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RESEARCH MEMORANDUM

TABULATED PRESSURE COEFFICIENTS AND AERODYNAMIC CHARACTERISTICS MEASURED IN FLIGHT ON THE WING OF THE DOUGLAS D-558-I AIRPLANE THROUGHOUT THE NORMAL-FORCE-COEFFICIENT RANGE AT MACH NUMBERS OF 0.67, 0.74, 0.78, AND 0.82

By Earl R. Keener, James R. Peele, and Julia B. Woodbridge

Langley Aeronautical Laboratory
Langley Field, Va.

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NATIONAL ADVISORY COMMITTEE FOR AERONAUTICS

RESEARCH MEMORANDUM

TABULATED PRESSURE COEFFICIENTS AND AERODYNAMIC CHARACTERISTICS MEASURED IN FLIGHT ON THE WING OF THE DOUGLAS D-558-I AIRPLANE THROUGHOUT THE NORMAL-FORCE-COEFFICIENT RANGE AT MACH NUMBERS OF 0.67, 0.74, 0.78, AND 0.82

By Earl R. Keener, James R. Peele,
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SUMMARY

Tabulated pressure coefficients and aerodynamic characteristics measured in flight are presented for six spanwise stations on the right wing of the D-558-I research airplane (BuAero No. 37972). The data were obtained throughout the normal-force-coefficient range at Mach numbers of 0.67, 0.74, 0.78, and 0.82. This paper supplements similar tabulated data which have been presented in NACA RM L50J10.

INTRODUCTION

As part of the National Advisory Committee for Aeronautics High-Speed Flight-Research Program pressure-distribution measurements have been made over six spanwise stations on the right wing of the Douglas D-558-I research airplane (BuAero No. 37972) to determine the chordwise and spanwise loading at subsonic and transonic Mach numbers.

A paper tabulating measured pressure coefficients and calculated section and wing panel characteristics has been presented previously (reference 1) and included data from a 1g stall at subcritical Mach numbers, a speed run to a Mach number of 0.90 and a wind-up turn at a Mach number of 0.86. The present paper supplements reference 1 and includes data obtained throughout the normal-force-coefficient range at Mach numbers of 0.67, 0.74, 0.78, and 0.82. In order that the data may be made available at an early date no analysis is included.

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SYMBOLS

$b/2$	wing semispan (12.5 ft)
$b'/2$	spanwise distance from row 1 to wing tip (10.1 ft)
c	local wing chord parallel to plane of symmetry, feet
$\bar{c}$	average chord of wing panel, feet (S'/b')
c'	mean aerodynamic chord of the wing panel (5.80 ft) $\left(\frac{2}{S'}\int_0^{b'/2} c^2\,dy'\right)$
c_n	section normal-force coefficient $\left(\int_0^1 P_R\,d\frac{x}{c}\right)$
$c_{m_{c/4}}$	section pitching-moment coefficient about 0.25 local chord point $\left(\int_0^1 P_R\left(0.25 - \frac{x}{c}\right)d\frac{x}{c}\right)$
c_m	section pitching-moment coefficient about a line perpendicular to longitudinal axis of airplane, passing through the 0.25c' $\left(\int_0^1 P_R\left(\frac{0.50c - 0.25c'}{c} - \frac{x}{c}\right)d\frac{x}{c}\right)$
C.P.x	wing panel chordwise center of pressure, percent c'
C.P.y'	wing panel lateral center of pressure, percent b'/2
C_{N_A}	airplane normal-force coefficient $\left(\frac{Wn}{qS}\right)$
$C_{N'}$	wing panel normal-force coefficient $\left(\int_0^1 c_n\frac{c}{\bar{c}}\,d\frac{2y'}{b'}\right)$
$C_{B'}$	wing panel bending-moment coefficient about row 1, $\left(\int_0^1 c_n\frac{c}{\bar{c}}\,\frac{2y'}{b'}\,d\frac{2y'}{b'}\right)$

$C_{M'}$	wing panel pitching-moment coefficient about the 0.25c', $\left(\frac{\bar{c}}{c'}\int_0^1 c_m\left(\frac{c}{\bar{c}}\right)^2 d\frac{2y'}{b}\right)$
g	acceleration due to gravity, 32.2 feet per second^2
M	free-stream Mach number
n	normal load factor
p	local static pressure, pounds per square foot
p_l	local static pressure on lower wing surface, pounds per square foot
p_o	free-stream static pressure, pounds per square foot
p_u	local static pressure on upper wing surface, pounds per square foot
P	pressure coefficient $\left(\frac{p - p_o}{q}\right)$
P_R	resultant pressure coefficient $\left(\frac{p_l - p_u}{q}\right)$
q	free-stream dynamic pressure, pounds per square foot
S	total wing area, including area projected through fuselage (150 sq ft)
S'/2	area of a single wing panel outboard of row 1 (57.5 sq ft)
W	airplane weight, pounds
x	chordwise distance rearward of leading edge, feet
y	spanwise distance outboard of airplane center line, feet
y'	spanwise distance outboard of row 1, feet
δ_{a_R}	deflection of right aileron, degrees

DESCRIPTION OF AIRPLANE AND TEST PANEL

The Douglas D-558-I research airplane used in these tests is shown in figure 1. A three-view drawing of the airplane showing the general over-all dimensions is shown in figure 2. Other pertinent dimensions are given in the symbols.

The airplane has an untwisted, 10-percent-thick wing, a taper ratio of 0.54, an aspect ratio of 4.17, and an incidence angle of 2°. The 50-percent-chord line is perpendicular to the longitudinal axis of the airplane. An NACA 65-110 airfoil section is employed at all stations. Table I gives the ordinates of the airfoil section.

The test panel for which pressure-distribution data are presented is the part of the right wing of the airplane outboard of wing station 28.75 inches.

