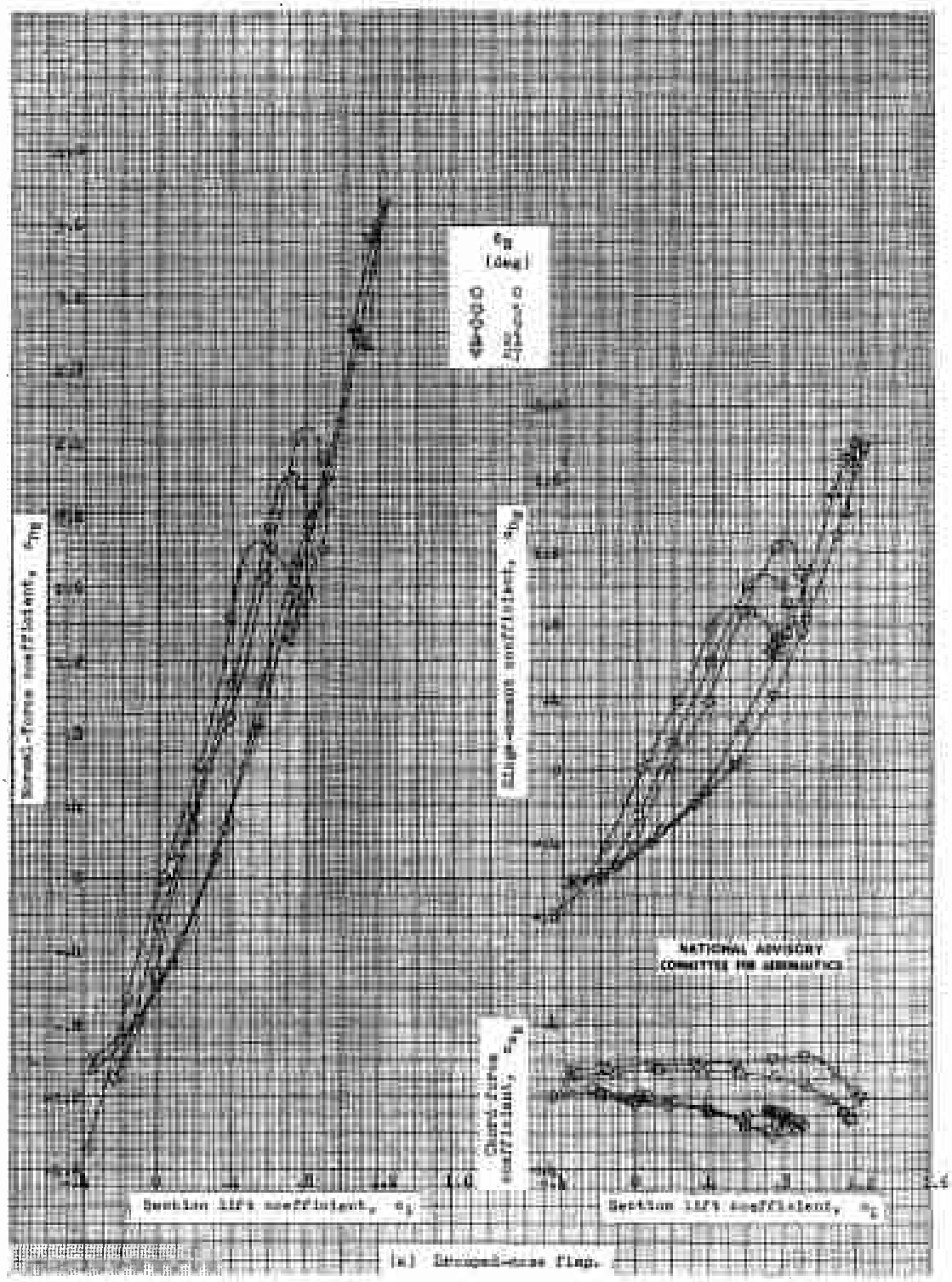
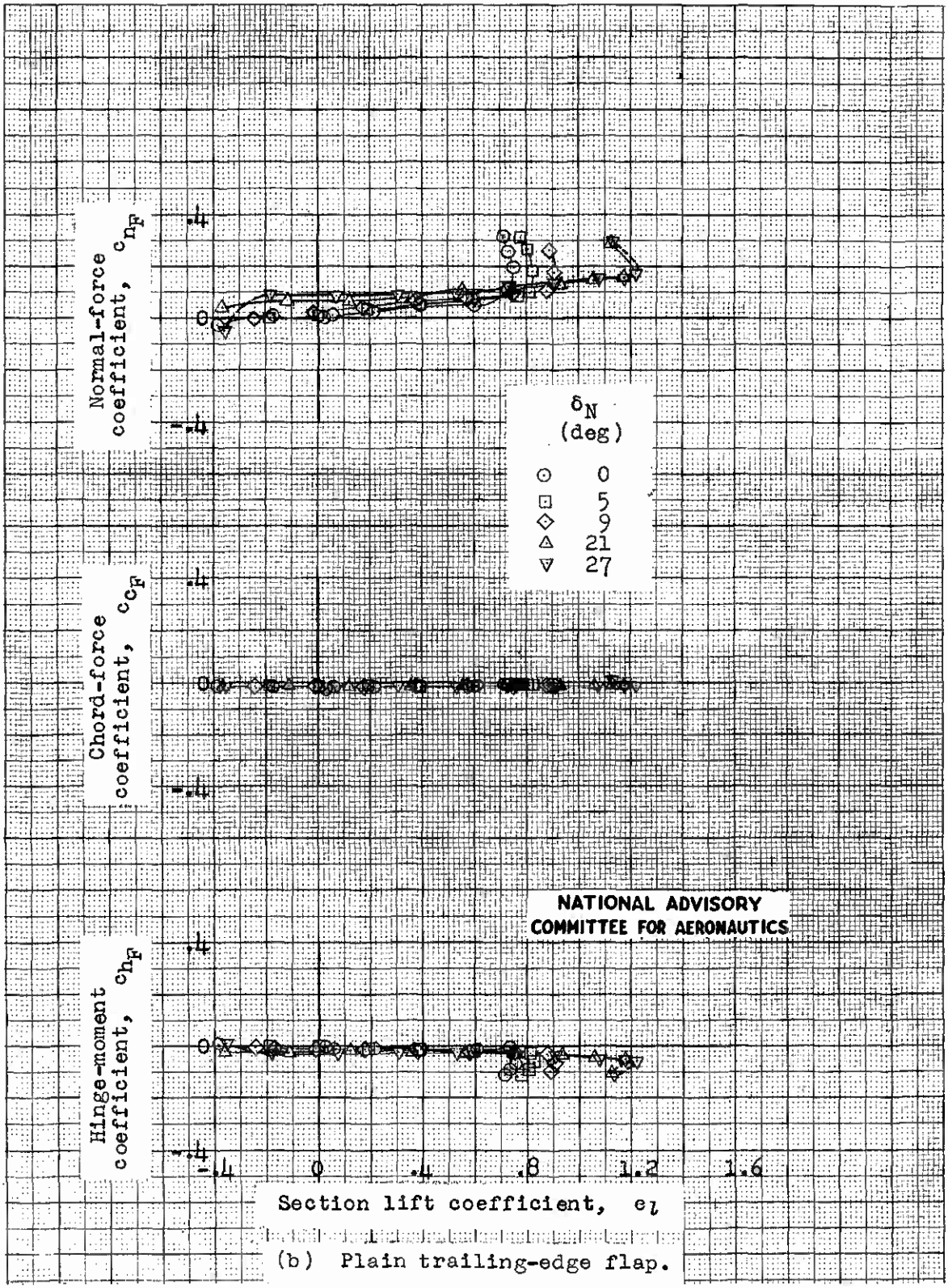
Figure 2.- Location of pressure orifices on NACA 2S-(50)(03)-(50)(03) airfoil with a 0.15c drooped-nose and a 0.20c plain trailing-edge flap.



