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VORCAM - A COMPUTER PROGRAM FOR CALCULATING  
VORTEX LIFT EFFECT OF CAMBERED WINGS BY THE  
SUCTION ANALOGY

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## INTRODUCTION

This report is a supplement to reference 1 and describes the usage of a computer program implementing an improved aerodynamic panel method described in reference 1. The method is applicable to cambered wings exhibiting edge-separated vortex flow at subsonic and supersonic speeds. The original method of the suction analogy (ref. 2) has been improved by determining the appropriate position and hence orientation of vortex force on cambered wings, as well as utilizing an effective angle of attack in supersonic flow.

In the following, the program capabilities, input format and output format are described. Then, input data of three sample test cases and the corresponding output, as well as the program listing are given.

## PROGRAM CAPABILITIES

This program has the following main features:

- (1) It is applicable to nonplanar wing configurations in subsonic and supersonic flow, such as wing-winglet, wing-vertical fin combinations, etc. For a wing with dihedral, it may be represented by up to five (5) contiguous spanwise panels with different dihedral angles.
- (2) Arbitrary camber shapes may be defined at ten (10) or less spanwise stations. Option for exactly defining leading-edge flap geometry is also provided.
- (3) The distribution of wing twist can be prescribed in a general way.
- (4) The vortex-lift effect is calculated through the use of Polhamus' suction analogy.

INPUT DATA FORMAT

Group 1 Format (13A6), 1 card

TITLE (I) A descriptive phrase describing the case to be run.

Group 2 Format 8(6X, I4), 1 card

NC Number of spanwise sections on the right wing (bounded by points of discontinuities in geometry, such as change in sweep, edges of flap segments, panels with different dihedral angles, etc.) Limited to 5.  
(See Sketch 1).

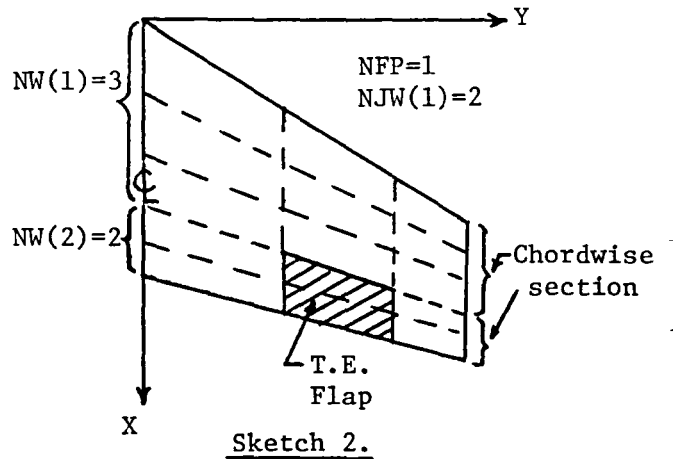
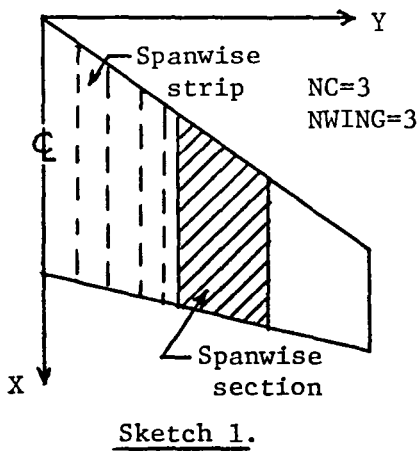
M1(I), I=1, NC Number of spanwise strips in each spanwise section.

There are NC numbers. Maximum total number of strips is 48. (See Sketch 1).

IWING = Last wing spanwise strip number, cumulative from center line, and used for a wing in combination with a tail, winglet or vertical fin. For a wing alone, set = 0.

NWING = The numerical value of last wing spanwise section, i. e., its most outboard section.

IWGLT = 1 if a winglet is present. = 2 if a vertical fin is present  
inboard of wing tip. = 0, otherwise.



Group 3 Format 8(6X, I4), 1 card

NFP Number of trailing-edge flap segments. Limited to 5.

NJW(I), I=1,NFP Numerical value of the spanwise section in which the trailing-edge flap segment is contained. For either clean or full-span flap configurations, set NFP = 1 and NJW(1) = 1.(See sketch 2).

NVRTX The spanwise strip number at which and outboard of which the leading-edge vortex lift effect is not included. Full vortex lift effect is assumed if this value is set to zero.

Group 4 Format 4(6X, I4), 1 card

NW(1) } Numbers of chordwise aerodynamic panels in chordwise sections  
NW(2) } (See Sketch 2). The chordwise section may be bounded along  
trailing-edge flap hinge line or winglet leading edge. NW(2) = 0  
for clean configurations. NW(1) + NW(2) is limited to 20.

ICAM = 0 for non-cambered airfoils.

= 1 if camber ordinates are to be read in.

= 2 if camber slopes are defined analytically in subroutine ZCDX.

= 3 if there are flat leading-edge flaps attached to a non-cambered wing.

IST Number of y stations at which camber ordinates are read in. Limited to 10. If ICAM = 3, IST is the number of leading-edge flap segments; for example, IST would be 1 for a simple flat leading-edge flap. If ICAM = 1, at least two y stations are needed, one being at the root and the other being at the tip.

Note: If a tail, winglet or vertical fin is present and has camber, only one camber shape is permitted. The last y station is used to describe that shape.

Omit Groups 5, 6, and 7 if ICAM  $\neq$  1. Repeat Groups 5, 6, 7 IST times.

Group 5 Format 4F10.6

YT(I) y-station at which camber ordinates are read in.

XNUM number of camber ordinates to be read in. Limited to 21.

CURV(I) = 0. if camber is to be formed by connecting straight segments, with first segment being regarded as flat leading-edge flap.

= 1. if cubic spline interpolation is used.

= 2. if cubic spline interpolation is used, with first segment being flat leading-edge flap.

CHND(I) Chord length at YT(I) station.

Group 6 Format 8F10.6

XT(I,J) x/c-values at which camber ordinates are read in for YT(I) station.

Group 7 Format 8F10.6

CA(J) z/c-values of camber ordinates at the corresponding XT(I,J)-locations.

Omit Groups 8, 9 and 10 if ICAM  $\neq$  3. Repeat IST times.

Group 8 Format 2F10.6

YLEF (I,1) Extreme inboard y-coordinate of Ith flat leading-edge flap segment.

YLEF (I,2) Extreme outboard y-coordinate of Ith flat leading-edge flap segment.

Group 9 Format 6F10.6

XLF(I,1) } First corner point coordinates of Ith flat leading-edge flap segment.

YLF(I,1) } See sketch 3.

Z1 } }

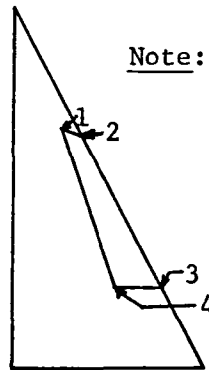
XLF(I,2) } Second corner point coordinates of Ith flat leading-edge flap segment.

YLF(I,2) } }

Z2 } }

Group 10 Format 6F10.6

XLF(I,3) } Third corner point coordinates of Ith flat leading-edge flap segment.  
XLF(I,3) }  
Z3 }  
XLF(I,4) } Fourth corner point coordinates of Ith flat leading-edge flap segment.  
YLF(I,4) }  
Z4 }



Note: The flat flap must be inside the boundary of planform described in Group 13.

Sketch 3.

Group 11 Format 8F10.6

AM Freestream Mach number

HALFSW Half of reference wing area, same units as (CREF) squared.

CREF Reference chord length

ALPCON = 1. if  $C_{L_\alpha}$  and  $C_{m_\alpha}$  are to be computed. For this case, set T.E. flap angles to zero. Otherwise, set ALPCON = 0.

DF(I), I=1, NFP Trailing-edge flap angles in degrees, inboard trailing-edge flap segment first.

Group 12 Format 4F10.6, 1 card

FALP number of angles of attack to be processed.

ALPI Initial angle of attack in degrees to be processed.

ALPIN incremental angle of attack in degrees to be processed.

PTION = 1. if detailed aerodynamic loading is to be printed.

= 0. if only overall aerodynamic characteristics are to be printed.

SUP =1. if effective angles of attack in supersonic flow are to be used.  
Use this option only if the leading edge is subsonic.

=0. otherwise.

Note: Set FALP, ALPI, and ALPIN to 0. if ALPCON = 1.0.

Group 13 Format 8F10.6

Corner-point coordinates of a spanwise section. See sketch 4a.

XXL(1) L. E. X-coordinate of the inboard chord.

XXT(1) T. E. X-coordinate of the inboard chord.

YL(1) Y-coordinate of the inboard chord.

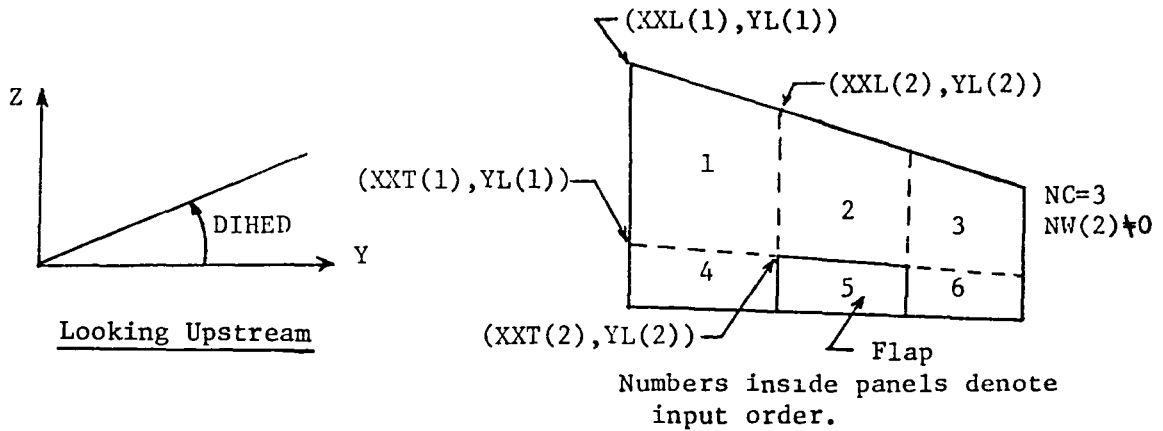
XXL(2) L. E. X-coordinate of the outboard chord.

XXT(2) T. E. X-coordinate of the outboard chord.

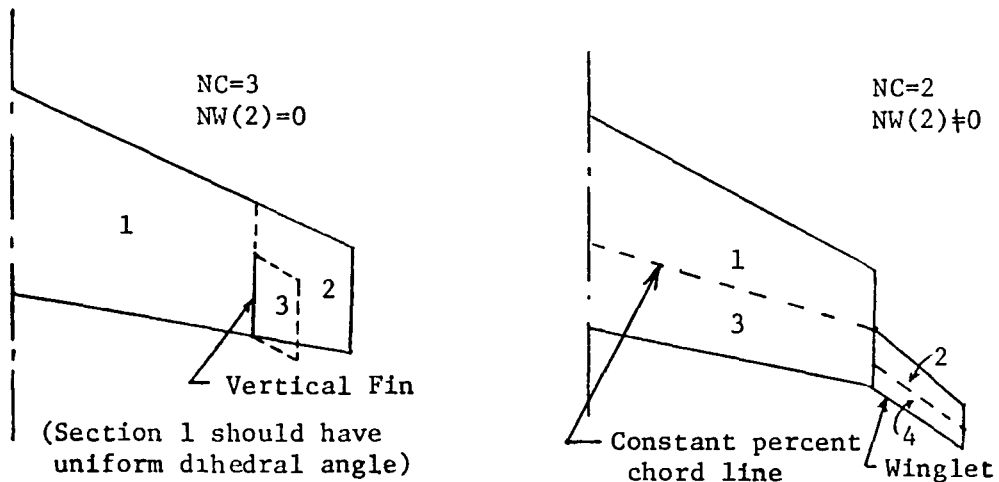
YL(2) Y-Coordinate of the outboard chord.

ZS elevation of the spanwise section.

DIHED dihedral angle in degrees for the section.



Sketch 4 a.



Sketch 4 b.

Group 14 Format 3F10.6

FCN = 1. if control point locations are to be calculated for this section based on 2-D theory.

= 0. if control point locations calculated for a preceding spanwise section are to be used. (For the aft most chordwise section, FCN should be the same as the corresponding leading chordwise section)

SWK Leading edge sweep angle of spanwise section projected on the X-Y plane, in degrees.