INSTRUMENTATION

Standard NACA instruments were used to record airspeed, altitude, normal acceleration, aileron position, rolling angular velocity, and yaw angle. The airspeed head and the yaw vane were mounted on separate booms, one chord length ahead of the right and left wing tips, respectively. Wing resultant and individual pressures were measured by two NACA 60-cell recording manometers. All instruments were synchronized by a common timer.

Flush-type orifices installed in the right wing skin were connected to the instrument compartment by $\frac{1}{8}$-inch inside-diameter aluminum tubing. Three-sixteenth-inch inside-diameter rubber tubing was used between the aluminum tubing and the manometer cells. The length of the aluminum tubing varied from approximately 6 feet at the root station to approximately 14 feet at the tip station. Approximately 4 feet of rubber tubing were used on each line.

The orifices were arranged in six chordwise rows, the chordwise and spanwise locations of which are shown in table II. Row 1 was located at wing station 28.75, the inboard boundary of the wing panel. Wherever possible, the orifices on the lower surface were located directly below the corresponding orifices on the upper surface; however, structural difficulties made this impossible in several cases. Errors due to location of orifices were considered to be negligible.

ACCURACY

The accuracy of the results is estimated to be within the following limits:

Mach number	±0.01
P and P_R	±0.02
c_n	±0.03
$c_{m_{c/4}}$	±0.006

TESTS

The data presented herein were obtained throughout the normal-force-coefficient range from wind-up turns at Mach numbers of 0.67, 0.74, 0.78, and 0.82. The wind-up turns were started from level flight at altitudes around 35,000 feet. The airplane entered a gradual right turn which was tightened until maximum allowable buffet was reached. During the turn the Mach number was held approximately constant and the ailerons were held near neutral. The rolling velocities due to the inherent lateral oscillations of the airplane were low and changes in the section normal-force coefficients due to the oscillations were within experimental accuracy.

METHODS

The section of the right wing outboard of row 1, table II(b), is treated as an isolated panel, and the coefficients obtained from integration of the pressure distributions are based upon its geometric properties. The wing-fuselage fairing includes the leading edge of row 1; however, the section load computations were based upon the chord of row 1 excluding the fairing.

The pressure differential between the lower and upper wing surfaces was measured at rows 1, 2, 3, 4, and 6. The upper and lower surface pressures were measured separately at row 5 relative to the instrument compartment pressure; the instrument compartment pressure was measured relative to the boom-static pressure; the boom-static pressure was corrected to free-stream static pressure by use of the radar tracking method of reference 2. Ground checks showed that lag in the pressure system was negligible.

Section coefficients were obtained by mechanical integration of the chordwise pressure distributions. Panel coefficients were obtained by mechanical integration of spanwise distributions of loads and moments.

PRESENTATION OF DATA

The measured pressure coefficients and the calculated section and wing panel characteristics are presented throughout the normal-force-coefficient range at Mach numbers of 0.67, 0.74, 0.78, and 0.82 in tables III, IV, V, and VI, respectively. Pressure coefficients are not presented for all the orifices, because some of the orifices were disconnected and some of the cells were inoperative.

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REFERENCES

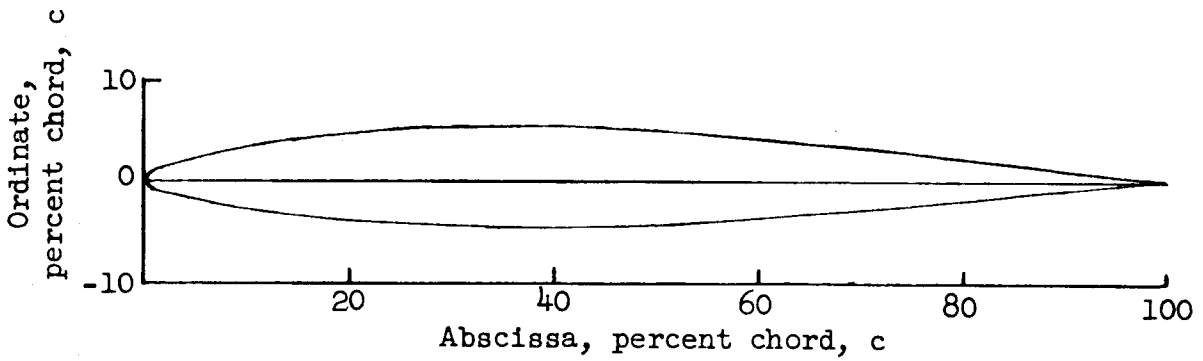
1. Keener, Earl R., and Pierce, Mary: Tabulated Pressure Coefficients and Aerodynamic Characteristics Measured in Flight on the Wing of the Douglas D-558-I Airplane for a 1g Stall, a Speed Run to a Mach Number of 0.90, and a Wind-Up Turn at a Mach Number of 0.86. NACA RM L50J10, 1950.

2. Zalovcik, John A.: A Radar Method of Calibrating Airspeed Installations on Airplanes in Maneuvers at High Altitudes and at Transonic and Supersonic Speeds. NACA Rep. 985, 1950.

TABLE I

PROFILE AND ORDINATES OF THE AIRFOIL SECTION

[Abscissa and ordinates in percent of local chord, c]

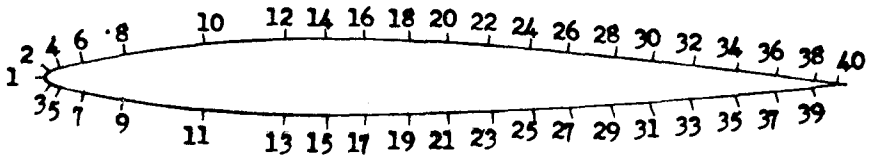


NACA 65-110 airfoil section		
Abscissa, percent chord, c	Ordinate, percent chord, c	
	Upper surface	Lower surface
0	0	0
.50	.796	-.746
.75	.966	-.896
1.25	1.222	-1.115
2.50	1.667	-1.481
5.00	2.334	-2.018
7.50	2.859	-2.435
10.00	3.298	-2.781
15.00	4.002	-3.329
20.00	4.541	-3.745
25.00	4.951	-4.056
30.00	5.246	-4.274
35.00	5.439	-4.409
40.00	5.532	-4.461
45.00	5.511	-4.416
50.00	5.364	-4.261
55.00	5.078	-3.983
60.00	4.682	-3.611
65.00	4.197	-3.167
70.00	3.642	-2.670
75.00	3.032	-2.137
80.00	2.385	-1.589
85.00	1.721	-1.048
90.00	1.068	-.551
95.00	.464	-.148
100.00	0	0
L.E. radius = 0.687 percent chord, c		