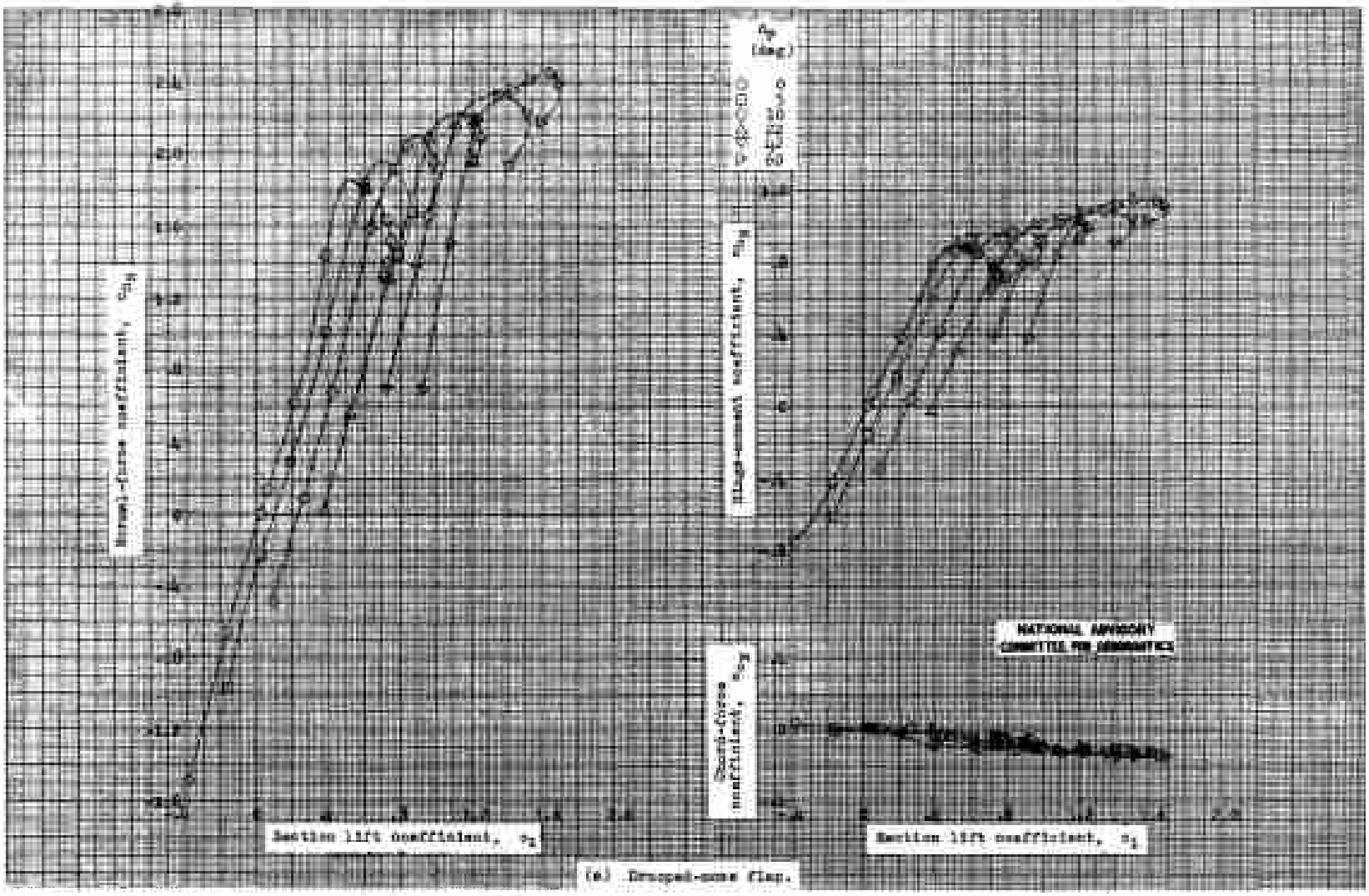
(a) Drooped-nose flap.

Figure 3.- Section flap load and hinge-moment characteristics of an NACA 2S-(50)(03)-(50)(03) airfoil for various deflections of the 0.15-chord drooped-nose flap; R, 2.1×10^6, $\delta_F = 0^\circ$.



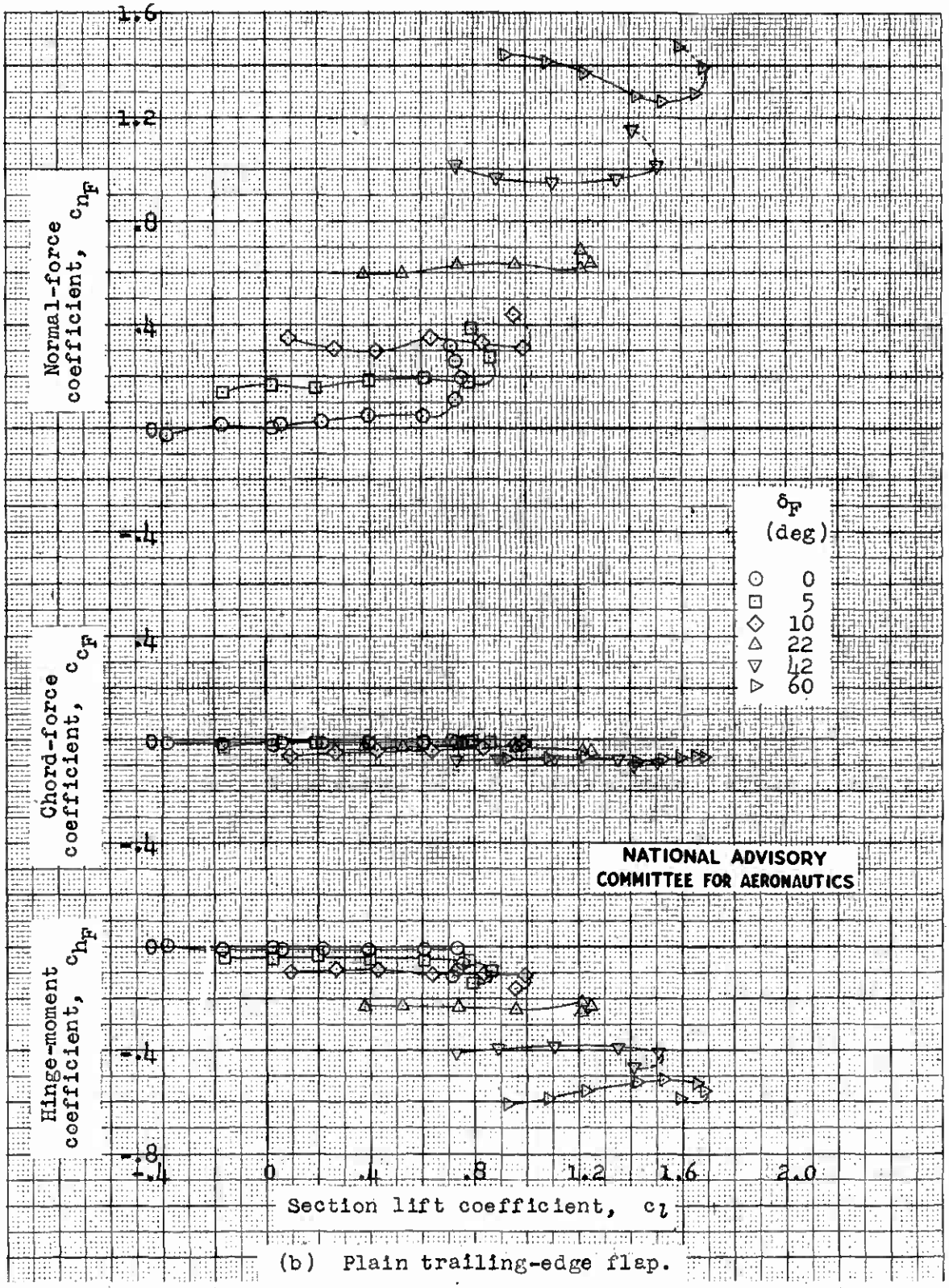
(b) Plain trailing-edge flap.