E = Hinge line location in fraction of local chord. (true also for non-flapped spanwise sections in a partial-span trailing-edge flap configuration)

= 1. for a configuration without trailing-edge flap segments.

TR Taper ratio for the section (i.e. tip chord/root chord of the tip section).

Note. Groups 13 and 14 are to be repeated NC times. With trailing-edge flaps or winglet, another NC cards are needed to describe the flap and the associated regions. The order of input is illustrated in Sketch 4. Panels with dihedral must be rotated to X-Y plane for geometric description.

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Group 15 should be omitted if ALPCON = 1.0

Group 15 Format 2F10.6, 1 card

TWIST1 = 0. if there is no wing twist

= 1. if there is wing twist

RINC Root chord incidence in degrees

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Groups 16, 17, and 18 should be omitted if TWIST1 = 0.

Group 16 Format 2F10.6, 1 card

YNUM Number of y- stations to be used to describe twist distribution.

TCURV = 0. if the twist distribution is assumed to have piecewise linear variation.

= 1. if cubic spline interpolation is used.



Group 17 Format 8F10.6

YTS(I) Nondimensional (based on semispan) y coordinates at which twist angles are defined. YNUM numbers. Limited to 21.

Group 18 Format 8F10.6

CA(I) Twist angles in degrees at the corresponding y-stations. Negative for washout (i.e., leading-edge down) .

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Group 19 should be omitted if IWING = 0.

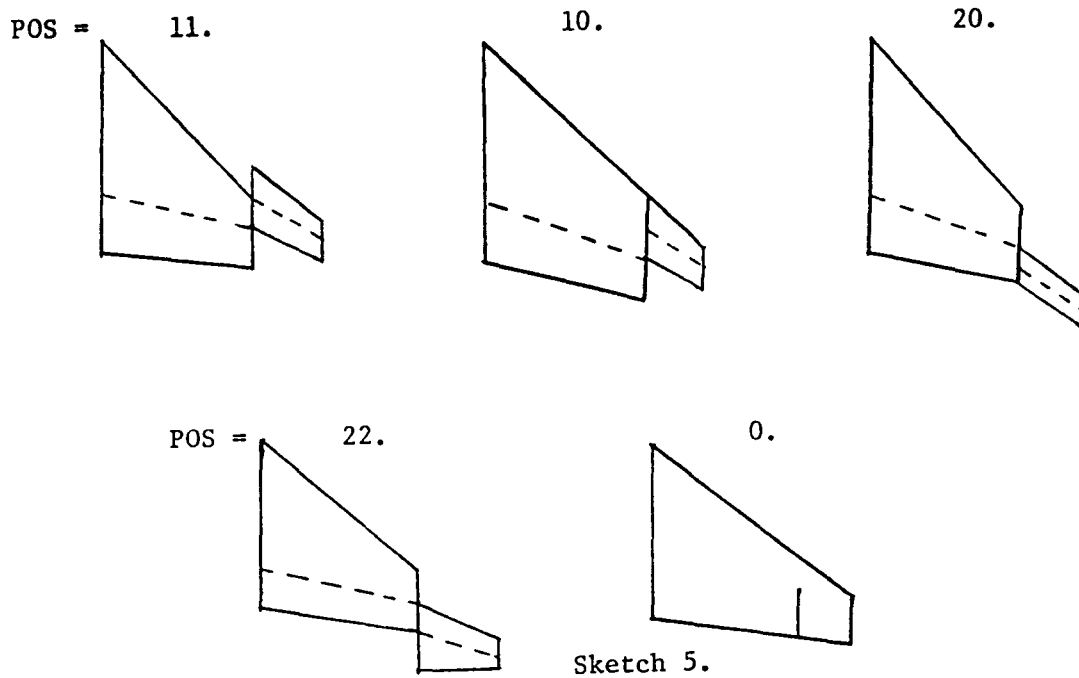
Group 19 Format 4F10.6, 1 card

TINC Tail incidence angle in degrees

HALFSH Tail half area. If the tail is to represent the winglet at the tip, put HALFSH = HALFSW. If the tail is a vertical fin inboard of wing tip, set HALFSH = fin area.

POS Winglet position indicator. The number, or key value, used for the configuration is dependent on whether the winglet is attached to the wing first or second chordwise section, respectively. Key values are indicated in sketch 5. If there is no winglet, it should be 0.

CAMT = 0, if the tail is not cambered.  
= 1, otherwise.



To run additional cases at the same time, repeat groups 1-19.

Remarks:

- (1) With the existing dimensions for the arrays DQ(140, 140) and GAMMA (19600), a total of 140 panels can be used. The minimum memory for execution is 58K (decimal). If the dimension for these two arrays is increased, up to 200 panels can be accepted.
- (2) Three working disk files are needed in execution. They are designated as (01), (02), and (03).
- (3) If the number of panels is to be increased, the following statements (see program listing for statement identification) must be changed:

SSC 10	DQ(N,N), N being the number of panels.
SSC 11	GAMMA(M), M being at least $(N+1)**2/4$ .
SSC 38	IQ = N.

## OUTPUT FORMAT

- (1) First, all input data will be printed.

HALFSW = half of reference wing area

CREF = reference chord

- (2) Panel endpoint coordinates and edge slopes:

(X1, Y1) coordinates of the inboard endpoint of a panel edge

(X2, Y2) coordinates of the corresponding outboard endpoint of a panel edge

BP tangent of sweep angle of a panel edge. The first BP is for the upstream edge and the second BP is for the downstream edge of a panel.

- (3) Control point coordinates

One set of (XCP, YCP, ZCP) defines a control point location.

- (4) Pressure distribution in attached flow

XV nondimensional chordwise location (referred to local chord)

YV nondimensional spanwise location (referred to wing semispan)

CP =  $\Delta C_p$

- (5) Sectional characteristics

Y/S nondimensional y-station, referred to wing semispan.

CL sectional lift coefficient

CM sectional pitching moment coefficient about the y axis.

CDI sectional induced drag coefficient.

CS\*C sectional suction coefficient multiplied by local chord.

CAV sectional axial (along x-axis) force coefficient due to leading edge vortex

- (6) The next group of output variables is the overall aerodynamic characteristics in attached potential flow. If AIPCON = 1.0, the lift and pitching moment coefficients will be  $C_{L_\alpha}$  and  $C_{M_\alpha}$ .

- (7) If ALPCON = 1.0, the factors,  $K_p$ ,  $K_{v, le}$  and  $K_{v, se}$ , etc. to be used in the method of suction analogy for a noncambered wing will be printed next.

They are used in the following formulas:

$$C_L = K_p \sin \alpha \cos^2 \alpha + (K_{v, le} + K_{v, se}) \sin^2 \alpha \cos \alpha$$

$$C_{D_i} = C_L \tan \alpha$$

$$C_m = K_p \sin \alpha \cos \alpha \frac{\bar{x}_p}{C_{ref}} + K_{v, le} \sin^2 \alpha \frac{\bar{x}_{le}}{C_{ref}} + K_{v, se} \sin^2 \alpha \frac{\bar{x}_{se}}{C_{ref}}$$

- (8) The bending moment distribution and the bending moment coefficient at the root chord will be printed next (attached-flow results only).
- (9) Finally, overall aerodynamic characteristics for attached flow and vortex-separated flow will be summarized. Most variables are self-explanatory. In the attached flow results, CB is the root chord bending moment coefficient. In the separated flow results, CAV is the total axial force coefficient due to leading-edge vortex.

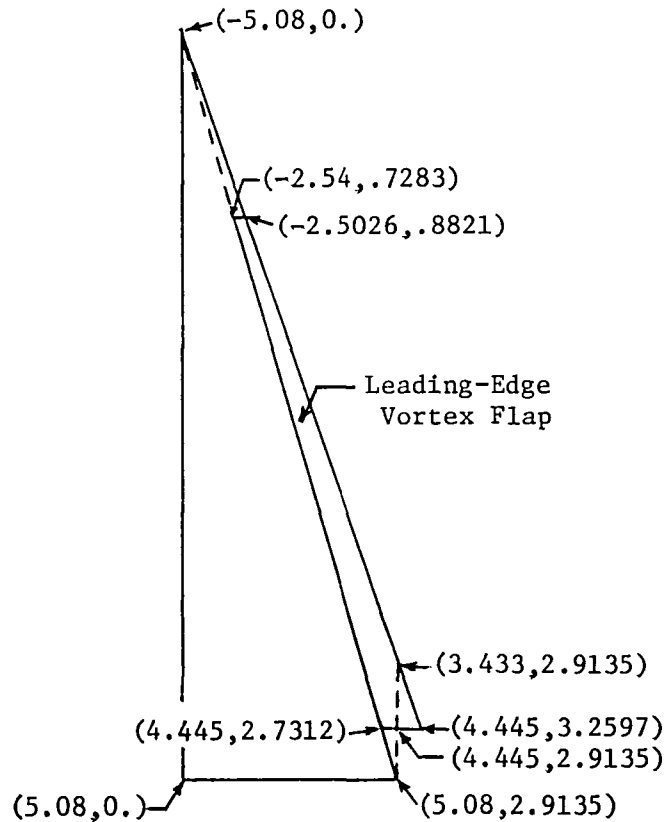
SAMPLE INPUT AND OUTPUT

1. First Sample Case

Input Data

RAO CONFIGURATION

2	12	2	0	2	0		
1	1	0					
10	0	3	1				
.7283	3.2597	0.	-2.5026	.8821	-.0677		
-2.54	.7283	-2.254	4.445	2.7312	0.		
4.445	3.2597	6.773	0.	0.			
.2	15.1968	0.	1.				
1.	16.	0.	3.433	5.08	2.9135	0.	0.
-5.08	5.08	0.	0.				
1.	71.107	1.	4.445	4.445	3.2597	0.	0.
3.433	4.445	2.9135	0.				
1.	71.107	1.	0.				
0.	0.						



Output

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 RAO CONFIGURATION

\*\*\*\*\*

INPUT DATA

2	12	2	0	2	0		
1	1	0					
10	0	3	1				
.728300	3.259700						
-2.540000	.728300	0.000000	-2.502600	.882100	-.067700		
4.445000	3.259700	-.254000	4.445000	2.731200	0.000000		
.200000	15.196800	6.773000	0.000000	0.000000			
1.000000	16.000000	0.000000	1.000000	0.000000			
-5.080000	5.080000	0.000000	3.433000	5.080000	2.913500	0.000000	0.000000
1.000000	71.107000	1.000000	0.000000				
3.433000	4.445000	2.913500	4.445000	4.445000	3.259700	0.000000	0.000000
1.000000	71.107000	1.000000	0.000000				
0.000000	0.000000						

HALF SW= .15197E+02                      CRFF= .67730E+01

PANEL ENDPOINT COORDINATES AND EDGE SLOPES =

X1	X2	Y1	Y2	RP	BP
-5.08000	-4.80340	0.00000	.09467	2.92192	2.85041
-4.83137	-4.56153	0.00000	.09467	2.85041	2.64290
-4.10981	-3.85962	0.00000	.09467	2.64290	2.31969
-2.98595	-2.76636	0.00000	.09467	2.31969	1.91242
-1.56981	-1.38877	0.00000	.09467	1.91242	1.46096
-.00000	.13830	0.00000	.09467	1.46096	1.00950
1.56981	1.66537	0.00000	.09467	1.00950	.60223
2.98595	3.04296	0.00000	.09467	.60223	.27902
4.10981	4.13622	0.00000	.09467	.27902	.07150
4.83137	4.83814	0.00000	.09467	.07150	.00000
-4.80340	-4.32653	.09467	.25787	2.92192	2.85041
-4.56153	-4.09634	.09467	.25787	2.85041	2.64290
-3.85962	-3.42829	.09467	.25787	2.64290	2.31969
-2.76636	-2.38778	.09467	.25787	2.31969	1.91242
-1.38877	-1.07665	.09467	.25787	1.91242	1.46096
.13830	.37673	.09467	.25787	1.46096	1.00950
1.66537	1.83012	.09467	.25787	1.00950	.60223
3.04296	3.14124	.09467	.25787	.60223	.27902
4.13622	4.18176	.09467	.25787	.27902	.07150
4.83814	4.84981	.09467	.25787	.07150	.00000
-4.32653	-3.64608	.25787	.49075	2.92192	2.85041
-4.09634	-3.43254	.25787	.49075	2.85041	2.64290
-3.42829	-2.81281	.25787	.49075	2.64290	2.31969
-2.38778	-1.84757	.25787	.49075	2.31969	1.91242