TABLE II

LOCATION OF PRESSURE MEASURING ORIFICES

(a) Chordwise location

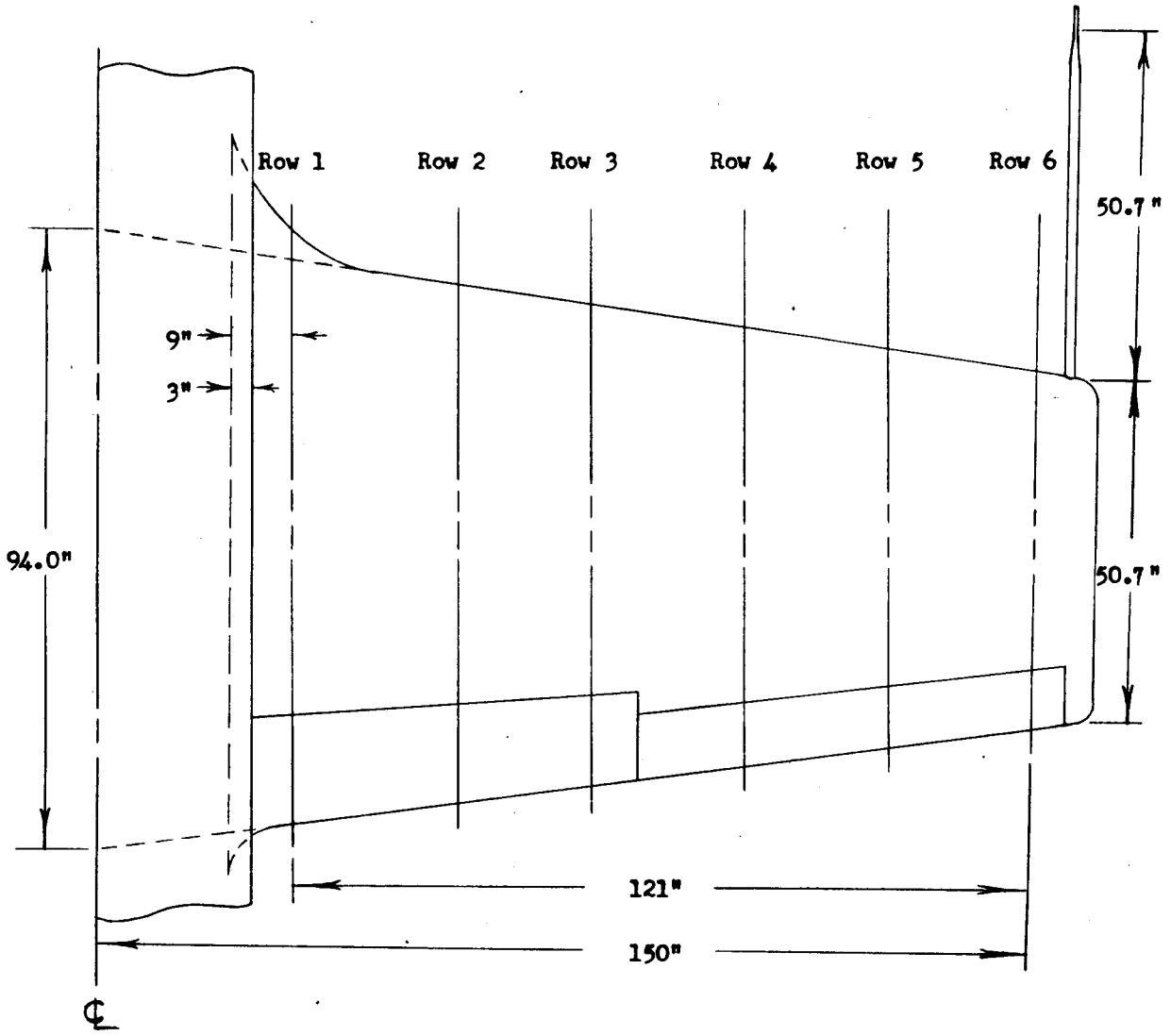


Orifice location, percent chord													
Upper surface							Lower surface						
Orifice No.	Row 1	Row 2	Row 3	Row 4	Row 5	Row 6	Orifice No.	Row 1	Row 2	Row 3	Row 4	Row 5	Row 6
							1	0.1	0	0	0	0	0
2	1.7	1.4	1.3	1.3	1.0	1.4	3	1.5	1.8	1.8	1.5	1.2	1.4
4	3.7	3.0	3.1	3.1	3.0	3.2	5	3.2	3.4	3.3	3.5	3.0	2.9
6	5.6	4.7	4.9	5.1	5.0	4.9	7	4.9	5.0	5.3	5.1	5.0	5.2
8	7.3	8.9	8.9	9.1	9.0	9.0	9	9.1	8.9	9.0	9.1	9.0	8.5
10	20.2	17.0	19.9	20.0	19.9	20.4	11	21.2	17.5	20.4	20.7	19.9	21.6
12	27.1	28.5	28.3	28.3	28.3	28.5	13	-	28.5	28.6	28.1	28.1	28.5
14	35.4	35.0	34.8	35.0	35.1	34.8	15	35.2	34.7	34.5	33.9	33.1	33.0
16	38.8	38.5	38.6	38.9	39.1	-	17	-	38.6	38.7	39.1	39.0	39.9
18	46.3	46.0	45.8	46.7	46.4	46.0	19	46.0	46.0	45.8	46.4	46.4	46.0
20	49.0	50.4	50.1	50.2	50.4	50.4	21	48.8	-	50.6	50.8	52.0	50.9
22	55.0	54.6	54.7	55.6	55.4	55.4	23	56.9	55.3	55.0	55.3	55.6	55.4
24	-	60.0	60.0	60.0	60.4	60.5	25	61.3	60.0	60.1	60.2	60.2	60.8
26	65.0	64.8	64.9	65.0	65.1	65.5	27	66.2	64.6	65.2	65.4	65.2	-
28	70.7	70.0	70.1	69.8	70.3	70.2	29	70.7	70.0	70.0	70.8	70.3	70.5
30	75.6	74.8	74.8	75.4	75.1	75.4	31	75.1	75.2	74.9	75.0	75.3	75.6
32	-	79.8	79.7	-	80.0	-	33	80.8	80.0	79.8	-	80.4	-
34	85.1	85.0	84.8	-	86.2	86.1	35	85.0	84.7	84.9	-	85.9	86.1
36	90.2	90.0	89.7	89.5	90.6	90.2	37	89.9	90.0	89.8	89.8	90.4	90.4
38	95.5	95.0	94.8	95.2	95.8	95.2	39	95.3	95.0	94.6	94.6	95.8	94.5
40	98.8	98.8	98.7	98.6	98.8	98.3							