Figure 3.- Concluded.



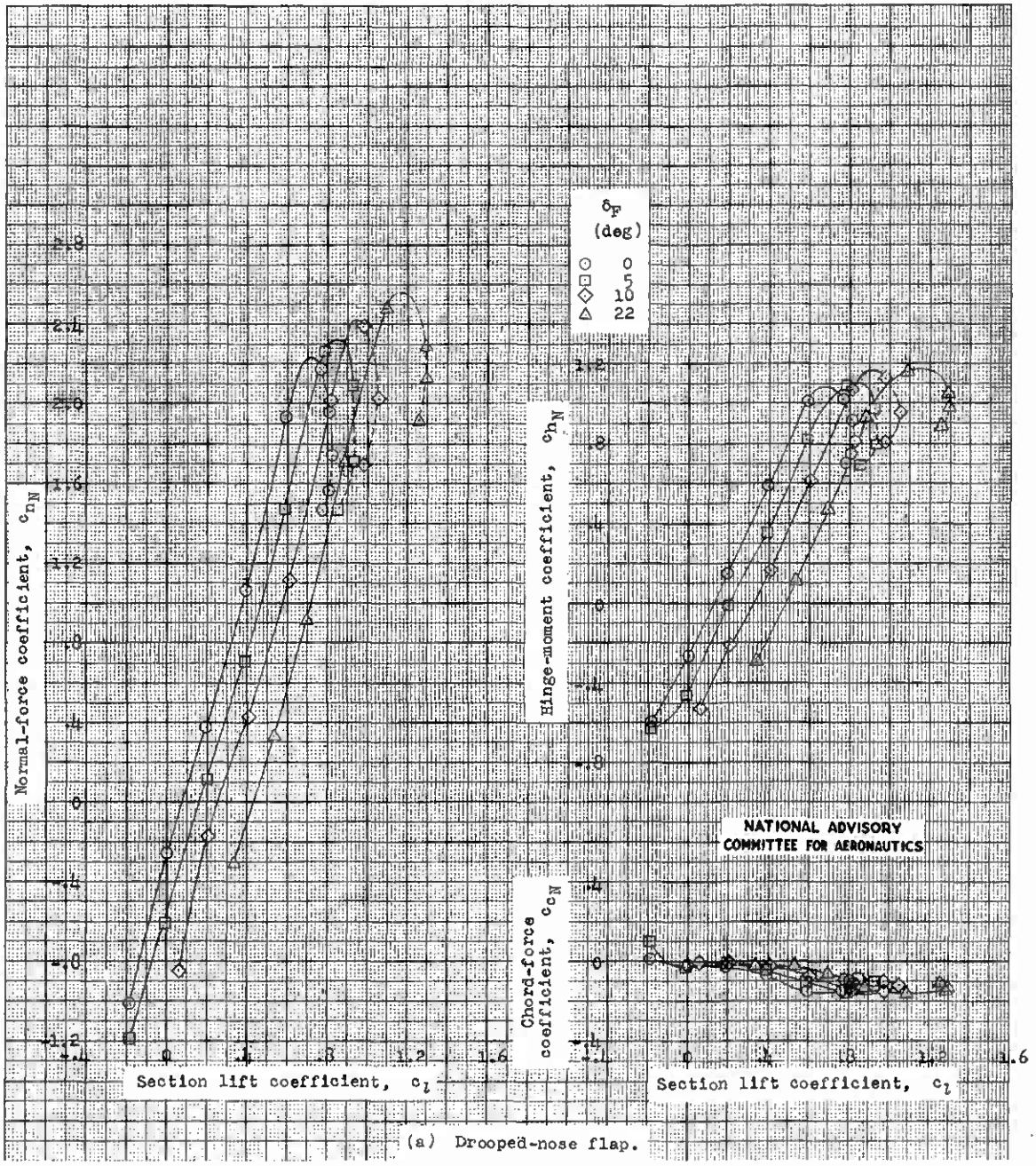
(e) Dropped-nose flap.

Figure 4.- Section flap load and hinge-moment characteristics of an NACA 2S-(50)(03)-(50)(03) airfoil for various deflections of the 0.20-chord plain trailing-edge flap; R, 2.1×10^6, $\delta_N = 0^\circ$.



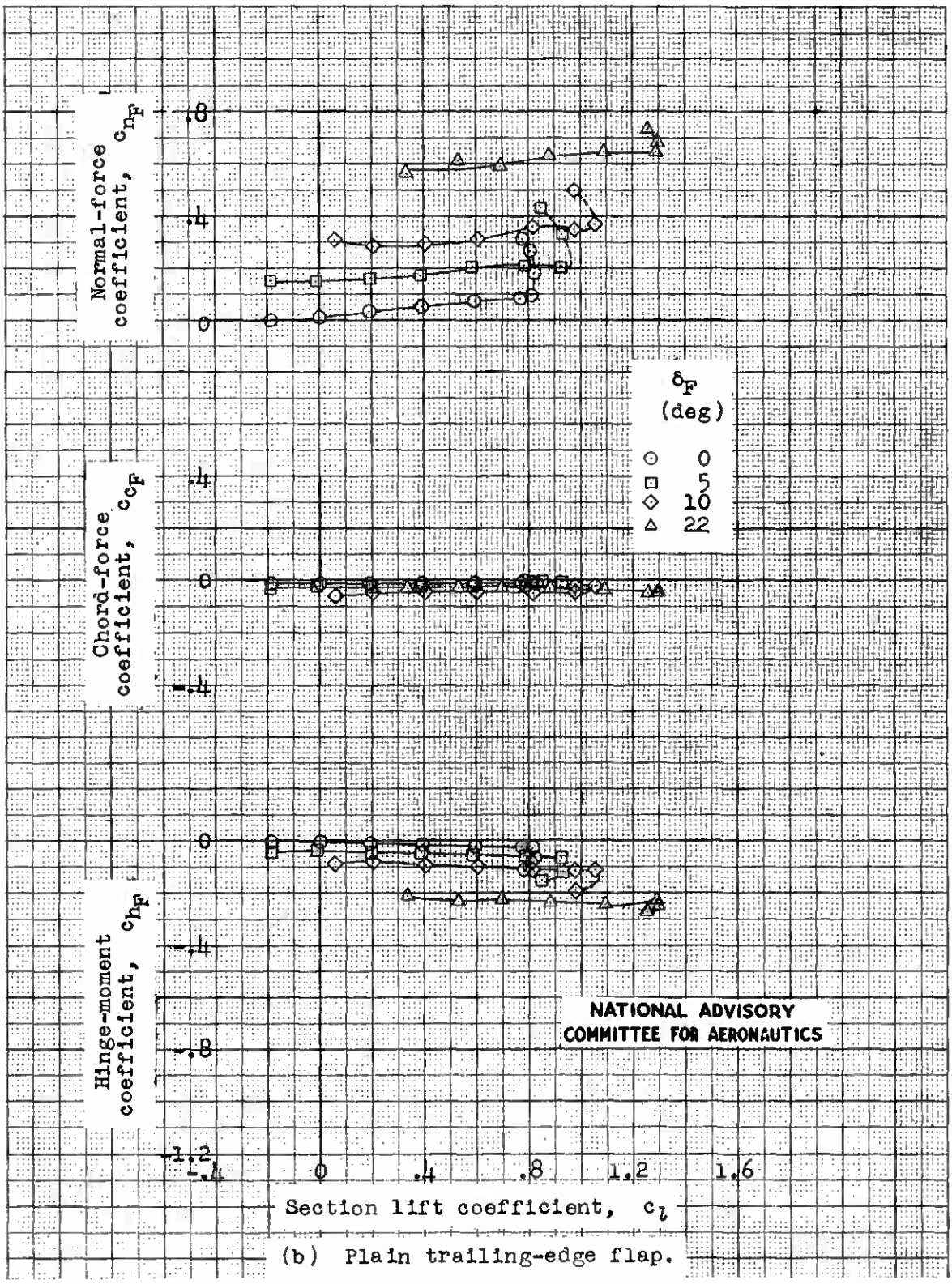
(b) Plain trailing-edge flap.