-1.07665	-.63129	.25787	.49075	1.91242	1.46096
.37673	.71696	.25787	.49075	1.46096	1.00950
1.83012	2.06521	.25787	.49075	1.00950	.60223
3.14124	3.28149	.25787	.49075	.60223	.27902
4.18176	4.24673	.25787	.49075	.27902	.07150
4.84981	4.86646	.25787	.49075	.07150	.00000
-3.64608	-2.80159	.49075	.77976	2.92192	2.85041
-3.43254	-2.60872	.49075	.77976	2.85041	2.64290
-2.81281	-2.04897	.49075	.77976	2.64290	2.31969
-1.84757	-1.17714	.49075	.77976	2.31969	1.91242
-.63129	-.07857	.49075	.77976	1.91242	1.46096
.71696	1.13920	.49075	.77976	1.46096	1.00950
2.06521	2.35698	.49075	.77976	1.00950	.60223
3.28149	3.45555	.49075	.77976	.60223	.27902
4.24673	4.32737	.49075	.77976	.27902	.07150
4.86646	4.88712	.49075	.77976	.07150	.00000
-2.80159	-1.84215	.77976	1.10813	2.92192	2.85041
-2.60872	-1.67275	.77976	1.10813	2.85041	2.64290
-2.04897	-1.18114	.77976	1.10813	2.64290	2.31969
-1.17714	-.41544	.77976	1.10813	2.31969	1.91242
-.07857	.54940	.77976	1.10813	1.91242	1.46096
1.13920	1.61893	.77976	1.10813	1.46096	1.00950
2.35698	2.68846	.77976	1.10813	1.00950	.60223
3.45555	3.65329	.77976	1.10813	.60223	.27902
4.32737	4.41899	.77976	1.10813	.27902	.07150
4.88712	4.91060	.77976	1.10813	.07150	.00000
-1.84215	-.82350	1.10813	1.45675	2.92192	2.85041
-1.67275	-.67903	1.10813	1.45675	2.85041	2.64290
-1.18114	-.25977	1.10813	1.45675	2.64290	2.31969
-.41544	.39325	1.10813	1.45675	2.31969	1.91242
.54940	1.21611	1.10813	1.45675	1.91242	1.46096
1.61893	2.12825	1.10813	1.45675	1.46096	1.00950
2.68846	3.04039	1.10813	1.45675	1.00950	.60223
3.65329	3.86325	1.10813	1.45675	.60223	.27902
4.41899	4.51627	1.10813	1.45675	.27902	.07150
4.91060	4.93553	1.10813	1.45675	.07150	.00000
-.82350	.19515	1.45675	1.80537	2.92192	2.85041
-.67903	.31469	1.45675	1.80537	2.85041	2.64290
-.25977	.66161	1.45675	1.80537	2.64290	2.31969
.39325	1.20195	1.45675	1.80537	2.31969	1.91242
1.21611	1.88282	1.45675	1.80537	1.91242	1.46096
2.12825	2.63757	1.45675	1.80537	1.46096	1.00950
3.04039	3.39232	1.45675	1.80537	1.00950	.60223
3.86325	4.07320	1.45675	1.80537	.60223	.27902
4.51627	4.61354	1.45675	1.80537	.27902	.07150
4.93553	4.96046	1.45675	1.80537	.07150	.00000
.19515	1.15459	1.80537	2.13374	2.92192	2.85041
.31469	1.25066	1.80537	2.13374	2.85041	2.64290
.66161	1.52944	1.80537	2.13374	2.64290	2.31969
1.20195	1.96365	1.80537	2.13374	2.31969	1.91242

1.88282	2.51079	1.80537	2.13374	1.91242	1.46096
2.63757	3.11730	1.80537	2.13374	1.46096	1.00950
3.39232	3.72381	1.80537	2.13374	1.00950	.60223
4.07320	4.27094	1.80537	2.13374	.60223	.27902
4.61354	4.70516	1.80537	2.13374	.27902	.07150
4.96046	4.98394	1.80537	2.13374	.07150	.00000
1.15459	1.99908	2.13374	2.42275	2.92192	2.85041
1.25066	2.07448	2.13374	2.42275	2.85041	2.64290
1.52944	2.29328	2.13374	2.42275	2.64290	2.31969
1.96365	2.63408	2.13374	2.42275	2.31969	1.91242
2.51079	3.06351	2.13374	2.42275	1.91242	1.46096
3.11730	3.53954	2.13374	2.42275	1.46096	1.00950
3.72381	4.01557	2.13374	2.42275	1.00950	.60223
4.27094	4.44500	2.13374	2.42275	.60223	.27902
4.70516	4.78580	2.13374	2.42275	.27902	.07150
4.98394	5.00460	2.13374	2.42275	.07150	.00000
1.99908	2.67953	2.42275	2.65563	2.92192	2.85041
2.07448	2.73827	2.42275	2.65563	2.85041	2.64290
2.29328	2.90876	2.42275	2.65563	2.64290	2.31969
2.63408	3.17429	2.42275	2.65563	2.31969	1.91242
3.06351	3.50887	2.42275	2.65563	1.91242	1.46096
3.53954	3.87977	2.42275	2.65563	1.46096	1.00950
4.01557	4.25066	2.42275	2.65563	1.00950	.60223
4.44500	4.58525	2.42275	2.65563	.60223	.27902
4.78580	4.85078	2.42275	2.65563	.27902	.07150
5.00460	5.02126	2.42275	2.65563	.07150	.00000
2.67953	3.15640	2.65563	2.81883	2.92192	2.85041
2.73827	3.20347	2.65563	2.81883	2.85041	2.64290
2.90876	3.34008	2.65563	2.81883	2.64290	2.31969
3.17429	3.55287	2.65563	2.81883	2.31969	1.91242
3.50887	3.82099	2.65563	2.81883	1.91242	1.46096
3.87977	4.11820	2.65563	2.81883	1.46096	1.00950
4.25066	4.41541	2.65563	2.81883	1.00950	.60223
4.58525	4.68353	2.65563	2.81883	.60223	.27902
4.85078	4.89631	2.65563	2.81883	.27902	.07150
5.02126	5.03293	2.65563	2.81883	.07150	.00000
3.15640	3.43300	2.81883	2.91350	2.92192	2.85041
3.20347	3.47330	2.81883	2.91350	2.85041	2.64290
3.34008	3.59027	2.81883	2.91350	2.64290	2.31969
3.55287	3.77246	2.81883	2.91350	2.31969	1.91242
3.82099	4.00202	2.81883	2.91350	1.91242	1.46096
4.11820	4.25650	2.81883	2.91350	1.46096	1.00950
4.41541	4.51098	2.81883	2.91350	1.00950	.60223
4.68353	4.74054	2.81883	2.91350	.60223	.27902
4.89631	4.92273	2.81883	2.91350	.27902	.07150
5.03293	5.03970	2.81883	2.91350	.07150	.00000
3.43300	3.93900	2.91350	3.08660	2.92317	2.85163
3.45777	3.95138	2.91350	3.08660	2.85163	2.64403
3.52964	3.98732	2.91350	3.08660	2.64403	2.32068
3.64158	4.04329	2.91350	3.08660	2.32068	1.91324



3.78264	4.11382	2.91350	3.08660	1.91324	1.46158
3.93900	4.19200	2.91350	3.08660	1.46158	1.00993
4.09536	4.27018	2.91350	3.08660	1.00993	.60249
4.23642	4.34071	2.91350	3.08660	.60249	.27914
4.34836	4.39668	2.91350	3.08660	.27914	.07153
4.42023	4.43262	2.91350	3.08660	.07153	.00000
3.93900	4.37721	3.08660	3.23651	2.92317	2.85163
3.95138	4.37887	3.08660	3.23651	2.85163	2.64403
3.98732	4.38368	3.08660	3.23651	2.64403	2.32068
4.04329	4.39118	3.08660	3.23651	2.32068	1.91324
4.11382	4.40063	3.08660	3.23651	1.91324	1.46158
4.19200	4.41110	3.08660	3.23651	1.46158	1.00993
4.27018	4.42158	3.08660	3.23651	1.00993	.60249
4.34071	4.43103	3.08660	3.23651	.60249	.27914
4.39668	4.43853	3.08660	3.23651	.27914	.07153
4.43262	4.44334	3.08660	3.23651	.07153	.00000

CONTROL POINT COORDINATES=

XCP	YCP	ZCP	XCP	YCP	ZCP
-4.74658	.04233	0.00000	-4.09761	.04233	0.00000
-3.04204	.04233	0.00000	-1.68385	.04233	0.00000
-.15508	.04233	0.00000	1.39576	.04233	0.00000
2.81805	.04233	0.00000	3.97368	.04233	0.00000
4.75050	.04233	0.00000	5.07315	.04233	0.00000
-4.39031	.16686	0.00000	-3.76488	.16686	0.00000
-2.74757	.16686	0.00000	-1.43863	.16686	0.00000
.03472	.16686	0.00000	1.52933	.16686	0.00000
2.90005	.16686	0.00000	4.01379	.16686	0.00000
4.76244	.16686	0.00000	5.07340	.16686	0.00000
-3.81959	.36636	0.00000	-3.23184	.36636	0.00000
-2.27584	.36636	0.00000	-1.04578	.36636	0.00000
.33877	.36636	0.00000	1.74331	.36636	0.00000
3.03143	.36636	0.00000	4.07804	.36636	0.00000
4.78158	.36636	0.00000	5.07380	.36636	0.00000
-3.06757	.62922	0.00000	-2.52949	.62922	0.00000
-1.65427	.62922	0.00000	-.52815	.62922	0.00000
.73941	.62922	0.00000	2.02526	.62922	0.00000
3.20453	.62922	0.00000	4.16271	.62922	0.00000
4.80680	.62922	0.00000	5.07432	.62922	0.00000
-2.17797	.94018	0.00000	-1.69864	.94018	0.00000
-.91898	.94018	0.00000	.08418	.94018	0.00000
1.21334	.94018	0.00000	2.35880	.94018	0.00000
3.40931	.94018	0.00000	4.26287	.94018	0.00000
4.83663	.94018	0.00000	5.07494	.94018	0.00000
-1.20247	1.28116	0.00000	-.78757	1.28116	0.00000
-.11270	1.28116	0.00000	.75563	1.28116	0.00000
1.73303	1.28116	0.00000	2.72454	1.28116	0.00000
3.63385	1.28116	0.00000	4.37269	1.28116	0.00000
4.86934	1.28116	0.00000	5.07562	1.28116	0.00000

-.19779	1.63234	0.00000	.15077	1.63234	0.00000
.71771	1.63234	0.00000	1.44718	1.63234	0.00000
2.26827	1.63234	0.00000	3.10122	1.63234	0.00000
3.86512	1.63234	0.00000	4.48580	1.63234	0.00000
4.90303	1.63234	0.00000	5.07632	1.63234	0.00000
.77770	1.97332	0.00000	1.06183	1.97332	0.00000
1.52399	1.97332	0.00000	2.11863	1.97332	0.00000
2.78796	1.97332	0.00000	3.46696	1.97332	0.00000
4.08967	1.97332	0.00000	4.59563	1.97332	0.00000
4.93574	1.97332	0.00000	5.07700	1.97332	0.00000
1.66731	2.28428	0.00000	1.89269	2.28428	0.00000
2.25928	2.28428	0.00000	2.73097	2.28428	0.00000
3.26190	2.28428	0.00000	3.80049	2.28428	0.00000
4.29444	2.28428	0.00000	4.69578	2.28428	0.00000
4.96557	2.28428	0.00000	5.07762	2.28428	0.00000
2.41932	2.54714	0.00000	2.59504	2.54714	0.00000
2.88085	2.54714	0.00000	3.24860	2.54714	0.00000
3.66253	2.54714	0.00000	4.08244	2.54714	0.00000
4.46755	2.54714	0.00000	4.78045	2.54714	0.00000
4.99078	2.54714	0.00000	5.07815	2.54714	0.00000
2.99005	2.74664	0.00000	3.12807	2.74664	0.00000
3.35258	2.74664	0.00000	3.64144	2.74664	0.00000
3.96659	2.74664	0.00000	4.29642	2.74664	0.00000
4.59892	2.74664	0.00000	4.84470	2.74664	0.00000
5.00992	2.74664	0.00000	5.07854	2.74664	0.00000
3.34632	2.87117	0.00000	3.46081	2.87117	0.00000
3.64705	2.87117	0.00000	3.88667	2.87117	0.00000
4.15639	2.87117	0.00000	4.43000	2.87117	0.00000
4.68093	2.87117	0.00000	4.88481	2.87117	0.00000
5.02187	2.87117	0.00000	5.07879	2.87117	0.00000
3.70190	3.00005	0.00000	3.75104	3.00005	0.00000
3.83090	3.00005	0.00000	3.93363	3.00005	0.00000
4.04923	3.00005	0.00000	4.16649	3.00005	0.00000
4.27401	3.00005	0.00000	4.36137	3.00005	0.00000
4.42009	3.00005	0.00000	4.44448	3.00005	0.00000
4.19730	3.17315	0.00000	4.21368	3.17315	0.00000
4.24030	3.17315	0.00000	4.27454	3.17315	0.00000
4.31308	3.17315	0.00000	4.35216	3.17315	0.00000
4.38800	3.17315	0.00000	4.41712	3.17315	0.00000
4.43670	3.17315	0.00000	4.44483	3.17315	0.00000

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ATTACHED POTENTIAL FLOW RESULTS

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XX

PRESSURE DISTRIBUTION AT ALPHA = 16.000 DEG.