TABLE II (Concluded)

LOCATION OF PRESSURE MEASURING ORIFICES

(b) Spanwise location



Orifice row no.	1	2	3	4	5	6
Distance from airplane ℄, percent b/2	19.2	36.0	49.3	64.4	77.7	94.0
Distance from row 1, percent b'/2	0	20.9	37.4	56.0	72.4	92.5

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TABLE III

TABULATION OF PRESSURE COEFFICIENTS AND AERODYNAMIC CHARACTERISTICS OF THE D-558-I WING; WIND-UP TURN AT M = 0.67

(a) M = 0.673, C_{N_A} = 0.390, δ_{a_R} = 0.8° up

Orifice	Pressure coefficients						
	Row 1	Row 2	Row 3	Row 4	Row 5		Row 6
					Upper	Lower	
1	------	------	------	------	------	0.818	------
2-3	1.375	2.044	2.141	2.077	-1.446	.655	1.889
4-5	1.098	1.840	1.791	1.784	-1.258	.532	------
6-7	1.010	1.059	------	1.075	-.754	.346	.757
8-9	.854	.977	1.018	.920	-.770	.167	.580
10-11	.504	.635	.643	.629	-.640	-.045	.358
12-13	------	.537	.562	.497	-.501	-.102	------
14-15	.504	------	------	.423	-.509	-----	------
16-17	------	.407	.440	.423	-.599	-.167	------
18-19	.399	.334	.342	.269	-.542	-.224	------
20-21	.334	------	.293	.236	-.452	-.167	------
22-23	------	.220	------	------	-.403	-.200	------
24-25	------	.212	.212	.187	-.273	-.159	.098
26-27	.179	.171	.163	.171	-.216	-.013	------
28-29	.106	.114	.138	.104	-.135	-.151	------
30-31	.146	.106	------	.020	-.094	-.061	.052
32-33	------	.122	------	------	-.013	-.029	------
34-35	.098	------	.081	------	.134	.020	.086
36-37	------	.098	------	0	.110	.093	.021
38-39	.081	.049	.057	------	.158	.158	-.033
40	------	------	------	------	.167	-----	------

Section aerodynamic characteristics						
c_n	0.385	0.404	0.443	0.380	0.366	0.244
$c_{m_{c/4}}$	-.0248	-.0035	.0055	.0119	.0209	.0106

Panel aerodynamic characteristics		
C_N' = 0.372 C_B' = 0.156	C_M' = 0.0050 C.P.$_x$ = 23.7	C.P.$_y'$ = 41.9

TABLE III

TABULATION OF PRESSURE COEFFICIENTS AND AERODYNAMIC CHARACTERISTICS OF THE D-558-I WING; WIND-UP TURN AT M = 0.67 - Continued

(b) M = 0.675, C_{N_A} = 0.452, δ_{a_R} = 0.8° up

Orifice	Pressure coefficients						
	Row 1	Row 2	Row 3	Row 4	Row 5		Row 6
					Upper	Lower	
1	------	------	------	------	------	0.742	------
2-3	1.532	2.226	2.323	2.281	-1.541	.709	2.057
4-5	1.265	2.049	2.089	1.991	-1.508	.589	------
6-7	1.153	1.742	------	1.645	-.750	.411	.807
8-9	.992	.944	1.040	.944	-.766	.218	.626
10-11	.572	.702	.686	.669	-.670	-.008	.387
12-13	------	.597	.589	.548	-.508	-.089	------
14-15	.548	------	------	.468	-.524	-----	------
16-17	------	.436	.468	.468	-.605	-.145	------
18-19	.435	.379	.379	.266	-.532	-.178	------
20-21	.379	------	.315	.258	-.460	-.161	------
22-23	------	.234	------	------	-.403	-.178	------
24-25	------	.226	.250	.210	-.299	-.137	.123
26-27	.194	.194	.185	.185	-.218	-.008	------
28-29	.129	.121	.153	.103	-.153	-.121	------
30-31	.145	.105	------	.031	-.097	-.049	.052
32-33	------	.129	------	------	-.008	-.024	------
34-35	.105	------	.081	------	.129	.024	.068
36-37	------	.097	------	0	.113	.097	.029
38-39	.081	.056	.065	------	.161	.177	.008
40	------	------	------	------	.161	-----	------

Section aerodynamic characteristics						
c_n	0.425	0.453	0.474	0.429	0.411	0.275
$c_{m_{c/4}}$	-.0167	.0006	.0029	.0155	.0206	.0081

Panel aerodynamic characteristics		
C_N' = 0.414 C_B' = 0.176	C_M' = 0.0071 C.P.$_x$ = 24.6	C.P.$_y'$ = 42.5