Figure 4.- Concluded.



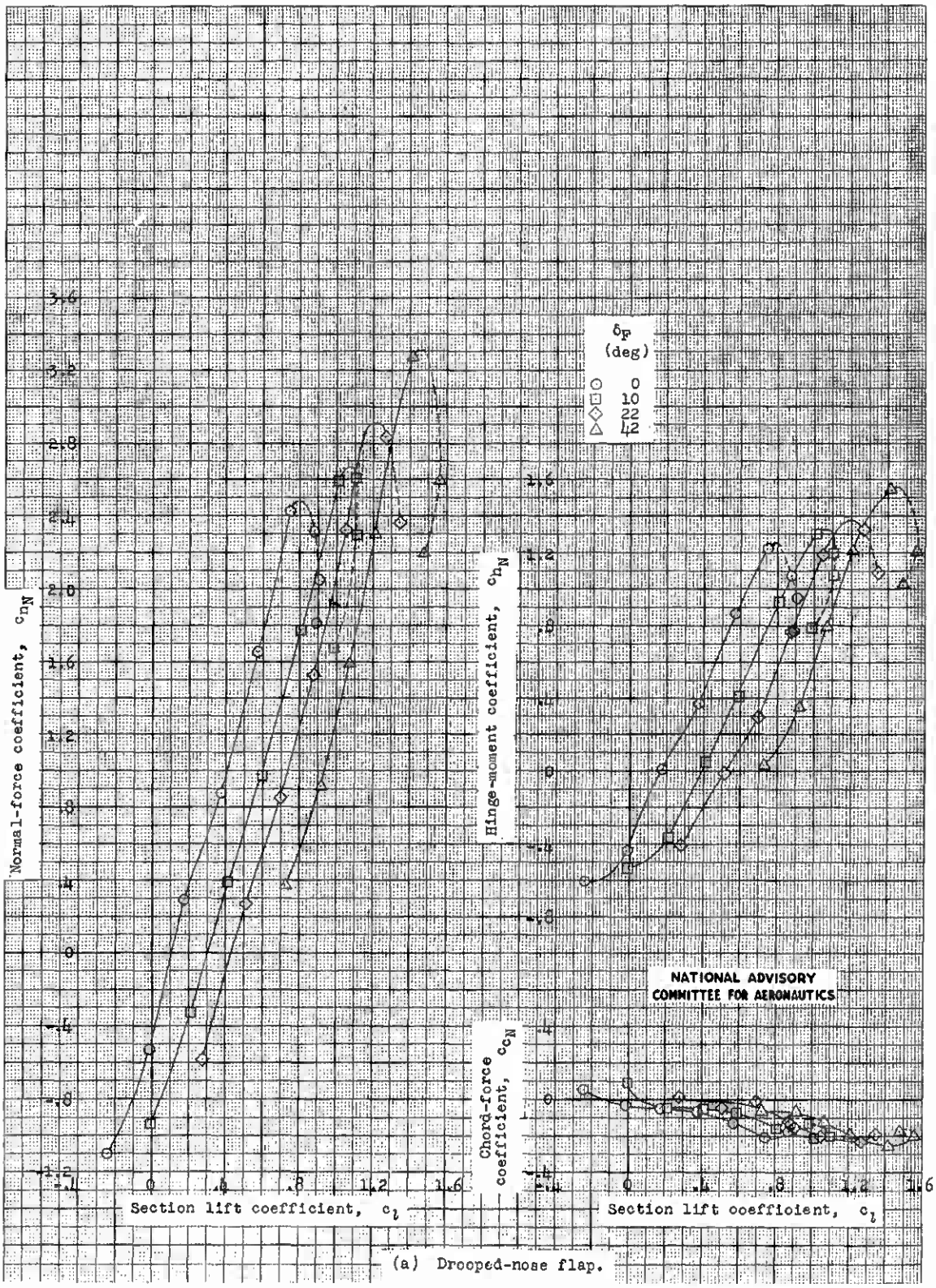
(a) Drooped-nose flap.

Figure 5.- Section flap load and hinge-moment characteristics of an NACA 2S-(50)(03)-(50)(03) airfoil for various deflections of the 0.20-chord plain trailing-edge flap; R, 2.1×10^6, $\delta_N = 5^\circ$.



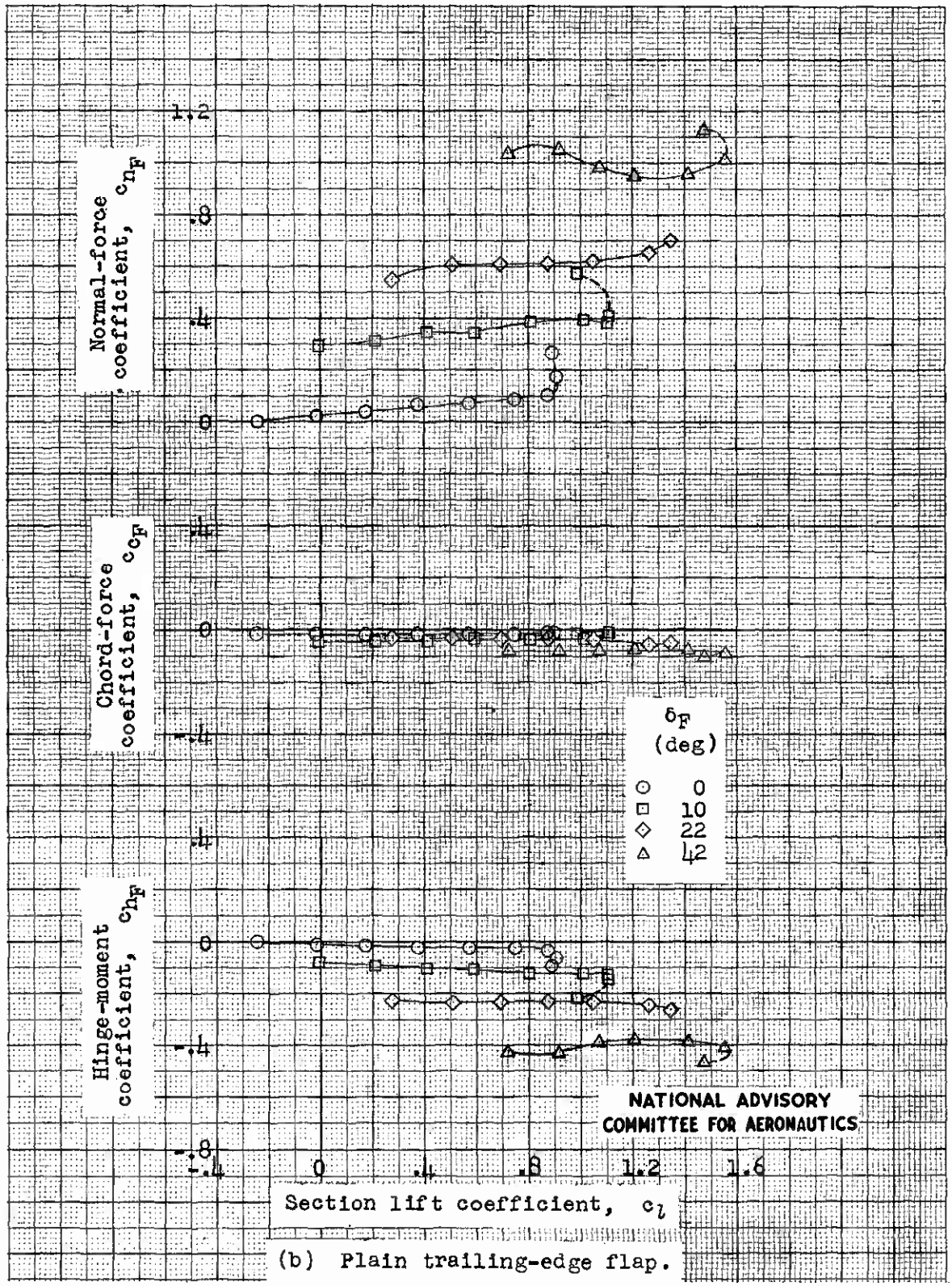
(b) Plain trailing-edge flap.