XX

VORTEX	XV	YV	CP
1	.00616	.01299	.66045
2	.05450	.01299	.42629
3	.14645	.01299	.39207
4	.27300	.01299	.36306
5	.42178	.01299	.33331
6	.57822	.01299	.29316
7	.72700	.01299	.23522
8	.85355	.01299	.16427
9	.94550	.01299	.09189
10	.99384	.01299	.02882
11	.00616	.05119	.97927
12	.05450	.05119	.46497
13	.14645	.05119	.39738
14	.27300	.05119	.36276
15	.42178	.05119	.33154
16	.57822	.05119	.29009
17	.72700	.05119	.23164
18	.85355	.05119	.16123
19	.94550	.05119	.09009
20	.99384	.05119	.02832
21	.00616	.11239	1.33433
22	.05450	.11239	.55636
23	.14645	.11239	.42028
24	.27300	.11239	.36946
25	.42178	.11239	.33250
26	.57822	.11239	.28698
27	.72700	.11239	.22732
28	.85355	.11239	.15742
29	.94550	.11239	.08788
30	.99384	.11239	.02774
31	.00616	.19303	1.70423
32	.05450	.19303	.66988
33	.14645	.19303	.46467
34	.27300	.19303	.38705
35	.42178	.19303	.34013
36	.57822	.19303	.28609
37	.72700	.19303	.22464

38	.85355	.19303	.15445
39	.94550	.19303	.08607
40	.99384	.19303	.02724
41	.00616	.28843	2.64608
42	.05450	.28843	1.18747
43	.14645	.28843	.51945
44	.27300	.28843	.42675
45	.42178	.28843	.35277
46	.57822	.28843	.29050
47	.72700	.28843	.22559
48	.85355	.28843	.15359
49	.94550	.28843	.08522
50	.99384	.28843	.02698
51	.00616	.39303	3.04059
52	.05450	.39303	1.22440
53	.14645	.39303	.69636
54	.27300	.39303	.46840
55	.42178	.39303	.37245
56	.57822	.39303	.30355
57	.72700	.39303	.23157
58	.85355	.39303	.15568
59	.94550	.39303	.08556
60	.99384	.39303	.02705
61	.00616	.50076	3.65261
62	.05450	.50076	1.43878
63	.14645	.50076	1.06564
64	.27300	.50076	.50802
65	.42178	.50076	.41366
66	.57822	.50076	.32389
67	.72700	.50076	.24493
68	.85355	.50076	.16043
69	.94550	.50076	.08693
70	.99384	.50076	.02735
71	.00616	.60537	4.24953
72	.05450	.60537	1.63804
73	.14645	.60537	1.05286
74	.27300	.60537	.69044
75	.42178	.60537	.44861
76	.57822	.60537	.36687
77	.72700	.60537	.26215
78	.85355	.60537	.16755
79	.94550	.60537	.08794
80	.99384	.60537	.02756
81	.00616	.70076	4.89899
82	.05450	.70076	1.86541
83	.14645	.70076	1.13154
84	.27300	.70076	.89038
85	.42178	.70076	.64781
86	.57822	.70076	.39513
87	.72700	.70076	.29512

88	.85355	.70076	.16920
89	.94550	.70076	.08665
90	.99384	.70076	.02679
91	.00616	.78140	5.62578
92	.05450	.78140	2.12986
93	.14645	.78140	1.31383
94	.27300	.78140	.95862
95	.42178	.78140	.80524
96	.57822	.78140	.60432
97	.72700	.78140	.28871
98	.85355	.78140	.16970
99	.94550	.78140	.07528
100	.99384	.78140	.02376
101	.00616	.84260	6.36386
102	.05450	.84260	2.40666
103	.14645	.84260	1.40394
104	.27300	.84260	1.10221
105	.42178	.84260	.84618
106	.57822	.84260	.66364
107	.72700	.84260	.44785
108	.85355	.84260	.10503
109	.94550	.84260	.05611
110	.99384	.84260	.01788
111	.00616	.88081	7.05461
112	.05450	.88081	2.71053
113	.14645	.88081	1.85270
114	.27300	.88081	1.08840
115	.42178	.88081	.87316
116	.57822	.88081	.61042
117	.72700	.88081	.31411
118	.85355	.88081	.03870
119	.94550	.88081	.03558
120	.99384	.88081	.01120
121	.00616	.92035	11.35646
122	.05450	.92035	4.28909
123	.14645	.92035	2.50178
124	.27300	.92035	1.76764
125	.42178	.92035	1.40286
126	.57822	.92035	1.15412
127	.72700	.92035	.91859
128	.85355	.92035	.70187
129	.94550	.92035	.51242
130	.99384	.92035	.33517
131	.00616	.97345	21.57048
132	.05450	.97345	8.07183
133	.14645	.97345	4.58535
134	.27300	.97345	3.05466
135	.42178	.97345	2.16773
136	.57822	.97345	1.58400
137	.72700	.97345	1.16947
138	.85355	.97345	.86824
139	.94550	.97345	.64974
140	.99384	.97345	.47709

Y/S	CL (RIGHT)	CL (LEFT)	CM	CDI	CS*C	CAV
.01299	.28581	.28581	.04439	.07934	.07792	0.00000
.05119	.29605	.29605	.04238	.07777	.20439	0.00000
.11239	.31434	.31434	.03637	.07637	.37138	0.00000
.19303	.34056	.34056	.02267	.07481	.56432	0.00000
.28843	.39900	.39900	.00621	.07111	.53819	-.00488
.39303	.44264	.44264	-.03457	.06591	.77857	-.00815
.50076	.52030	.52030	-.08961	.05205	.93060	-.01160
.60537	.58536	.58536	-.16220	.05820	.87781	-.02474
.70076	.68349	.68349	-.25356	.03006	1.06459	-.03782
.78140	.78993	.78993	-.35558	.01717	.98398	-.04484
.84260	.87743	.87743	-.44320	-.02633	1.06810	-.06196
.88081	.92958	.92958	-.49436	-.05950	1.08670	-.07599
.92035	1.63984	1.63984	-.90084	-.26680	1.17173	0.00000
.97345	2.88017	2.88017	-1.63990	-1.39785	1.41122	0.00000

TOTAL LIFT COEFFICIENT = .52231

TOTAL INDUCED DRAG COEFFICIENT = .06396

THE INDUCED DRAG PARAMETER = .23445

TOTAL PITCHING MOMENT COEFFICIENT = -.07317

FAR-FIELD INDUCED DRAG= .06388

FAR-FIELD INDUCED DRAG PARAMETER= .23415

THE FOLLOWING BENDING MOMENT COEFFICIENT IS BASED ON  $Q \cdot S \cdot (B/2)$ ,  
 WHERE  $S = 30.39360$  AND  $R/2 = 3.25970$

Y/S	BM (RIGHT)	BM (LEFT)
.01299	.11302	.11302
.05119	.10316	.10316
.11239	.08836	.08836
.19303	.07066	.07066
.28843	.05241	.05241
.39303	.03576	.03576
.50076	.02221	.02221
.60537	.01243	.01243
.70076	.00621	.00621
.78140	.00279	.00279
.84260	.00121	.00121
.88081	.00061	.00061
.92035	.00024	.00024
.97345	.00001	.00001

THE BENDING MOMENT COEFFICIENT BASED ON WING HALF SPAN AND WING AREA  
 AT THE WING ROOT = .116470 (RIGHT), = .116470 (LEFT)

XX

OVER-ALL AERODYNAMIC CHARACTERISTICS

XX

ATTACHED FLOW

ALPHA	CL	CDI	CM	CB
16.0000	.52231	.06396	-.07317	.11647

SEPARATED FLOW

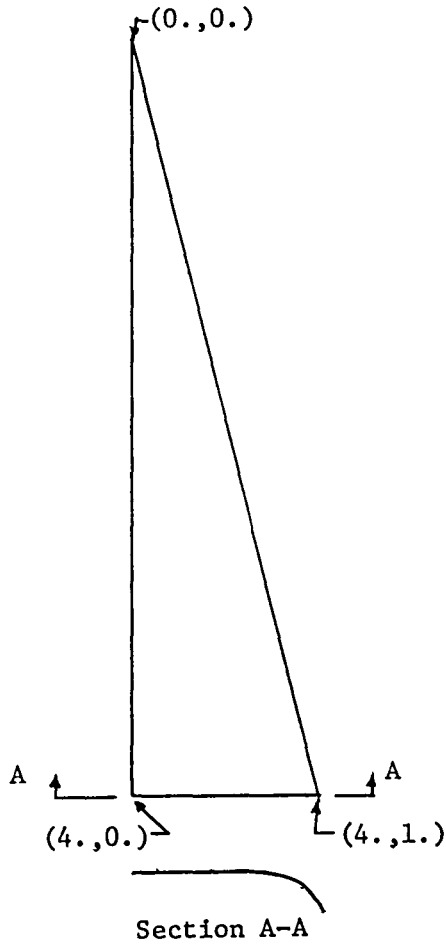
ALPHA	CLP	CLV,LE	CLV,SF	CL	
16.0000	.51383	.15670	0.00000	.67053	
ALPHA	CDP	CDV,LE	CDV,SE	CDI	CAV
16.0000	.11745	.03210	0.00000	.14955	-.01233
ALPHA	CMV,LE	CMV,SF	CM		
16.0000	-.07317	-.01450	0.00000	-.08767	

2. Second Sample Case

Input Data

ARC CP-924, SQUIRE WING 7

1	14	0	1	0				
1	1	0						
10	0	2	0					
.09	2.	2.666667	0.	0.	0.			
2.	10.	10.	1.	1.	0.			
0.	4.	0.	4.	4.	4.	1.	0.	0.
1.	75.963757	1.	0.					
0.	0.							