TABLE III

TABULATION OF PRESSURE COEFFICIENTS AND AERODYNAMIC CHARACTERISTICS OF THE D-558-I WING; WIND-UP TURN AT M = 0.67 - Continued

(c) M = 0.676, C_{N_A} = 0.540, δ_{a_R} = 0.8° up

Orifice	Pressure coefficients						
	Row 1	Row 2	Row 3	Row 4	Row 5		Row 6
					Upper	Lower	
1	------	------	------	------	------	0.600	------
2-3	2.353	2.524	2.604	2.571	-1.779	.769	2.403
4-5	1.526	2.379	2.339	2.241	-1.755	.648	------
6-7	1.462	2.170	------	2.114	-.775	.447	1.182
8-9	1.293	1.849	1.792	1.713	-1.265	.262	.764
10-11	.675	.715	.707	.724	-.670	.021	.471
12-13	------	.667	.659	.611	-.566	-.059	------
14-15	.627	------	------	.531	-.566	-----	------
16-17	------	.506	.530	.514	-.638	-.116	------
18-19	.498	.418	.418	.338	-.574	-.188	------
20-21	.418	------	.362	.297	-.477	-.164	------
22-23	------	.265	------	------	-.421	-.172	------
24-25	------	.265	.257	.233	-.333	-.148	.141
26-27	.217	.193	.201	.201	-.236	-.019	------
28-29	.129	.137	.169	.127	-.156	-.124	------
30-31	.161	.113	------	.035	-.116	-.035	.090
32-33	------	.145	------	------	-.035	-.027	------
34-35	.112	------	.088	------	.093	.013	.106
36-37	------	.104	------	.008	.077	.085	.053
38-39	.088	.064	.064	------	.134	.158	.016
40	------	------	------	------	.142	-----	------

Section aerodynamic characteristics						
c_n	0.522	0.553	0.585	0.539	0.494	0.326
$c_{m_{c/4}}$	-.0084	.0084	.0116	.0245	.0242	.0052

Panel aerodynamic characteristics		
C_N' = 0.507 C_B' = 0.214	C_M' = 0.0118 $C.P._x$ = 22.7	$C.P._y'$ = 42.7

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TABULATION OF PRESSURE COEFFICIENTS AND AERODYNAMIC CHARACTERISTICS OF THE D-558-I WING; WIND-UP TURN AT M = 0.67 - Continued

(d) M = 0.677, C_{N_A} = 0.680, δ_{a_R} = 0.8° up

Orifice	Pressure coefficients						
	Row 1	Row 2	Row 3	Row 4	Row 5		Row 6
					Upper	Lower	
1	------	------	------	------	------	0.439	------
2-3	2.859	2.868	2.923	2.883	-2.061	.863	2.764
4-5	1.725	2.700	2.732	2.570	-2.005	.743	------
6-7	1.773	2.524	------	2.429	-.791	.559	1.789
8-9	1.614	2.292	2.244	2.204	-1.869	.367	1.252
10-11	1.318	1.366	1.190	1.038	-.711	.112	.553
12-13	------	.615	.591	.535	-.487	.016	------
14-15	.679	------	------	.543	-.559	-----	------
16-17	------	.503	.543	.527	-.639	-.064	------
18-19	.535	.447	.447	.375	-.567	-.152	------
20-21	.463	------	.383	.320	-.471	-.128	------
22-23	------	.296	------	------	-.423	-.160	------
24-25	------	.264	.272	.256	-.320	-.120	.189
26-27	.232	.216	.200	.208	-.232	-.024	------
28-29	.144	.144	.168	.134	-.200	-.112	------
30-31	.176	.120	------	.059	-.128	-.040	.112
32-33	------	.184	------	------	-.040	-.032	------
34-35	.120	------	.088	------	.096	.008	.192
36-37	------	.112	------	.024	.072	.080	.099
38-39	.096	.072	.072	------	.120	.152	.048
40	------	------	------	------	.136	-----	------

Section aerodynamic characteristics						
c_n	0.676	0.677	0.697	0.629	0.603	0.453
$c_{m_{c/4}}$	.0010	.0193	.0232	.0341	.0341	.0077

Panel aerodynamic characteristics		
C_N' = 0.623 C_B' = 0.263	C_M' = 0.0245 C.P.$_x$ = 21.1	C.P.$_y'$ = 42.2

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TABLE III

TABULATION OF PRESSURE COEFFICIENTS AND AERODYNAMIC CHARACTERISTICS OF THE D-558-I WING; WIND-UP TURN AT M = 0.67 - Continued

(e) M = 0.675, C_{N_A} = 0.708, δ_{a_R} = 0.7° up

Orifice	Pressure coefficients						
	Row 1	Row 2	Row 3	Row 4	Row 5		Row 6
					Upper	Lower	
1	------	------	------	------	------	0.421	------
2-3	2.997	2.981	3.037	3.004	-2.143	.877	2.917
4-5	1.786	2.820	2.844	2.764	-2.095	.773	------
6-7	1.818	2.644	------	2.522	-.861	.581	2.059
8-9	1.659	2.388	2.356	2.308	-1.967	.381	1.359
10-11	1.386	1.923	1.282	1.210	-.958	.132	.577
12-13	------	.577	.578	.513	-.461	.028	------
14-15	.681	------	------	.513	-.541	-----	------
16-17	------	.505	.545	.525	-.621	-.060	------
18-19	.545	.449	.457	.377	-.565	-.132	------
20-21	.465	------	.401	.320	-.469	-.108	------
22-23	------	.296	------	------	-.421	-.140	------
24-25	------	.288	.272	.264	-.333	-.116	.189
26-27	.232	.216	.216	.216	-.252	.004	------
28-29	.160	.144	.176	.141	-.172	-.100	------
30-31	.176	.128	------	.071	-.124	.004	.144
32-33	------	.192	------	------	-.036	-.012	------
34-35	.128	------	.096	------	.060	.028	.239
36-37	------	.112	------	.040	.068	.100	.130
38-39	.096	.072	.080	------	.124	.172	.072
40	------	------	------	------	.140	-----	------