Figure 5.- Concluded.



(a) Drooped-nose flap.

Figure 6.- Section flap load and hinge-moment characteristics of an NACA 2S-(50)(03)-(50)(03) airfoil for various deflections of the 0.20-chord plain trailing-edge flap; R, 2.1×10^6, $\delta_N = 9^\circ$.



(b) Plain trailing-edge flap.

Figure 6.- Concluded.

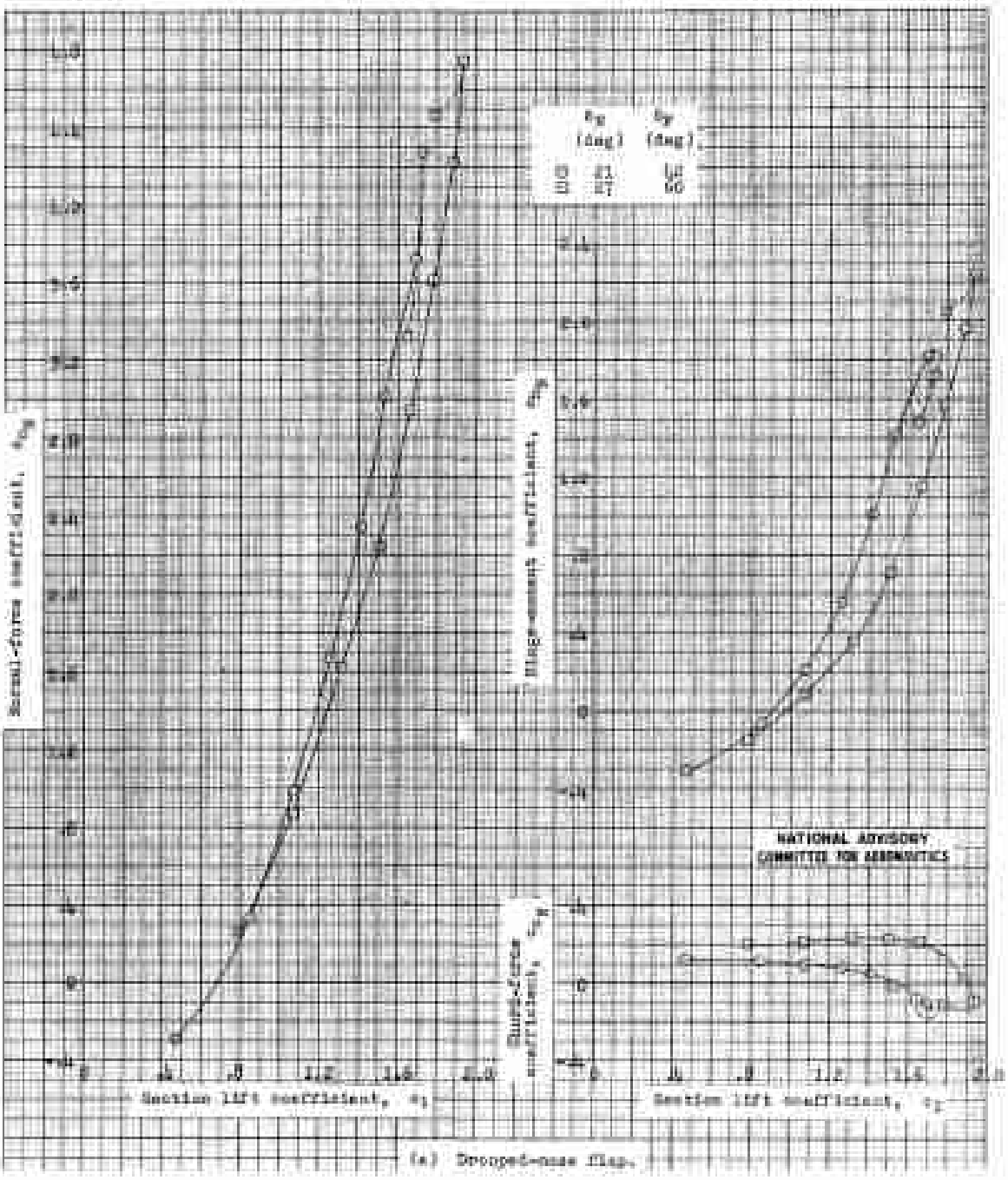
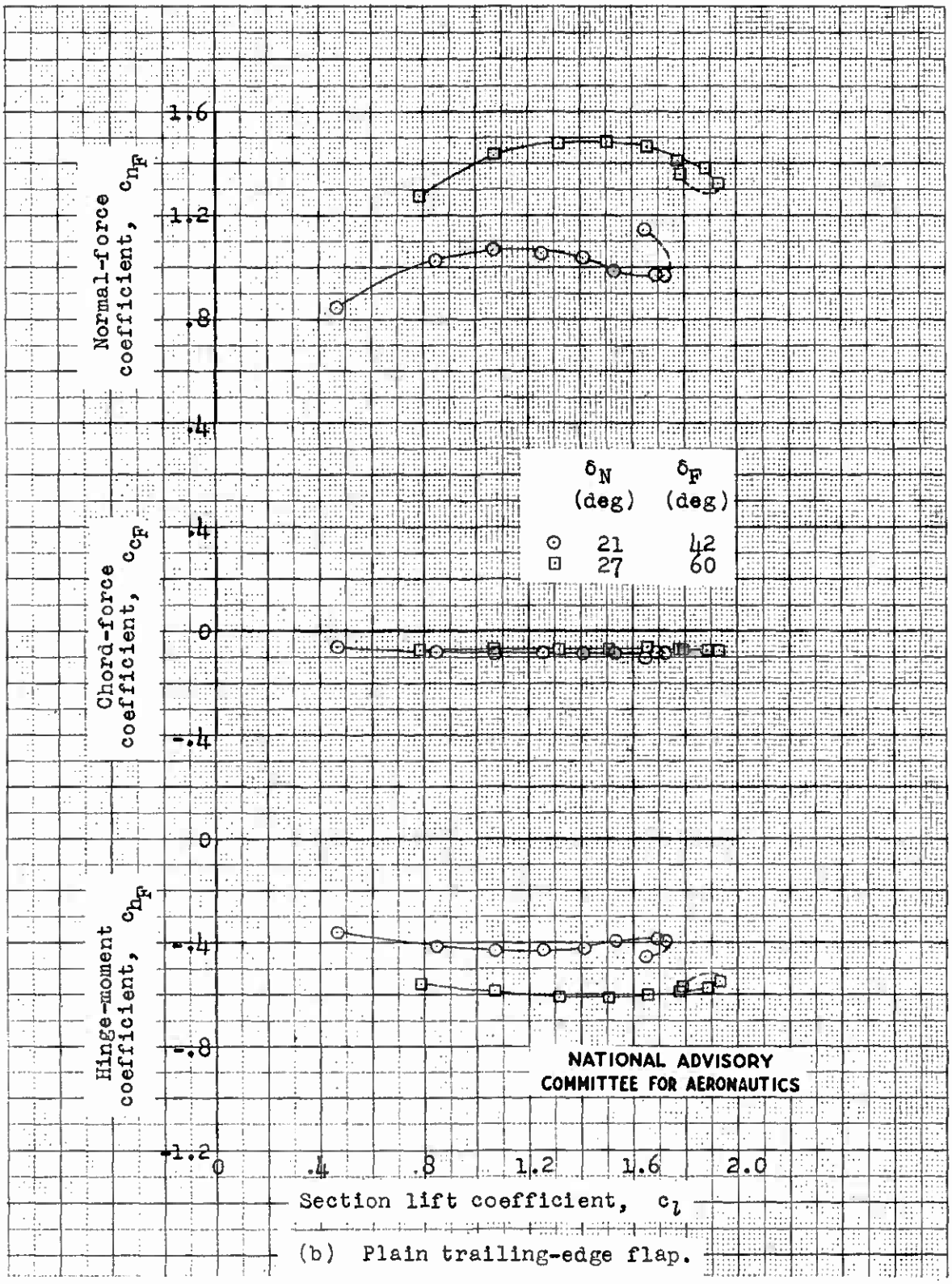