Output

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 ARC CP-924, SQUIRE WING 7

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INPUT DATA

1	14	0	1	0			
1	1	0					
10	0	2	0				
.090000	2.000000	2.666667	0.000000	0.000000			
2.000000	10.000000	10.000000	1.000000	0.000000			
0.000000	4.000000	0.000000	4.000000	4.000000	1.000000	0.000000	0.000000
1.000000	75.963757	1.000000	0.000000				
0.000000	0.000000						

HALF SW= .20000E+01                      CREF= .26667E+01

PANEL ENDPOINT COORDINATES AND EDGE SLOPES =

X1	X2	Y1	Y2	BP	RP
0.00000	.09789	0.00000	.02447	4.00000	3.90211
.09789	.19338	0.00000	.02447	3.90211	3.61803
.38197	.47051	0.00000	.02447	3.61803	3.17557
.82443	.90214	0.00000	.02447	3.17557	2.61803
1.38197	1.44603	0.00000	.02447	2.61803	2.00000
2.00000	2.04894	0.00000	.02447	2.00000	1.38197
2.61803	2.65185	0.00000	.02447	1.38197	.82443
3.17557	3.19575	0.00000	.02447	.82443	.38197
3.61803	3.62738	0.00000	.02447	.38197	.09789
3.90211	3.90451	0.00000	.02447	.09789	.00000
.09789	.26795	.02447	.06699	4.00000	3.90211
.19338	.35928	.02447	.06699	3.90211	3.61803
.47051	.62433	.02447	.06699	3.61803	3.17557
.90214	1.03715	.02447	.06699	3.17557	2.61803
1.44603	1.55734	.02447	.06699	2.61803	2.00000
2.04894	2.13397	.02447	.06699	2.00000	1.38197
2.65185	2.71061	.02447	.06699	1.38197	.82443
3.19575	3.23080	.02447	.06699	.82443	.38197
3.62738	3.64362	.02447	.06699	.38197	.09789
3.90451	3.90867	.02447	.06699	.09789	.00000
.26795	.51371	.06699	.12843	4.00000	3.90211
.35928	.59903	.06699	.12843	3.90211	3.61803
.62433	.84662	.06699	.12843	3.61803	3.17557
1.03715	1.23226	.06699	.12843	3.17557	2.61803
1.55734	1.71819	.06699	.12843	2.61803	2.00000
2.13397	2.25686	.06699	.12843	2.00000	1.38197
2.71061	2.79552	.06699	.12843	1.38197	.82443
3.23080	3.28145	.06699	.12843	.82443	.38197

3.64362	3.66709	.06699	.12843	.38197	.09789
3.90867	3.91468	.06699	.12843	.09789	.00000
.51371	.82443	.12843	.20611	4.00000	3.90211
.59903	.90214	.12843	.20611	3.90211	3.61803
.84662	1.12767	.12843	.20611	3.61803	3.17557
1.23226	1.47894	.12843	.20611	3.17557	2.61803
1.71819	1.92156	.12843	.20611	2.61803	2.00000
2.25686	2.41221	.12843	.20611	2.00000	1.38197
2.79552	2.90287	.12843	.20611	1.38197	.82443
3.28145	3.34549	.12843	.20611	.82443	.38197
3.66709	3.69676	.12843	.20611	.38197	.09789
3.91468	3.92229	.12843	.20611	.09789	.00000
.82443	1.18653	.20611	.29663	4.00000	3.90211
.90214	1.25538	.20611	.29663	3.90211	3.61803
1.12767	1.45519	.20611	.29663	3.61803	3.17557
1.47894	1.76640	.20611	.29663	3.17557	2.61803
1.92156	2.15856	.20611	.29663	2.61803	2.00000
2.41221	2.59326	.20611	.29663	2.00000	1.38197
2.90287	3.02797	.20611	.29663	1.38197	.82443
3.34549	3.42012	.20611	.29663	.82443	.38197
3.69676	3.73134	.20611	.29663	.38197	.09789
3.92229	3.93115	.20611	.29663	.09789	.00000
1.18653	1.58418	.29663	.39604	4.00000	3.90211
1.25538	1.64330	.29663	.39604	3.90211	3.61803
1.45519	1.81487	.29663	.39604	3.61803	3.17557
1.76640	2.08210	.29663	.39604	3.17557	2.61803
2.15856	2.41882	.29663	.39604	2.61803	2.00000
2.59326	2.79209	.29663	.39604	2.00000	1.38197
3.02797	3.16535	.29663	.39604	1.38197	.82443
3.42012	3.50208	.29663	.39604	.82443	.38197
3.73134	3.76931	.29663	.39604	.38197	.09789
3.93115	3.94088	.29663	.39604	.09789	.00000
1.58418	2.00000	.39604	.50000	4.00000	3.90211
1.64330	2.04894	.39604	.50000	3.90211	3.61803
1.81487	2.19098	.39604	.50000	3.61803	3.17557
2.08210	2.41221	.39604	.50000	3.17557	2.61803
2.41882	2.69098	.39604	.50000	2.61803	2.00000
2.79209	3.00000	.39604	.50000	2.00000	1.38197
3.16535	3.30902	.39604	.50000	1.38197	.82443
3.50208	3.58779	.39604	.50000	.82443	.38197
3.76931	3.80902	.39604	.50000	.38197	.09789
3.94088	3.95106	.39604	.50000	.09789	.00000
2.00000	2.41582	.50000	.60396	4.00000	3.90211
2.04894	2.45459	.50000	.60396	3.90211	3.61803
2.19098	2.56710	.50000	.60396	3.61803	3.17557
2.41221	2.74233	.50000	.60396	3.17557	2.61803
2.69098	2.96314	.50000	.60396	2.61803	2.00000
3.00000	3.20791	.50000	.60396	2.00000	1.38197
3.30902	3.45268	.50000	.60396	1.38197	.82443
3.58779	3.67349	.50000	.60396	.82443	.38197

3.80902	3.84872	.50000	.60396	.38197	.09789
3.95106	3.96123	.50000	.60396	.09789	.00000
2.41582	2.81347	.60396	.70337	4.00000	3.90211
2.45459	2.84251	.60396	.70337	3.90211	3.61803
2.56710	2.92678	.60396	.70337	3.61803	3.17557
2.74233	3.05803	.60396	.70337	3.17557	2.61803
2.96314	3.22341	.60396	.70337	2.61803	2.00000
3.20791	3.40674	.60396	.70337	2.00000	1.38197
3.45268	3.59007	.60396	.70337	1.38197	.82443
3.67349	3.75545	.60396	.70337	.82443	.38197
3.84872	3.88670	.60396	.70337	.38197	.09789
3.96123	3.97096	.60396	.70337	.09789	.00000
2.81347	3.17557	.70337	.79389	4.00000	3.90211
2.84251	3.19575	.70337	.79389	3.90211	3.61803
2.92678	3.25430	.70337	.79389	3.61803	3.17557
3.05803	3.34549	.70337	.79389	3.17557	2.61803
3.22341	3.46040	.70337	.79389	2.61803	2.00000
3.40674	3.58779	.70337	.79389	2.00000	1.38197
3.59007	3.71517	.70337	.79389	1.38197	.82443
3.75545	3.83008	.70337	.79389	.82443	.38197
3.88670	3.92127	.70337	.79389	.38197	.09789
3.97096	3.97982	.70337	.79389	.09789	.00000
3.17557	3.48629	.79389	.87157	4.00000	3.90211
3.19575	3.49886	.79389	.87157	3.90211	3.61803
3.25430	3.53534	.79389	.87157	3.61803	3.17557
3.34549	3.59217	.79389	.87157	3.17557	2.61803
3.46040	3.66377	.79389	.87157	2.61803	2.00000
3.58779	3.74314	.79389	.87157	2.00000	1.38197
3.71517	3.82252	.79389	.87157	1.38197	.82443
3.83008	3.89412	.79389	.87157	.82443	.38197
3.92127	3.95095	.79389	.87157	.38197	.09789
3.97982	3.98743	.79389	.87157	.09789	.00000
3.48629	3.73205	.87157	.93301	4.00000	3.90211
3.49886	3.73861	.87157	.93301	3.90211	3.61803
3.53534	3.75764	.87157	.93301	3.61803	3.17557
3.59217	3.78728	.87157	.93301	3.17557	2.61803
3.66377	3.82462	.87157	.93301	2.61803	2.00000
3.74314	3.86603	.87157	.93301	2.00000	1.38197
3.82252	3.90743	.87157	.93301	1.38197	.82443
3.89412	3.94477	.87157	.93301	.82443	.38197
3.95095	3.97441	.87157	.93301	.38197	.09789
3.98743	3.99344	.87157	.93301	.09789	.00000
3.73205	3.90211	.93301	.97553	4.00000	3.90211
3.73861	3.90451	.93301	.97553	3.90211	3.61803
3.75764	3.91146	.93301	.97553	3.61803	3.17557
3.78728	3.92229	.93301	.97553	3.17557	2.61803
3.82462	3.93593	.93301	.97553	2.61803	2.00000
3.86603	3.95106	.93301	.97553	2.00000	1.38197
3.90743	3.96618	.93301	.97553	1.38197	.82443
3.94477	3.97982	.93301	.97553	.82443	.38197

3.97441	3.99065	.93301	.97553	.38197	.09789
3.99344	3.99760	.93301	.97553	.09789	.00000
3.90211	3.98904	.97553	.99726	4.00000	3.90211
3.90451	3.98931	.97553	.99726	3.90211	3.61803
3.91146	3.99009	.97553	.99726	3.61803	3.17557
3.92229	3.99130	.97553	.99726	3.17557	2.61803
3.93593	3.99283	.97553	.99726	2.61803	2.00000
3.95106	3.99452	.97553	.99726	2.00000	1.38197
3.96618	3.99621	.97553	.99726	1.38197	.82443
3.97982	3.99774	.97553	.99726	.82443	.38197
3.99065	3.99895	.97553	.99726	.38197	.09789
3.99760	3.99973	.97553	.99726	.09789	.00000

CONTROL POINT COORDINATES=

XCP	YCP	ZCP	XCP	YCP	ZCP
.12803	.01093	0.00000	.38602	.01093	0.00000
.80352	.01093	0.00000	1.33933	.01093	0.00000
1.94154	.01093	0.00000	2.55184	.01093	0.00000
3.11115	.01093	0.00000	3.56538	.01093	0.00000
3.87059	.01093	0.00000	3.99730	.01093	0.00000
.25448	.04323	0.00000	.50405	.04323	0.00000
.90791	.04323	0.00000	1.42622	.04323	0.00000
2.00876	.04323	0.00000	2.59913	.04323	0.00000
3.14018	.04323	0.00000	3.57957	.04323	0.00000
3.87481	.04323	0.00000	3.99739	.04323	0.00000
.45908	.09549	0.00000	.69502	.09549	0.00000
1.07681	.09549	0.00000	1.56681	.09549	0.00000
2.11753	.09549	0.00000	2.67565	.09549	0.00000
3.18715	.09549	0.00000	3.60254	.09549	0.00000
3.88165	.09549	0.00000	3.99753	.09549	0.00000
.73289	.16543	0.00000	.95058	.16543	0.00000
1.30286	.16543	0.00000	1.75496	.16543	0.00000
2.26310	.16543	0.00000	2.77806	.16543	0.00000
3.25001	.16543	0.00000	3.63327	.16543	0.00000
3.89080	.16543	0.00000	3.99772	.16543	0.00000
1.06394	.25000	0.00000	1.25958	.25000	0.00000
1.57615	.25000	0.00000	1.98245	.25000	0.00000
2.43910	.25000	0.00000	2.90188	.25000	0.00000
3.32600	.25000	0.00000	3.67043	.25000	0.00000
3.90187	.25000	0.00000	3.99795	.25000	0.00000
1.43777	.34549	0.00000	1.60849	.34549	0.00000
1.88476	.34549	0.00000	2.23933	.34549	0.00000
2.63783	.34549	0.00000	3.04169	.34549	0.00000
3.41182	.34549	0.00000	3.71239	.34549	0.00000
3.91436	.34549	0.00000	3.99821	.34549	0.00000
1.83803	.44774	0.00000	1.98208	.44774	0.00000
2.21520	.44774	0.00000	2.51437	.44774	0.00000
2.85063	.44774	0.00000	3.19140	.44774	0.00000

3.50370	.44774	0.00000	3.75732	.44774	0.00000
3.92774	.44774	0.00000	3.99849	.44774	0.00000
2.24723	.55226	0.00000	2.36402	.55226	0.00000
2.55301	.55226	0.00000	2.79556	.55226	0.00000
3.06817	.55226	0.00000	3.34444	.55226	0.00000
3.59764	.55226	0.00000	3.80325	.55226	0.00000
3.94142	.55226	0.00000	3.99878	.55226	0.00000
2.64749	.65451	0.00000	2.73761	.65451	0.00000
2.88344	.65451	0.00000	3.07061	.65451	0.00000
3.28096	.65451	0.00000	3.49414	.65451	0.00000
3.68952	.65451	0.00000	3.84818	.65451	0.00000
3.95480	.65451	0.00000	3.99906	.65451	0.00000
3.02131	.75000	0.00000	3.08653	.75000	0.00000
3.19205	.75000	0.00000	3.32748	.75000	0.00000
3.47970	.75000	0.00000	3.63396	.75000	0.00000
3.77533	.75000	0.00000	3.89014	.75000	0.00000
3.96729	.75000	0.00000	3.99932	.75000	0.00000
3.35237	.83457	0.00000	3.39552	.83457	0.00000
3.46535	.83457	0.00000	3.55497	.83457	0.00000
3.65570	.83457	0.00000	3.75778	.83457	0.00000
3.85133	.83457	0.00000	3.92730	.83457	0.00000
3.97835	.83457	0.00000	3.99955	.83457	0.00000
3.62617	.90451	0.00000	3.65108	.90451	0.00000
3.69139	.90451	0.00000	3.74312	.90451	0.00000
3.80126	.90451	0.00000	3.86019	.90451	0.00000
3.91419	.90451	0.00000	3.95804	.90451	0.00000
3.98751	.90451	0.00000	3.99974	.90451	0.00000
3.83078	.95677	0.00000	3.84205	.95677	0.00000
3.86030	.95677	0.00000	3.88372	.95677	0.00000
3.91004	.95677	0.00000	3.93671	.95677	0.00000
3.96115	.95677	0.00000	3.98100	.95677	0.00000
3.99434	.95677	0.00000	3.99988	.95677	0.00000
3.95723	.98907	0.00000	3.96008	.98907	0.00000
3.96469	.98907	0.00000	3.97061	.98907	0.00000
3.97726	.98907	0.00000	3.98400	.98907	0.00000
3.99018	.98907	0.00000	3.99520	.98907	0.00000
3.99857	.98907	0.00000	3.99997	.98907	0.00000

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ATTACHED POTENTIAL FLOW RESULTS

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XX

PRESSURE DISTRIBUTION AT ALPHA = 10.000 DEG.