Section aerodynamic characteristics						
c_n	0.694	0.743	0.728	0.668	0.642	0.480
$c_{m_{c/4}}$	-.0003	.0258	.0245	.0314	.0361	.0068

Panel aerodynamic characteristics		
C_N' = 0.662	C_M' = 0.0268	$C.P._y'$ = 42.0
C_B' = 0.278	$C.P._x$ = 21.0	

TABLE III

TABULATION OF PRESSURE COEFFICIENTS AND AERODYNAMIC CHARACTERISTICS OF THE D-558-I WING; WIND-UP TURN AT M = 0.67 - Continued

(f) M = 0.674, C_{N_A} = 0.793, δ_{a_R} = 0.6° up

Orifice	Pressure coefficients						
	Row 1	Row 2	Row 3	Row 4	Row 5		Row 6
					Upper	Lower	
1	------	------	------	------	------	0.314	------
2-3	3.168	3.094	3.119	3.127	-2.259	.908	3.006
4-5	2.187	2.926	2.974	2.870	-2.194	.804	------
6-7	1.896	2.781	------	2.660	-.908	.619	2.299
8-9	1.768	2.540	2.500	2.435	-2.066	.418	1.617
10-11	1.495	2.210	1.423	1.366	-1.246	.169	.619
12-13	------	.691	.997	.964	-.466	.056	------
14-15	.683	------	------	.442	-.474	-----	------
16-17	------	.482	.450	.450	-.603	-.032	------
18-19	.546	.426	.402	.346	-.563	-.112	------
20-21	.466	------	.370	.313	-.474	-.080	------
22-23	------	.289	------	------	-.434	-.121	------
24-25	------	.281	.273	.249	-.346	-.104	.254
26-27	.233	.217	.233	.217	-.257	-.008	------
28-29	.161	.153	.201	.149	-.193	-.088	------
30-31	.193	.137	------	.077	-.137	-.008	.209
32-33	------	.193	------	------	-.048	-.008	------
34-35	.137	------	.113	------	.040	.024	.286
36-37	------	.129	------	.056	.048	.088	.158
38-39	.096	.080	.096	------	.113	.169	.088
40	------	------	------	------	.121	-----	------

Section aerodynamic characteristics						
c_n	0.742	0.798	0.778	0.720	0.710	0.545
$c_{m_{c/4}}$	.0035	.0283	.0280	.0361	.0357	.0013

Panel aerodynamic characteristics		
C_N' = 0.727 C_B' = 0.305	C_M' = 0.0283 $C.P._x$ = 21.1	$C.P._y'$ = 42.0

TABLE III

TABULATION OF PRESSURE COEFFICIENTS AND AERODYNAMIC CHARACTERISTICS OF THE D-558-I WING; WIND-UP TURN AT M = 0.67 - Concluded

(g) M = 0.669, C_{N_A} = 0.875, δ_{a_R} = 0.5° up

Orifice	Pressure coefficients						
	Row 1	Row 2	Row 3	Row 4	Row 5		Row 6
					Upper	Lower	
1	------	------	------	------	------	0.179	------
2-3	3.391	3.361	3.409	3.378	-2.451	.942	3.255
4-5	2.905	3.182	3.206	3.150	-2.378	.844	------
6-7	1.930	3.020	------	2.921	-.958	.674	2.736
8-9	1.883	2.768	2.760	2.670	-2.256	.471	1.956
10-11	1.639	1.891	1.607	1.598	-1.445	.195	.722
12-13	------	1.039	1.388	1.364	-.820	.114	------
14-15	.803	------	------	.738	-.503	-----	------
16-17	------	.528	.609	.568	-.536	-.008	------
18-19	.552	.414	.357	.325	-.519	-.081	------
20-21	.471	------	.317	.300	-.471	-.081	------
22-23	------	.268	------	------	-.422	-.097	------
24-25	------	.268	.235	.235	-.341	-.089	.289
26-27	.235	.219	.219	.211	-.276	.025	------
28-29	.179	.162	.203	.162	-.219	-.089	------
30-31	.195	.138	------	.093	-.146	-.016	.240
32-33	------	.211	------	------	-.073	-.016	------
34-35	.146	------	.130	------	.008	.025	.377
36-37	------	.146	------	.081	.025	.106	.201
38-39	.097	.106	.114	------	.073	.171	.114
40	------	------	------	------	.090	-----	------

Section aerodynamic characteristics						
c_n	0.818	0.844	0.866	0.840	0.804	0.650
$c_{m_{c/4}}$	.0019	.0325	.0328	.0406	.0335	-.0074

Panel aerodynamic characteristics		
C_N' = 0.806 C_B' = 0.348	C_M' = 0.0202 C.P.$_x$ = 22.5	C.P.$_y'$ = 43.2

TABLE IV

TABULATION OF PRESSURE COEFFICIENTS AND AERODYNAMIC CHARACTERISTICS OF THE D-558-I WING; WIND-UP TURN AT M = 0.74

(a) M = 0.742, C_{N_A} = 0.405, δa_R = 0.2° up

Orifice	Pressure coefficients						
	Row 1	Row 2	Row 3	Row 4	Row 5		Row 6
					Upper	Lower	
1	------	------	------	------	------	0.928	------
2-3	1.256	1.585	1.675	1.575	-.988	.590	1.606
4-5	.979	1.482	1.669	1.527	-1.046	.466	------
6-7	.892	1.314	------	1.308	-.887	.317	.670
8-9	.796	1.115	1.095	.999	-.892	.149	.526
10-11	.582	.638	.789	.831	-.740	-.083	.366
12-13	------	.638	.536	.412	-.521	-.209	------
14-15	.567	------	------	.461	-.606	-----	------
16-17	------	.515	.539	.552	-.706	-.214	------
18-19	.451	.374	.380	.299	-.626	-.276	------
20-21	.364	------	.303	.251	-.505	-.250	------
22-23	------	.206	------	------	-.467	-.229	------
24-25	------	.193	.206	.175	-.327	-.201	.103
26-27	.144	.155	.162	.187	-.235	-.170	------
28-29	.084	.103	.129	.103	-.186	-.067	------
30-31	.116	.064	------	.034	-.103	-.022	.077
32-33	------	.110	------	------	-.041	.021	------
34-35	.080	------	.075	------	.085	.036	.183
36-37	------	.077	------	.045	.068	.120	.080
38-39	.041	.045	.064	------	.158	.178	.013
40	------	------	------	------	.171	-----	------