Figure 7.- Section flap load and hinge-moment characteristics of an NACA 2S-(50)(03)-(50)(03) airfoil for various deflections of the 0.15-chord drooped-nose flap and 0.20-chord plain trailing-edge flap; R, 2.1×10^6.



(b) Plain trailing-edge flap.

Figure 7.- Concluded.

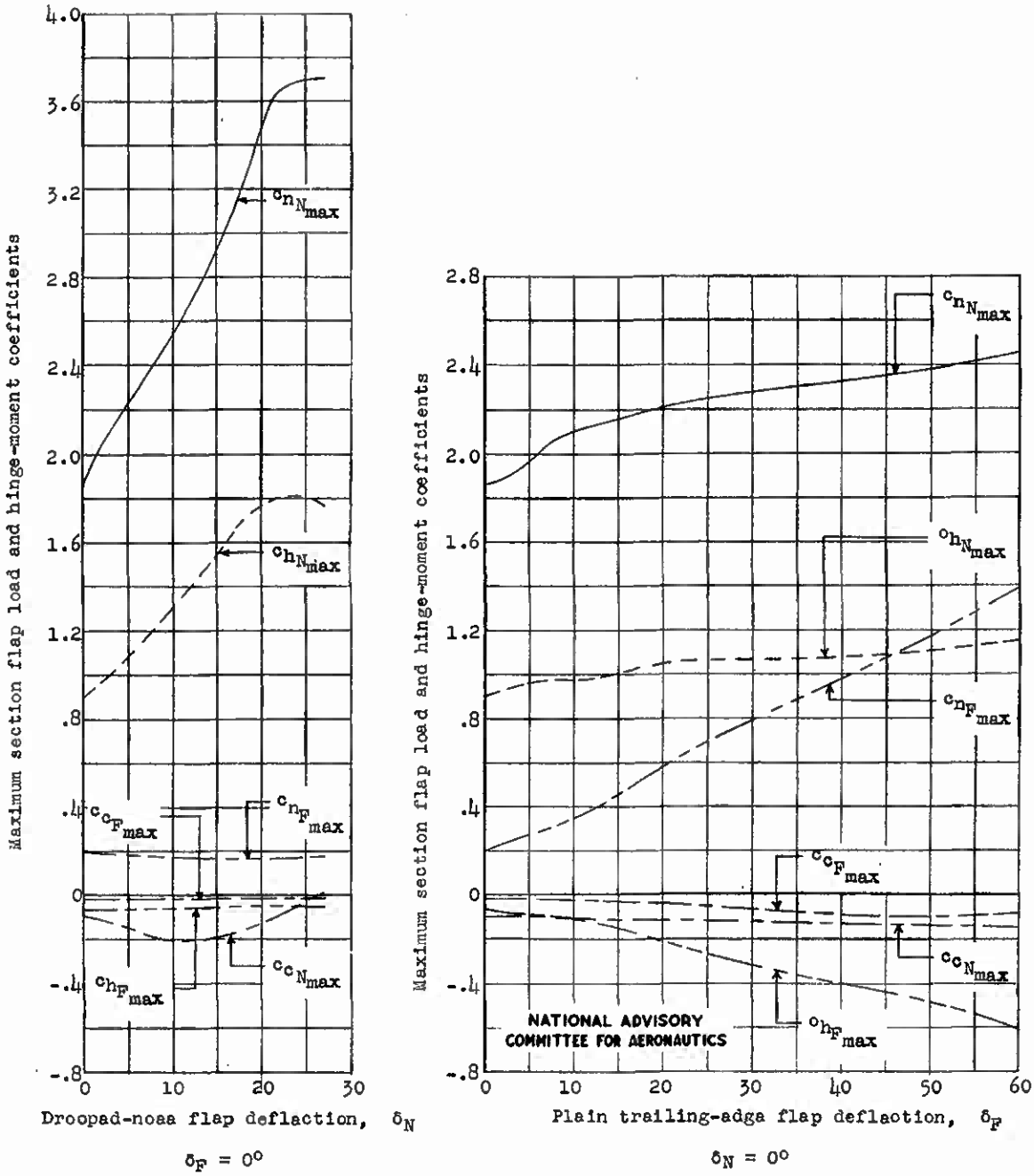


Figure 8.- Variation of maximum section flap load and hinge-moment coefficianta of an NACA 2S-(50)(03)-(50)(03) airfoil for various deflactions of the 0.15-chord drooped-nosa flap and 0.20-chord plain trailing-edge flap; R, 2.1×10^6.