XX

VORTEX	XV	YV	CP
1	.00616	.01093	.28632
2	.05450	.01093	.17430
3	.14645	.01093	.16864
4	.27300	.01093	.16220
5	.42178	.01093	.15408
6	.57822	.01093	.14158
7	.72700	.01093	.12113
8	.85355	.01093	.09015
9	.94550	.01093	.05209
10	.99384	.01093	.01622
11	.00616	.04323	.53948
12	.05450	.04323	.19716
13	.14645	.04323	.17287
14	.27300	.04323	.16288
15	.42178	.04323	.15392
16	.57822	.04323	.14082
17	.72700	.04323	.11998
18	.85355	.04323	.08885
19	.94550	.04323	.05114
20	.99384	.04323	.01593
21	.00616	.09549	.64086
22	.05450	.09549	.28450
23	.14645	.09549	.18641
24	.27300	.09549	.16755
25	.42178	.09549	.15521
26	.57822	.09549	.14049
27	.72700	.09549	.11867
28	.85355	.09549	.08721
29	.94550	.09549	.05001
30	.99384	.09549	.01564
31	.00616	.16543	.68370
32	.05450	.16543	.41232
33	.14645	.16543	.22357
34	.27300	.16543	.17930
35	.42178	.16543	.15977
36	.57822	.16543	.14177
37	.72700	.16543	.11820
38	.85355	.16543	.08609
39	.94550	.16543	.04922
40	.99384	.16543	.01545

41	.00616	.25000	.73408
42	.05450	.25000	.51536
43	.14645	.25000	.29602
44	.27300	.25000	.20483
45	.42178	.25000	.17037
46	.57822	.25000	.14630
47	.72700	.25000	.11978
48	.85355	.25000	.08644
49	.94550	.25000	.04934
50	.99384	.25000	.01553
51	.00616	.34549	.79272
52	.05450	.34549	.57269
53	.14645	.34549	.39145
54	.27300	.34549	.25436
55	.42178	.34549	.19278
56	.57822	.34549	.15727
57	.72700	.34549	.12546
58	.85355	.34549	.08963
59	.94550	.34549	.05118
60	.99384	.34549	.01622
61	.00616	.44774	.86037
62	.05450	.44774	.59955
63	.14645	.44774	.47739
64	.27300	.44774	.33045
65	.42178	.44774	.23610
66	.57822	.44774	.18114
67	.72700	.44774	.13952
68	.85355	.44774	.09857
69	.94550	.44774	.05666
70	.99384	.44774	.01864
71	.00616	.55226	.93716
72	.05450	.55226	.61077
73	.14645	.55226	.53194
74	.27300	.55226	.41613
75	.42178	.55226	.30549
76	.57822	.55226	.22732
77	.72700	.55226	.17004
78	.85355	.55226	.11946
79	.94550	.55226	.07055
80	.99384	.55226	.02619
81	.00616	.65451	1.02390
82	.05450	.65451	.61570
83	.14645	.65451	.55339
84	.27300	.65451	.48299
85	.42178	.65451	.38823
86	.57822	.65451	.29979
87	.72700	.65451	.22646
88	.85355	.65451	.16231
89	.94550	.65451	.10204

90	.99384	.65451	.04686
91	.00616	.75000	1.12333
92	.05450	.75000	.62039
93	.14645	.75000	.54944
94	.27300	.75000	.51328
95	.42178	.75000	.45384
96	.57822	.75000	.38046
97	.72700	.75000	.30541
98	.85355	.75000	.23204
99	.94550	.75000	.15988
100	.99384	.75000	.09105
101	.00616	.83457	1.24223
102	.05450	.83457	.62993
103	.14645	.83457	.52933
104	.27300	.83457	.50475
105	.42178	.83457	.47639
106	.57822	.83457	.43127
107	.72700	.83457	.37341
108	.85355	.83457	.30552
109	.94550	.83457	.23029
110	.99384	.83457	.15244
111	.00616	.90451	1.39592
112	.05450	.90451	.65152
113	.14645	.90451	.50311
114	.27300	.90451	.46579
115	.42178	.90451	.44907
116	.57822	.90451	.42493
117	.72700	.90451	.38724
118	.85355	.90451	.33463
119	.94550	.90451	.26817
120	.99384	.90451	.19364
121	.00616	.95677	1.64413
122	.05450	.95677	.70924
123	.14645	.95677	.48886
124	.27300	.95677	.41496
125	.42178	.95677	.38369
126	.57822	.95677	.36310
127	.72700	.95677	.33470
128	.85355	.95677	.29385
129	.94550	.95677	.24251
130	.99384	.95677	.18495
131	.00616	.98907	2.49276
132	.05450	.98907	1.00211
133	.14645	.98907	.60414
134	.27300	.98907	.43810
135	.42178	.98907	.34729
136	.57822	.98907	.28943
137	.72700	.98907	.24663
138	.85355	.98907	.20974
139	.94550	.98907	.17597
140	.99384	.98907	.14357



Y/S	CL (RIGHT)	CL (LEFT)	CM	CDI	CS*C	CAV
.01093	.13557	.13557	-.08716	.02328	.00931	-.00023
.04323	.13977	.13977	-.09105	.02185	.01874	-.00070
.09549	.14693	.14693	-.09923	.02182	.01617	-.00077
.16543	.15946	.15946	-.11383	.02180	.01331	-.00073
.25000	.17479	.17479	-.13615	.02069	.01436	-.00088
.34549	.19405	.19405	-.16807	.01880	.01671	-.00118
.44774	.21739	.21739	-.21062	.01568	.01866	-.00157
.55226	.24381	.24381	-.26274	.01061	.01957	-.00204
.65451	.26933	.26933	-.31780	.00236	.01921	-.00260
.75000	.28421	.28421	-.35882	-.01049	.01759	-.00330
.83457	.27560	.27560	-.36303	-.02711	.01482	-.00422
.90451	.24274	.24274	-.32712	-.04209	.01117	-.00552
.95677	.20181	.20181	-.27571	-.05104	.00720	-.00788
.98907	.19240	.19240	-.26859	-.06926	.00427	-.01853

TOTAL LIFT COEFFICIENT = .19333

TOTAL INDUCED DRAG COEFFICIENT = .01438

THE INDUCED DRAG PARAMETER = .38461

TOTAL PITCHING MOMENT COEFFICIENT = -.17865

FAR-FIELD INDUCED DRAG = .01343

FAR-FIELD INDUCED DRAG PARAMETER = .35918

THE FOLLOWING BENDING MOMENT COEFFICIENT IS BASED ON  $Q \cdot S \cdot (B/2)$ ,  
 WHERE  $S = 4.00000$  AND  $B/2 = 1.00000$

Y/S	BM(RIGHT)	BM(LEFT)
.01093	.03618	.03618
.04323	.03317	.03317
.09549	.02860	.02860
.16543	.02306	.02306
.25000	.01724	.01724
.34549	.01180	.01180
.44774	.00725	.00725
.55226	.00390	.00390
.65451	.00176	.00176
.75000	.00063	.00063
.83457	.00017	.00017
.90451	.00003	.00003
.95677	.00000	.00000
.98907	-.00000	-.00000

THE BENDING MOMENT COEFFICIENT BASED ON WING HALF SPAN AND WING AREA  
 AT THE WING ROOT = .037233 (RIGHT), = .037233 (LEFT)

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ATTACHED POTENTIAL FLOW RESULTS

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XX

PRESSURE DISTRIBUTION AT ALPHA = 20.000 DEG.

XX

VORTEX	XV	YV	CP
1	.00616	.01093	.59386
2	.05450	.01093	.34685
3	.14645	.01093	.33325
4	.27300	.01093	.32151
5	.42178	.01093	.30662
6	.57822	.01093	.28287
7	.72700	.01093	.24338
8	.85355	.01093	.18233
9	.94550	.01093	.10610
10	.99384	.01093	.03325
11	.00616	.04323	1.44996
12	.05450	.04323	.38908
13	.14645	.04323	.34042
14	.27300	.04323	.32285
15	.42178	.04323	.30624
16	.57822	.04323	.28139
17	.72700	.04323	.24110
18	.85355	.04323	.17973
19	.94550	.04323	.10418
20	.99384	.04323	.03265
21	.00616	.09549	2.04141
22	.05450	.09549	.57556
23	.14645	.09549	.36644
24	.27300	.09549	.33124
25	.42178	.09549	.30844
26	.57822	.09549	.28057
27	.72700	.09549	.23840
28	.85355	.09549	.17636
29	.94550	.09549	.10182
30	.99384	.09549	.03203
31	.00616	.16543	2.51579
32	.05450	.16543	.93169
33	.14645	.16543	.44266
34	.27300	.16543	.35301
35	.42178	.16543	.31645
36	.57822	.16543	.28253
37	.72700	.16543	.23710
38	.85355	.16543	.17385
39	.94550	.16543	.10006
40	.99384	.16543	.03160
41	.00616	.25000	3.02074

42	.05450	.25000	1.30903
43	.14645	.25000	.61351
44	.27300	.25000	.40460
45	.42178	.25000	.33602
46	.57822	.25000	.29037
47	.72700	.25000	.23941
48	.85355	.25000	.17391
49	.94550	.25000	.09990
50	.99384	.25000	.03166
51	.00616	.34549	3.58378
52	.05450	.34549	1.63098
53	.14645	.34549	.87844
54	.27300	.34549	.51779
55	.42178	.34549	.38187
56	.57822	.34549	.31114
57	.72700	.34549	.24948
58	.85355	.34549	.17924
59	.94550	.34549	.10294
60	.99384	.34549	.03300
61	.00616	.44774	4.23073
62	.05450	.44774	1.92271
63	.14645	.44774	1.17179
64	.27300	.44774	.71630
65	.42178	.44774	.48166
66	.57822	.44774	.36166
67	.72700	.44774	.27749
68	.85355	.44774	.19630
69	.94550	.44774	.11346
70	.99384	.44774	.03855
71	.00616	.55226	4.99534
72	.05450	.55226	2.22406
73	.14645	.55226	1.44491
74	.27300	.55226	.98024
75	.42178	.55226	.66332
76	.57822	.55226	.47220
77	.72700	.55226	.34605
78	.85355	.55226	.24134
79	.94550	.55226	.14371
80	.99384	.55226	.05809
81	.00616	.65451	5.93640
82	.05450	.65451	2.57306
83	.14645	.65451	1.69781
84	.27300	.65451	1.25499
85	.42178	.65451	.91698
86	.57822	.65451	.66923
87	.72700	.65451	.48936
88	.85355	.65451	.34594
89	.94550	.65451	.22135
90	.99384	.65451	.11625
91	.00616	.75000	7.16895

92	.05450	.75000	3.02610
93	.14645	.75000	1.97039
94	.27300	.75000	1.51797
95	.42178	.75000	1.19797
96	.57822	.75000	.93827
97	.72700	.75000	.72445
98	.85355	.75000	.54167
99	.94550	.75000	.38284
100	.99384	.75000	.25051
101	.00616	.83457	8.93548
102	.05450	.83457	3.68002
103	.14645	.83457	2.32576
104	.27300	.83457	1.78798
105	.42178	.83457	1.47408
106	.57822	.83457	1.22224
107	.72700	.83457	1.00758
108	.85355	.83457	.80751
109	.94550	.83457	.62355
110	.99384	.83457	.46561
111	.00616	.90451	11.84204
112	.05450	.90451	4.77959
113	.14645	.90451	2.91916
114	.27300	.90451	2.17439
115	.42178	.90451	1.80316
116	.57822	.90451	1.53342
117	.72700	.90451	1.29786
118	.85355	.90451	1.08012
119	.94550	.90451	.87476
120	.99384	.90451	.69604
121	.00616	.95677	17.94619
122	.05450	.95677	7.11483
123	.14645	.95677	4.18510
124	.27300	.95677	2.96278
125	.42178	.95677	2.34378
126	.57822	.95677	2.00125
127	.72700	.95677	1.69745
128	.85355	.95677	1.40296
129	.94550	.95677	1.15303
130	.99384	.95677	.95019
131	.00616	.98907	39.89844
132	.05450	.98907	15.62324
133	.14645	.98907	8.91139
134	.27300	.98907	5.97402
135	.42178	.98907	4.31347
136	.57822	.98907	3.27890
137	.72700	.98907	2.60836
138	.85355	.98907	2.15858
139	.94550	.98907	1.86314
140	.99384	.98907	1.65125