Section aerodynamic characteristics						
c_n	0.384	0.433	0.458	0.404	0.375	0.265
$c_{m_{c/4}}$	-.0161	-.0032	-.0010	.0061	.0093	-.0058

Panel aerodynamic characteristics		
C_N' = 0.388 C_B' = 0.162	C_M' = 0.0013 C.P.$_x$ = 24.7	C.P.$_y'$ = 41.8

TABLE IV

TABULATION OF PRESSURE COEFFICIENTS AND AERODYNAMIC CHARACTERISTICS OF THE D-558-I WING; WIND-UP TURN AT M = 0.74 - Continued

(b) M = 0.744, C_{N_A} = 0.505, δ_{a_R} = 0.1° down

Orifice	Pressure coefficients						
	Row 1	Row 2	Row 3	Row 4	Row 5		Row 6
					Upper	Lower	
1	------	------	------	------	------	0.856	------
2-3	1.754	1.837	1.920	1.839	-1.202	.667	1.847
4-5	1.168	1.735	1.920	1.754	-1.218	.529	------
6-7	1.059	1.607	------	1.543	-1.152	.373	1.393
8-9	.957	1.473	1.384	1.371	-1.150	.208	.633
10-11	.806	1.193	1.133	1.110	-1.129	-.022	.472
12-13	------	.925	1.031	1.046	-.522	-.143	------
14-15	.622	------	------	.370	-.522	-----	------
16-17	------	.376	.347	.314	-.629	-.183	------
18-19	.434	.370	.344	.265	-.614	-.254	------
20-21	.367	------	.300	.249	-.489	-.226	------
22-23	------	.223	------	------	-.458	-.218	------
24-25	------	.204	.204	.179	-.323	-.190	.128
26-27	.166	.153	.172	.191	-.239	-.165	------
28-29	.089	.108	.128	.108	-.190	-.063	------
30-31	.115	.070	------	.041	-.109	-.029	.077
32-33	------	.134	------	------	-.048	.029	------
34-35	.070	------	.074	------	.035	.048	.281
36-37	------	.083	------	.057	.061	.125	.112
38-39	.045	.045	.064	------	.144	.180	.038
40	------	------	------	------	.163	-----	------

Section aerodynamic characteristics						
c_n	0.456	0.544	0.555	0.507	0.460	0.353
$c_{m_{c/4}}$	-.0090	.0093	.0061	.0164	.0151	-.0052

Panel aerodynamic characteristics		
C_N' = 0.484 C_B' = 0.204	C_M' = 0.0100 C.P.$_x$ = 22.8	C.P.$_y'$ = 42.2

TABLE IV

TABULATION OF PRESSURE COEFFICIENTS AND AERODYNAMIC CHARACTERISTICS OF THE D-558-I WING; WIND-UP TURN AT M = 0.74 - Continued

(c) M = 0.750, C_{N_A} = 0.590, δ_{a_R} = 0.2° up

Orifice	Pressure coefficients						
	Row 1	Row 2	Row 3	Row 4	Row 5		Row 6
					Upper	Lower	
1	------	------	------	------	------	0.813	------
2-3	1.979	1.922	1.997	1.930	-1.224	.700	1.882
4-5	1.266	1.840	2.054	1.822	-1.242	.572	------
6-7	1.231	1.709	------	1.639	-1.164	.415	1.467
8-9	1.063	1.558	1.489	1.445	-1.189	.248	.749
10-11	.899	1.338	1.224	1.206	-1.187	-.006	.595
12-13	------	1.118	1.118	1.137	-1.043	-.138	------
14-15	.930	------	------	.852	-.594	-----	------
16-17	------	.729	.575	.550	-.558	-.169	------
18-19	.377	.245	.195	.136	-.566	-.247	------
20-21	.329	------	.183	.151	-.458	-.227	------
22-23	------	.195	------	------	-.433	-.219	------
24-25	------	.188	.176	.132	-.290	-.192	.126
26-27	.153	.138	.151	.163	-.219	-.159	------
28-29	.101	.101	.113	.094	-.169	-.058	------
30-31	.126	.063	------	.023	-.091	-.025	.088
32-33	------	.132	------	------	-.037	.017	------
34-35	.088	------	.073	------	.032	.012	.246
36-37	------	.082	------	.038	.082	.107	.107
38-39	.053	.044	-.063	------	.151	.173	.050
40	------	------	------	------	.170	-----	------

Section aerodynamic characteristics						
c_n	0.523	0.615	0.586	0.548	0.513	0.393
$c_{m_{c/4}}$	-.0071	.0116	.0155	.0222	.0229	-.0055

Panel aerodynamic characteristics		
$C_{N'}$ = 0.533 $C_{B'}$ = 0.225	$C_{M'}$ = 0.0149 C.P.$_x$ = 22.2	C.P.$_{y'}$ = 42.2

TABLE IV

TABULATION OF PRESSURE COEFFICIENTS AND AERODYNAMIC CHARACTERISTICS OF THE D-558-I WING; WIND-UP TURN AT M = 0.74 - Continued