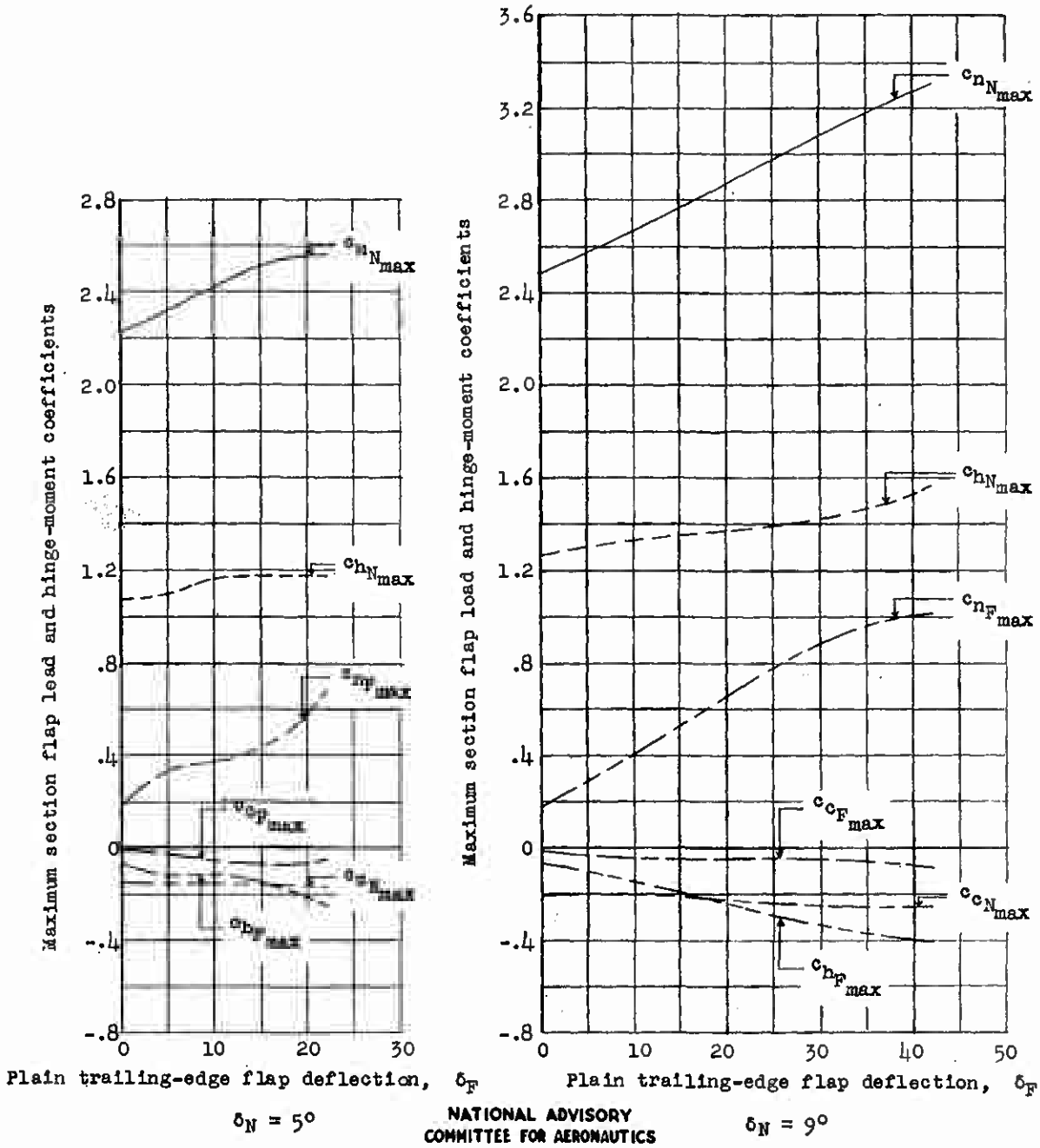


Figure 9.- Variation of maximum section flap load and hinge-moment coefficients with plain trailing-edge flap deflections of an NACA 2S-(50)(03)-(50)(03) airfoil for various deflections of the 0.15-chord drooped-nose flap; R, 2.1×10^6.

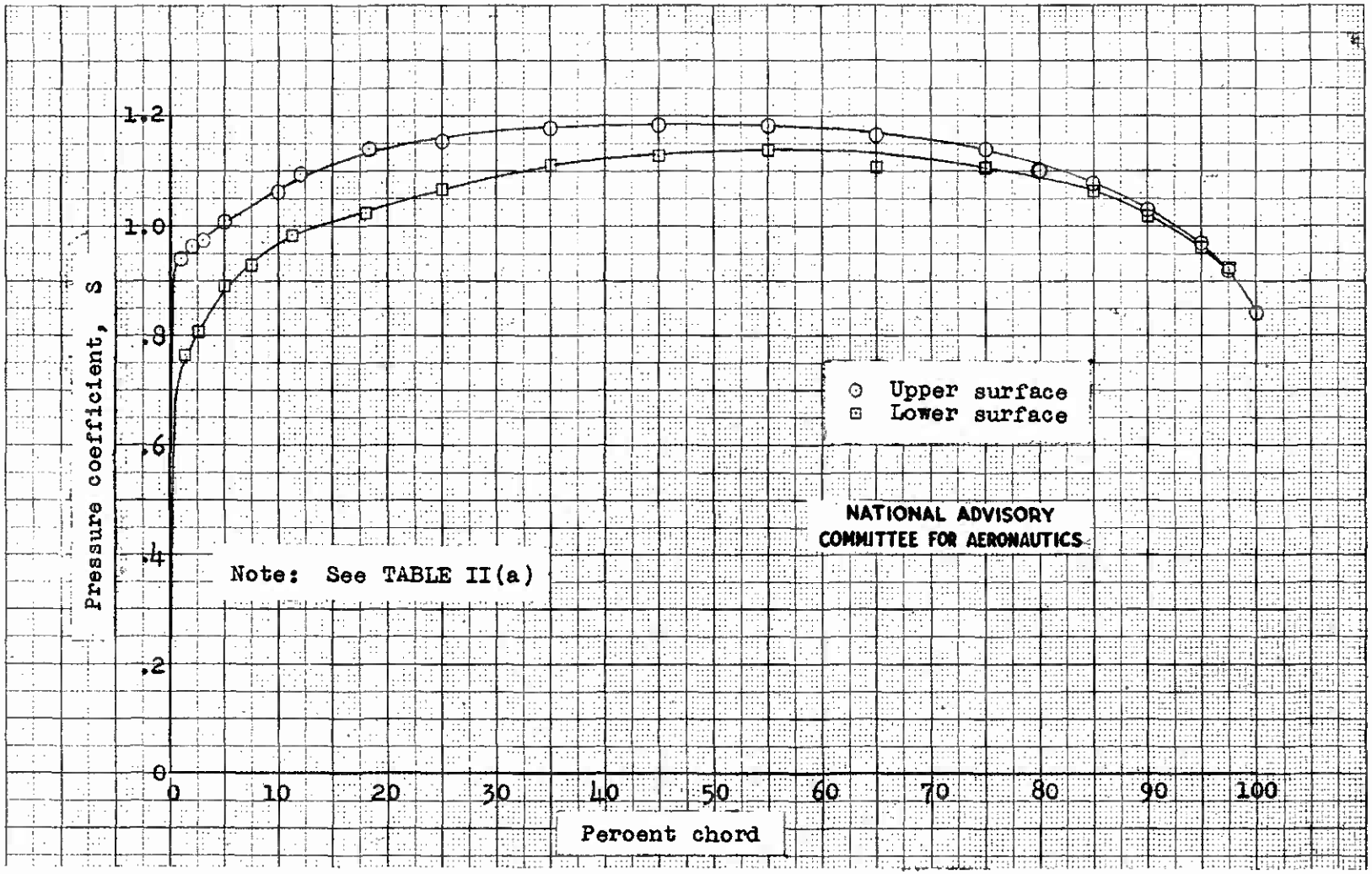


Figure 10 .- Variation of pressure coefficient with percent chord for the NACA 2S-(50)(03)-(50)(03) airfoil with the flaps neutral. R, 2.1×10^6; M, 0.15; α, 0.5°.