Y/S	CL (RIGHT)	CL (LEFT)	CM	CDI	CS*C	CAV
.01093	.25868	.25868	-.17453	.09187	.03611	-.00006
.04323	.27294	.27294	-.18266	.08956	.08473	-.00060
.09549	.29152	.29152	-.19995	.08922	.11616	-.00207
.16543	.32578	.32578	-.23261	.09158	.14786	-.00410
.25000	.37076	.37076	-.28546	.09184	.19392	-.00677
.34549	.42999	.42999	-.36597	.09069	.24688	-.01051
.44774	.50722	.50722	-.48218	.08712	.29861	-.01578
.55226	.60592	.60592	-.64122	.07863	.34404	-.02337
.65451	.72486	.72486	-.84076	.05880	.38009	-.03479
.75000	.85445	.85445	-1.06001	.01462	.40568	-.05317
.83457	.97637	.97637	-1.26169	-.07440	.42167	-.08613
.90451	1.12089	1.12089	-1.48260	-.23862	.43089	0.00000
.95677	1.42314	1.42314	-1.92423	-.63096	.44930	0.00000
.98907	2.53512	2.53512	-3.62788	-3.03994	.56372	0.00000

TOTAL LIFT COEFFICIENT = .46291

TOTAL INDUCED DRAG COEFFICIENT = .07098

THE INDUCED DRAG PARAMETER = .33123

TOTAL PITCHING MOMENT COEFFICIENT = -.44135

FAR-FIELD INDUCED DRAG= .07155

FAR-FIELD INDUCED DRAG PARAMETER= .33390

THE FOLLOWING BENDING MOMENT COEFFICIENT IS BASED ON  $Q*S*(R/2)$ ,  
 WHERE S = 4.00000 AND R/2 = 1.00000

Y/S	BM (RIGHT)	BM (LEFT)
.01093	.09792	.09792
.04323	.09054	.09054
.09549	.07922	.07922
.16543	.06526	.06526
.25000	.05024	.05024
.34549	.03575	.03575
.44774	.02316	.02316
.55226	.01337	.01337
.65451	.00667	.00667
.75000	.00276	.00276
.83457	.00089	.00089
.90451	.00020	.00020
.95677	.00003	.00003
.98907	.00000	.00000

THE BENDING MOMENT COEFFICIENT BASED ON WING HALF SPAN AND WING AREA

AT THE WING ROOT = .100475 (RIGHT), = .100475 (LEFT)

XX

OVER-ALL AERODYNAMIC CHARACTERISTICS

XX

ATTACHED FLOW

ALPHA	CL	CDI	CM	CR
10.0000	.19333	.01438	-.17865	.03723
20.0000	.46291	.07098	-.44135	.10048

SEPARATED FLOW

ALPHA	CLP	CLV,LE	CLV,SF	CL
10.0000	.19376	.00383	0.00000	.19759
20.0000	.46535	.11690	0.00000	.58225

ALPHA	CDP	CDV,LE	CDV,SF	CDI	CAV
10.0000	.01607	-.00078	0.00000	.01529	-.00143
20.0000	.10396	.02752	0.00000	.13148	-.01412

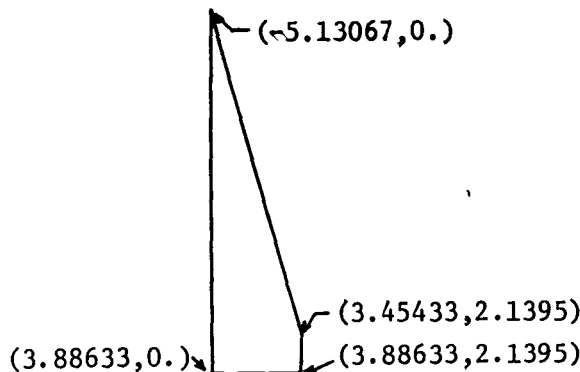
ALPHA	CMP	CMV,LE	CMV,SF	CM
10.0000	-.17865	-.00244	0.00000	-.18109
20.0000	-.44135	-.11070	0.00000	-.55205

3. Third Sample Case'

Input Data

NASA TN-D-8247--76-DEGREE-SWEEP, M=2.3

1	14	0	1	0				
1	1	0	10					
10	0	1	9.0731					
0.	16	1	.1	.15	.2	.25		3
0.	.025	.05	.6	.7	.3	.9		1.
35	.4	.5	.8	.8	.8	.9		1.
.061787	.050189	.057952	.052683	-.046335	-.039755	-.03277c		-.026287
.021029	.016235	.007329	.000507	-.003015	-.005070	-.003527		-.000452
.2154	16.	1.	8.2789					
0.	.025	.05	.1	.15	.2	.25		3
35	.4	.5	.6	.7	.8	.9		1.
.034920	.033990	.033012	-.031079	-.027975	-.024726	-.021476		.018070
.014845	.011475	.004723	-.000797	-.004167	-.005979	-.003068		.000858
.4305	16.	1.	7.3889					
0.	.025	.05	.1	.15	.2	.25		3
35	.4	.5	.6	.7	.8	.9		1.
.013304	.014129	.014955	-.016024	-.015956	-.014955	-.013642		-.012072
.010042	.007877	.003478	-.001137	-.005359	-.009352	-.012817		-.016701
.6459	16.	1.	6.5303					
0.	.025	.05	.1	.15	.2	.25		3
35	.4	.5	.6	.7	.8	.9		1.
.005911	.007320	.008637	.010076	-.010781	-.011209	-.011041		-.010306
.009448	.008162	.004824	.001317	-.002374	-.006493	-.010581		-.014701
.8611	16.	1.	5.6563					
0.	.025	.05	.1	.15	.2	.25		3
35	.4	.5	.6	.7	.8	.9		1.
.004579	.006206	.007496	.009476	.009476	.011280	-.013118		-.013154
.012712	.011810	.009653	.007143	.004933	.000760	-.003147		-.007054
1.2918	16.	1.	3.9134					
0.	.025	.05	.1	.15	.2	.25		3
35	.4	.5	.6	.7	.8	.9		1.
.031865	.033551	.034522	.036541	.038611	.040297	.041550		.042648
.043543	.044079	.044846	.045178	.043875	.041856	.038867		.033424
1.507	16.	1.	3.0437					
0.	.025	.05	.1	.15	.2	.25		3
35	.4	.5	.6	.7	.8	.9		1.
.060157	.060326	.063508	.066170	.068864	.071098	.073266		.075106
.076617	.077702	.079377	.079936	.080198	.079443	.077209		.072116
1.7224	16.	1.	2.1671					
0.	.025	.05	.1	.15	.2	.25		3
35	.4	.5	.6	.7	.8	.9		1.
.112178	.114393	.116146	.119192	.122376	.125421	.125513		.131143
.131974	.134188	.137373	.139495	.140880	.141110	.140280		.136311
1.9378	16.	1.	1.2959					
0.	.025	.05	.1	.15	.2	.25		3
35	.4	.5	.6	.7	.8	.9		1.
.232040	.234586	.236978	.240528	.243846	.247319	.251100		.254572
.257736	.260282	.265761	.270468	.273015	.274018	.274018		.270854
2.1397	16.	1.	.4348					
0.	.025	.05	.1	.15	.2	.25		3
35	.4	.5	.6	.7	.8	.9		1.
.819687	.822447	.825437	.830727	.834867	.840156	.845216		.850046
.853956	.858786	.869365	.878505	.886845	.894434	.900184		.899034
2.3	10.10807	6.058	0.	0.	0.	0.		
2.	10.	10.	1.	1.	1.	1.		
-5.13067	3.88633	0.	3.45433	3.88633	2.1395	0.		0.
1.	76.	1.	.048					
0.	0.	1.						





Output

\*\*\*\*\*  
NASA TN-D-8247--76-DEGREE-SWEEP, M=2.3

\*\*\*\*\*

INPUT DATA

1	14	0	1	0				
1	1	0	1	10				
10	0	1	10					
0.000000	16.000000	1.000000	9.073100					
0.000000	.025000	.050000	.100000	.150000	.200000	.250000	.300000	
.350000	.400000	.500000	.600000	.700000	.800000	.900000	1.000000	
.061787	.060189	.057952	.052683	.046335	.039755	.032778	.026287	
.021029	.016235	.007329	.000507	-.003615	-.005070	-.003527	-.000452	
.215400	16.000000	1.000000	8.278900					
0.000000	.025000	.050000	.100000	.150000	.200000	.250000	.300000	
.350000	.400000	.500000	.600000	.700000	.800000	.900000	1.000000	
.034920	.033990	.033012	.031079	.027975	.024726	.021476	.018070	
.014845	.011475	.004723	-.000797	-.004167	-.005979	-.003068	.000858	
.430500	16.000000	1.000000	7.388900					
0.000000	.025000	.050000	.100000	.150000	.200000	.250000	.300000	
.350000	.400000	.500000	.600000	.700000	.800000	.900000	1.000000	
.013304	.014129	.014955	.016024	.015956	.014955	.013642	.012072	
.010042	.007877	.003478	-.001137	-.005359	-.009352	-.012817	-.016701	
.645900	16.000000	1.000000	6.530300					
0.000000	.025000	.050000	.100000	.150000	.200000	.250000	.300000	
.350000	.400000	.500000	.600000	.700000	.800000	.900000	1.000000	
.005911	.007320	.008637	.010076	.010781	.011209	.011041	.010306	
.009448	.008162	.004824	.001317	-.002374	-.006493	-.010581	-.014701	
.861100	16.000000	1.000000	5.656300					
0.000000	.025000	.050000	.100000	.150000	.200000	.250000	.300000	
.350000	.400000	.500000	.600000	.700000	.800000	.900000	1.000000	
.004579	.006206	.007496	.009476	.009476	.011280	.013118	.013154	
.012712	.011810	.009653	.007143	.004933	.000760	-.003147	-.007054	
1.291800	16.000000	1.000000	3.913400					
0.000000	.025000	.050000	.100000	.150000	.200000	.250000	.300000	
.350000	.400000	.500000	.600000	.700000	.800000	.900000	1.000000	
.031865	.033551	.034522	.036541	.038611	.040297	.041550	.042648	
.043543	.044079	.044846	.045178	.043875	.041856	.038867	.033424	
1.507000	16.000000	1.000000	3.043700					
0.000000	.025000	.050000	.100000	.150000	.200000	.250000	.300000	
.350000	.400000	.500000	.600000	.700000	.800000	.900000	1.000000	
.060157	.060326	.063508	.066170	.068864	.071098	.073266	.075106	
.076617	.077702	.079377	.079936	.080198	.079443	.077209	.072116	
1.722400	16.000000	1.000000	2.167100					
0.000000	.025000	.050000	.100000	.150000	.200000	.250000	.300000	
.350000	.400000	.500000	.600000	.700000	.800000	.900000	1.000000	

.112178	.114393	.116146	.119192	.122376	.125421	.125513	.13114
.131974	.134188	.137373	.139495	.140880	.141110	.140280	.13631
1.937800	16.000000	1.000000	1.295900				
0.000000	.025000	.050000	.100000	.150000	.200000	.250000	.30000
.350000	.400000	.500000	.600000	.700000	.800000	.900000	1.00000
.232040	.234586	.236978	.240528	.243846	.247319	.251100	.25457
.257736	.260282	.265761	.270468	.273015	.274018	.274018	.27085
2.139700	16.000000	1.000000	.434800				
0.000000	.025000	.050000	.100000	.150000	.200000	.250000	.30000
.350000	.400000	.500000	.600000	.700000	.800000	.900000	1.00000
.819687	.822447	.825437	.830727	.834867	.840156	.845216	.85004
.853956	.858786	.869365	.878565	.886845	.894434	.900184	.89903
2.300000	10.108070	6.058000	0.000000	0.000000			
2.000000	10.000000	10.000000	1.000000	1.000000			
-5.130670	3.886330	0.000000	3.454330	3.886330	2.139500	0.000000	0.00000
1.000000	76.000000	1.000000	.048000				
0.000000	0.000000						