(d) M = 0.750, C_{N_A} = 0.701, δa_R = 0.2° up

Orifice	Pressure coefficients						
	Row 1	Row 2	Row 3	Row 4	Row 5		Row 6
					Upper	Lower	
1	------	------	------	------	------	0.717	------
2-3	2.286	2.186	2.261	2.176	-1.378	.788	2.090
4-5	1.407	2.085	2.299	2.048	-1.409	.650	------
6-7	1.399	1.941	------	1.847	-1.305	.494	1.691
8-9	1.266	1.771	1.740	1.683	-1.345	.305	1.136
10-11	1.040	1.570	1.435	1.438	-1.348	.054	.794
12-13	------	1.256	1.344	1.363	-1.267	-.059	------
14-15	1.200	------	------	1.229	-1.205	-----	------
16-17	------	.735	.822	1.193	-.767	-.122	------
18-19	.598	.389	.609	.490	-.463	-.207	------
20-21	.402	------	.455	.320	-.363	-.191	------
22-23	------	.132	------	------	-.370	-.192	------
24-25	------	.151	.126	.070	-.247	-.169	.183
26-27	.136	.126	.070	.113	-.180	-.141	------
28-29	.088	.088	.068	.063	-.157	-.046	------
30-31	.113	.057	------	.013	-.079	-.028	.153
32-33	------	.126	------	------	-.031	-.021	------
34-35	.088	------	.063	------	.016	.009	.327
36-37	------	.075	------	.044	.072	.111	.186
38-39	.053	.044	.070	------	.155	.185	.085
40	------	------	------	------	.161	-----	------

Section aerodynamic characteristics						
c_n	0.617	0.680	0.713	0.704	0.630	0.525
$c_{m_{c/4}}$	-.0087	.0177	.0158	.0167	.0251	-.0145

Panel aerodynamic characteristics		
C_N' = 0.656 C_B' = 0.294	C_M' = 0.0144 C.P.x = 22.8	C.P.y' = 44.8

TABLE IV

TABULATION OF PRESSURE COEFFICIENTS AND AERODYNAMIC CHARACTERISTICS OF THE D-558-I WING; WIND-UP TURN AT M = 0.74 - Continued

(e) M = 0.742, C_{N_A} = 0.792, δ_{a_R} = 0.9° up

Orifice	Pressure coefficients						
	Row 1	Row 2	Row 3	Row 4	Row 5		Row 6
					Upper	Lower	
1	------	------	------	------	------	0.581	------
2-3	2.589	2.487	2.551	2.467	-1.635	.827	2.418
4-5	1.689	2.353	2.557	2.321	-1.628	.719	------
6-7	1.541	2.207	------	2.111	-1.572	.571	1.957
8-9	1.403	1.990	1.983	1.913	-1.567	.365	1.459
10-11	1.194	1.792	1.602	1.696	-1.569	.104	.980
12-13	------	1.728	1.079	1.582	-1.495	-.016	------
14-15	1.492	------	------	.964	-1.459	-----	------
16-17	------	.784	.870	.875	-.860	-.107	------
18-19	.719	.332	.721	.645	-.454	-.220	------
20-21	.574	------	.673	.440	-.342	-.184	------
22-23	------	.261	------	------	-.357	-.181	------
24-25	------	.223	.401	.147	-.271	-.163	.212
26-27	.143	.185	.258	.153	-.209	-.153	------
28-29	.102	.121	.179	.064	-.179	-.067	------
30-31	.128	.083	------	.023	-.100	-.048	.166
32-33	------	.134	------	------	-.041	-.005	------
34-35	.102	------	.069	------	.074	-.069	.265
36-37	------	.143	------	.026	.053	.064	.143
38-39	.066	.096	.083	------	.125	.150	.087
40	------	------	------	------	.138	-----	------

Section aerodynamic characteristics						
c_n	0.734	0.799	0.806	0.771	0.732	0.624
$c_{m_{c/4}}$	-.0132	.0148	.0032	.0251	.0390	-.0103

Panel aerodynamic characteristics		
C_N' = 0.746 C_B' = 0.325	C_M' = 0.0144 C.P.$_x$ = 23.1	C.P.$_y'$ = 43.6

TABLE IV

TABULATION OF PRESSURE COEFFICIENTS AND AERODYNAMIC CHARACTERISTICS OF THE D-558-I WING; WIND-UP TURN AT M = 0.74 - Concluded

(f) M = 0.736, C_{N_A} = 0.826, δ_{a_R} = 0.4° up

Orifice	Pressure coefficients						
	Row 1	Row 2	Row 3	Row 4	Row 5		Row 6
					Upper	Lower	
1	------	------	------	------	------	0.398	------
2-3	2.789	2.682	2.745	2.686	-1.790	.895	2.362
4-5	2.425	2.538	2.764	2.519	-1.759	.785	------
6-7	1.815	2.425	------	2.362	-1.664	.637	2.136
8-9	1.508	2.224	2.161	2.123	-1.687	.433	1.721
10-11	1.329	1.954	1.470	1.834	-1.662	.182	1.138
12-13	------	1.269	1.131	1.275	-1.130	.050	------
14-15	1.053	------	------	.945	-1.062	-----	------
16-17	------	.848	.930	.809	-1.017	-.047	------
18-19	.701	.565	.609	.540	-.944	-.147	------
20-21	.601	------	.475	.421	-.532	-.137	------
22-23	------	.289	------	------	-.346	-.147	------
24-25	------	.302	.342	.266	-.296	-.150	.269
26-27	.186	.226	.279	.251	-.235	-.140	------
28-29	.143	.201	.241	.157	-.195	-.059	------
30-31	.157	.226	------	.111	-.150	-.051	.249
32-33	------	.207	------	------	-.105	-.029	------
34-35	.107	------	.088	------	-.017	-.092	.342
36-37	------	.207	------	.138	-.037	.044	.178
38-39	.111	.132	.161	------	.029	.119	.088
40	------	------	------	------	.064	-----	------

Section aerodynamic characteristics						
c_n	0.746	0.848	0.830	0.822	0.809	0.714
$c_{m_{c/4}}$	-.0061	.0026	-.0045	.0113	.0225	-.0216

Panel aerodynamic characteristics		
C_N' = 0.793 C_B' = 0.354	C_M' = 0.0092 $C.P._x$ = 23.8	$C.P._y'$ = 44.6