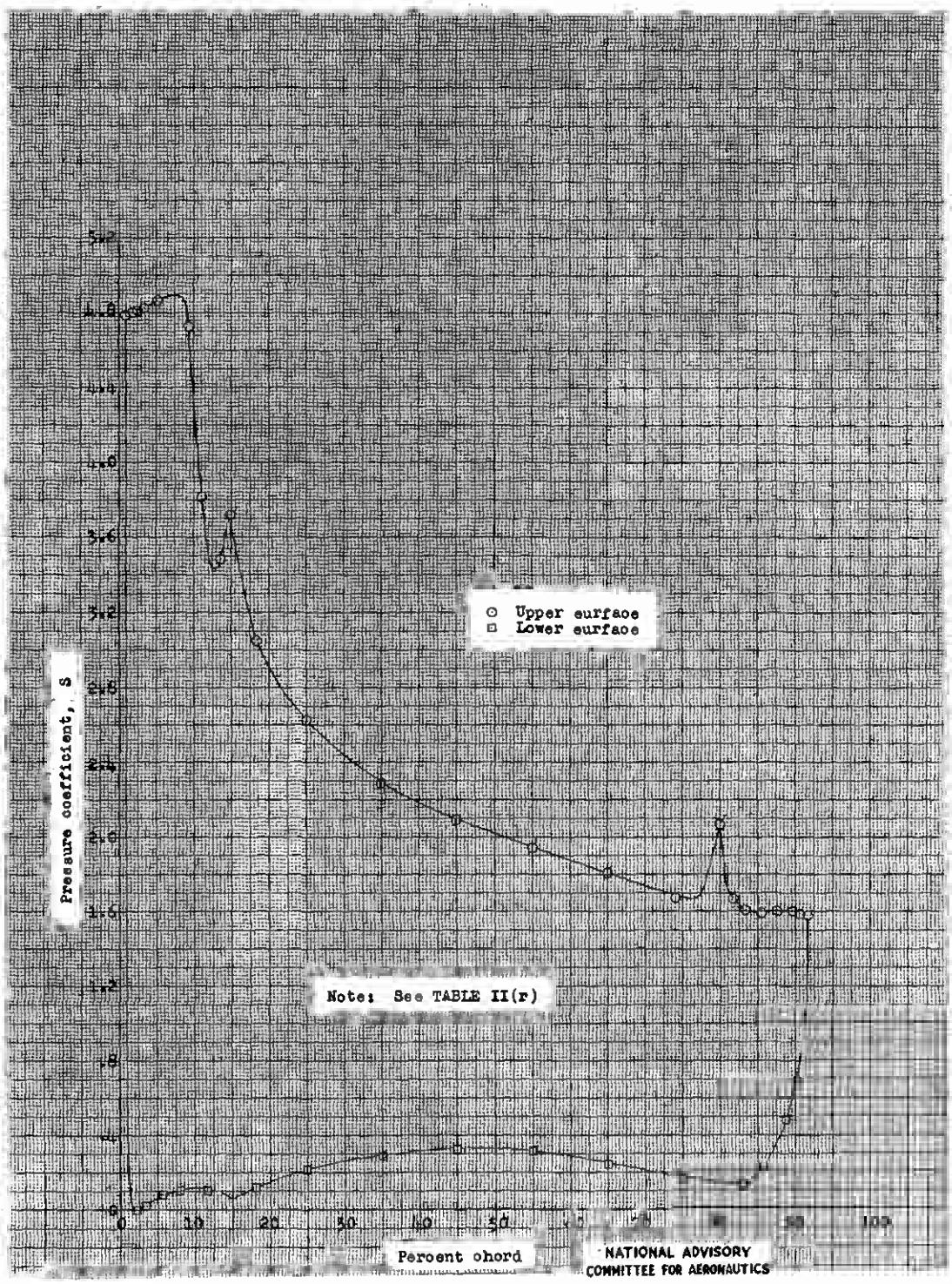


Figure 11 .- Variation of pressure coefficient with percent chord for the NACA 2S-(50)(03)-(50)(03) airfoil with the drooped-nose flap deflected 27° and the plain trailing-edge flap deflected 60°. R, 2.1×10^6; M, 0.15; α, 10.2°.

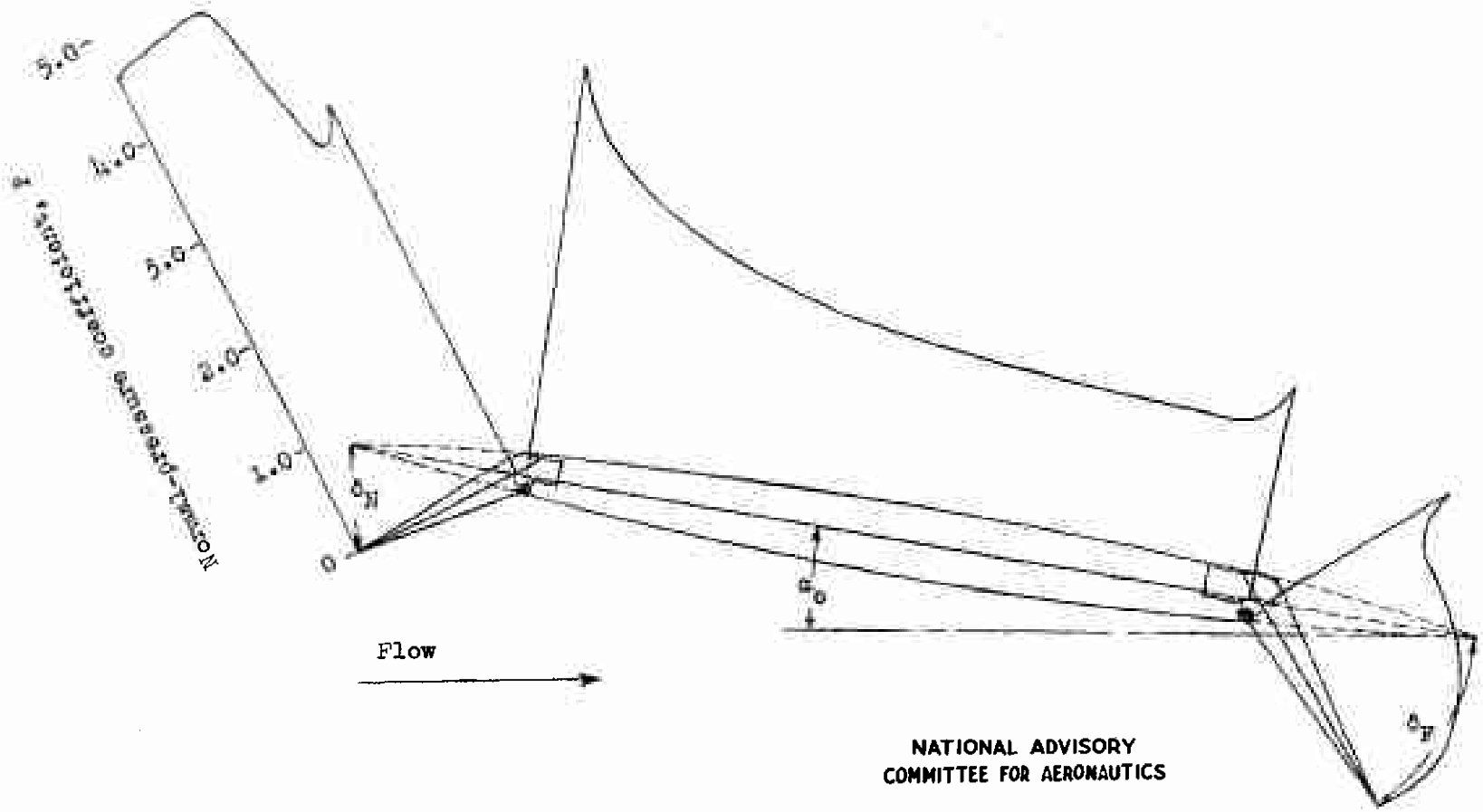


Figure 12.- Load distribution over an NACA 2S-(50)(03)-(50)(03) airfoil; δ_N, 27°; δ_F, 60°. R, 2.1×10^6; α_o, 10.2°.

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ATI-12843

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TITLE: Aerodynamic Load Measurements over Leading-Edge and Trailing-Edge Plain Flaps on a 6-Percent Thick Symmetrical Circular-Arc Airfoil Section

AUTHOR(S): Underwood, W. J.; Nuber, Robert J.

ORIGINATING AGENCY: National Advisory Committee for Aeronautics, Washington, D. C.

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ABSTRACT:

Various flap deflections were investigated either individually or in appropriate combinations. Results indicated that drooped-nose flap section normal-force and hinge-moment coefficients increased rapidly in a positive direction with increasing section lift coefficient, but for given lift coefficient increasing the downwash deflection of either flap produced negative increments. Maximum flap normal-force and hinge-moment coefficients were, respectively, 4.74 and 2.24 for drooped-nose flap as compared with 1.48 and -0.61 for plain trailing-edge flap.

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