HALF SW= .10108E+02

CREF= .60580E+01

PANEL ENDPOINT COORDINATES AND EDGE SLOPES =

X1	X2	Y1	Y2	BP	BP
-5.13067	-4.92058	0.00000	.05236	4.01262	3.91442
-4.91001	-4.70506	0.00000	.05236	3.91442	3.62945
-4.26962	-4.07960	0.00000	.05236	3.62945	3.18559
-3.27220	-3.10541	0.00000	.05236	3.18559	2.62629
-2.01537	-1.87787	0.00000	.05236	2.62629	2.00631
-.62217	-.51713	0.00000	.05236	2.00631	1.38633
.77103	.84362	0.00000	.05236	1.38633	.82703
2.02786	2.07116	0.00000	.05236	.82703	.38317
3.02528	3.04534	0.00000	.05236	.38317	.09820
3.66567	3.67081	0.00000	.05236	.09820	.00000
-4.92058	-4.55558	.05236	.14332	4.01262	3.91442
-4.70506	-4.34900	.05236	.14332	3.91442	3.62945
-4.07960	-3.74945	.05236	.14332	3.62945	3.18559
-3.10541	-2.81564	.05236	.14332	3.18559	2.62629
-1.87787	-1.63897	.05236	.14332	2.62629	2.00631
-.51713	-.33463	.05236	.14332	2.00631	1.38633
.84362	.96972	.05236	.14332	1.38633	.82703
2.07116	2.14639	.05236	.14332	.82703	.38317
3.04534	3.08020	.05236	.14332	.38317	.09820
3.67081	3.67974	.05236	.14332	.09820	.00000
-4.55558	-4.02812	.14332	.27477	4.01262	3.91442
-4.34900	-3.83444	.14332	.27477	3.91442	3.62945
-3.74945	-3.27236	.14332	.27477	3.62945	3.18559
-2.81564	-2.39689	.14332	.27477	3.18559	2.62629
-1.63897	-1.29374	.14332	.27477	2.62629	2.00631
-.33463	-.07089	.14332	.27477	2.00631	1.38633
.96972	1.15196	.14332	.27477	1.38633	.82703
2.14639	2.25510	.14332	.27477	.82703	.38317

3.08020	3.13057	.14332	.27477	.38317	.09820
3.67974	3.69265	.14332	.27477	.09820	.00000
-4.02812	-3.36124	.27477	.44097	4.01262	3.91442
-3.83444	-3.18388	.27477	.44097	3.91442	3.62945
-3.27236	-2.66916	.27477	.44097	3.62945	3.18559
-2.39689	-1.86746	.27477	.44097	3.18559	2.62629
-1.29374	-.85726	.27477	.44097	2.62629	2.00631
-.07089	.26255	.27477	.44097	2.00631	1.38633
1.15196	1.38236	.27477	.44097	1.38633	.82703
2.25510	2.39255	.27477	.44097	.82703	.38317
3.13057	3.19425	.27477	.44097	.38317	.09820
3.69265	3.70897	.27477	.44097	.09820	.00000
-3.36124	-2.58409	.44097	.63464	4.01262	3.91442
-3.18388	-2.42574	.44097	.63464	3.91442	3.62945
-2.66916	-1.96622	.44097	.63464	3.62945	3.18559
-1.86746	-1.25049	.44097	.63464	3.18559	2.62629
-.85726	-.34861	.44097	.63464	2.62629	2.00631
.26255	.65112	.44097	.63464	2.00631	1.38633
1.38236	1.65086	.44097	.63464	1.38633	.82703
2.39255	2.55273	.44097	.63464	.82703	.38317
3.19425	3.26846	.44097	.63464	.38317	.09820
3.70897	3.72799	.44097	.63464	.09820	.00000
-2.58409	-1.73063	.63464	.84734	4.01262	3.91442
-2.42574	-1.59317	.63464	.84734	3.91442	3.62945
-1.96622	-1.19426	.63464	.84734	3.62945	3.18559
-1.25049	-.57293	.63464	.84734	3.18559	2.62629
-.34861	.20998	.63464	.84734	2.62629	2.00631
.65112	1.07785	.63464	.84734	2.00631	1.38633
1.65086	1.94572	.63464	.84734	1.38633	.82703
2.55273	2.72863	.63464	.84734	.82703	.38317
3.26846	3.34996	.63464	.84734	.38317	.09820
3.72799	3.74887	.63464	.84734	.09820	.00000
-1.73063	-.83817	.84734	1.06975	4.01262	3.91442
-1.59317	-.72255	.84734	1.06975	3.91442	3.62945
-1.19426	-.38702	.84734	1.06975	3.62945	3.18559
-.57293	.13558	.84734	1.06975	3.18559	2.62629
.20998	.79410	.84734	1.06975	2.62629	2.00631
1.07785	1.52408	.84734	1.06975	2.00631	1.38633
1.94572	2.25406	.84734	1.06975	1.38633	.82703
2.72863	2.91258	.84734	1.06975	.82703	.38317
3.34996	3.43518	.84734	1.06975	.38317	.09820
3.74887	3.77071	.84734	1.06975	.09820	.00000
-.83817	.05429	1.06975	1.29216	4.01262	3.91442
-.72255	.14807	1.06975	1.29216	3.91442	3.62945
-.38702	.42022	1.06975	1.29216	3.62945	3.18559
.13558	.84410	1.06975	1.29216	3.18559	2.62629
.79410	1.37823	1.06975	1.29216	2.62629	2.00631
1.52408	1.97031	1.06975	1.29216	2.00631	1.38633
2.25406	2.56239	1.06975	1.29216	1.38633	.82703
2.91258	3.09652	1.06975	1.29216	.82703	.38317

3.43518	3.52040	1.06975	1.29216	.38317	.09820
3.77071	3.79255	1.06975	1.29216	.09820	.00000
.05429	.90775	1.29216	1.50486	4.01262	3.91442
.14807	.98064	1.29216	1.50486	3.91442	3.62945
.42022	1.19218	1.29216	1.50486	3.62945	3.18559
.84410	1.52165	1.29216	1.50486	3.18559	2.62629
1.37823	1.93682	1.29216	1.50486	2.62629	2.00631
1.97031	2.39704	1.29216	1.50486	2.00631	1.38633
2.56239	2.85725	1.29216	1.50486	1.38633	.82703
3.09652	3.27242	1.29216	1.50486	.82703	.38317
3.52040	3.60190	1.29216	1.50486	.38317	.09820
3.79255	3.81344	1.29216	1.50486	.09820	.00000
.90775	1.68490	1.50486	1.69853	4.01262	3.91442
.98064	1.73877	1.50486	1.69853	3.91442	3.62945
1.19218	1.89512	1.50486	1.69853	3.62945	3.18559
1.52165	2.13863	1.50486	1.69853	3.18559	2.62629
1.93682	2.44547	1.50486	1.69853	2.62629	2.00631
2.39704	2.78561	1.50486	1.69853	2.00631	1.38633
2.85725	3.12575	1.50486	1.69853	1.38633	.82703
3.27242	3.43260	1.50486	1.69853	.82703	.38317
3.60190	3.67611	1.50486	1.69853	.38317	.09820
3.81344	3.83246	1.50486	1.69853	.09820	.00000
1.68490	2.35178	1.69853	1.86473	4.01262	3.91442
1.73877	2.38933	1.69853	1.86473	3.91442	3.62945
1.89512	2.49832	1.69853	1.86473	3.62945	3.18559
2.13863	2.66806	1.69853	1.86473	3.18559	2.62629
2.44547	2.88195	1.69853	1.86473	2.62629	2.00631
2.78561	3.11905	1.69853	1.86473	2.00631	1.38633
3.12575	3.35616	1.69853	1.86473	1.38633	.82703
3.43260	3.57005	1.69853	1.86473	.82703	.38317
3.67611	3.73979	1.69853	1.86473	.38317	.09820
3.83246	3.84878	1.69853	1.86473	.09820	.00000
2.35178	2.87924	1.86473	1.99618	4.01262	3.91442
2.38933	2.90389	1.86473	1.99618	3.91442	3.62945
2.49832	2.97541	1.86473	1.99618	3.62945	3.18559
2.66806	3.08681	1.86473	1.99618	3.18559	2.62629
2.88195	3.22718	1.86473	1.99618	2.62629	2.00631
3.11905	3.38279	1.86473	1.99618	2.00631	1.38633
3.35616	3.53839	1.86473	1.99618	1.38633	.82703
3.57005	3.67876	1.86473	1.99618	.82703	.38317
3.73979	3.79016	1.86473	1.99618	.38317	.09820
3.84878	3.86168	1.86473	1.99618	.09820	.00000
2.87924	3.24424	1.99618	2.08714	4.01262	3.91442
2.90389	3.25995	1.99618	2.08714	3.91442	3.62945
2.97541	3.30555	1.99618	2.08714	3.62945	3.18559
3.08681	3.37658	1.99618	2.08714	3.18559	2.62629
3.22718	3.46608	1.99618	2.08714	2.62629	2.00631
3.38279	3.56529	1.99618	2.08714	2.00631	1.38633
3.53839	3.66449	1.99618	2.08714	1.38633	.82703
3.67876	3.75399	1.99618	2.08714	.82703	.38317

3.79016	3.82502	1.99618	2.08714	.38317	.09820
3.86168	3.87062	1.99618	2.08714	.09820	.00000
3.24424	3.43082	2.08714	2.13364	4.01262	3.91442
3.25995	3.44196	2.08714	2.13364	3.91442	3.62945
3.30555	3.47431	2.08714	2.13364	3.62945	3.18559
3.37658	3.52470	2.08714	2.13364	3.18559	2.62629
3.46608	3.58819	2.08714	2.13364	2.62629	2.00631
3.56529	3.65857	2.08714	2.13364	2.00631	1.38633
3.66449	3.72895	2.08714	2.13364	1.38633	.82703
3.75399	3.79245	2.08714	2.13364	.82703	.38317
3.82502	3.84283	2.08714	2.13364	.38317	.09820
3.87062	3.87518	2.08714	2.13364	.09820	.00000

CONTROL POINT COORDINATES=

XCP	YCP	ZCP	XCP	YCP	ZCP
-4.84011	.02338	0.00000	-4.24951	.02338	0.00000
-3.30234	.02338	0.00000	-2.09219	.02338	0.00000
-.73565	.02338	0.00000	.63669	.02338	0.00000
1.89283	.02338	0.00000	2.91201	.02338	0.00000
3.59636	.02338	0.00000	3.88024	.02338	0.00000
-4.56892	.09248	0.00000	-3.99668	.09248	0.00000
-3.07894	.09248	0.00000	-1.90639	.09248	0.00000
-.59201	.09248	0.00000	.73768	.09248	0.00000
1.95478	.09248	0.00000	2.94229	.09248	0.00000
3.60537	.09248	0.00000	3.88043	.09248	0.00000
-4.13012	.20430	0.00000	-3.58758	.20430	0.00000
-2.71747	.20430	0.00000	-1.60577	.20430	0.00000
-.35960	.20430	0.00000	.90108	.20430	0.00000
2.05502	.20430	0.00000	2.99128	.20430	0.00000
3.61995	.20430	0.00000	3.88074	.20430	0.00000
-3.54290	.35395	0.00000	-3.04010	.35395	0.00000
-2.23373	.35395	0.00000	-1.20347	.35395	0.00000
-.04858	.35395	0.00000	1.11976	.35395	0.00000
2.18917	.35395	0.00000	3.05685	.35395	0.00000
3.63946	.35395	0.00000	3.88115	.35395	0.00000
-2.83292	.53487	0.00000	-2.37817	.53487	0.00000
-1.64886	.53487	0.00000	-.71705	.53487	0.00000
.32746	.53487	0.00000	1.38415	.53487	0.00000
2.35136	.53487	0.00000	3.13612	.53487	0.00000
3.66305	.53487	0.00000	3.88164	.53487	0.00000
-2.03120	.73918	0.00000	-1.63071	.73918	0.00000
-.98842	.73918	0.00000	-.16779	.73918	0.00000
.75210	.73918	0.00000	1.68270	.73918	0.00000
2.53451	.73918	0.00000	3.22563	.73918	0.00000
3.68969	.73918	0.00000	3.88220	.73918	0.00000
-1.17279	.95793	0.00000	-.83039	.95793	0.00000
-.28127	.95793	0.00000	.42031	.95793	0.00000
1.20676	.95793	0.00000	2.00237	.95793	0.00000
2.73061	.95793	0.00000	3.32147	.95793	0.00000

3.71822	.95793	0.00000	3.88280	.95793	0.00000
-.29520	1.18157	0.00000	-.01220	1.18157	0.00000
.44167	1.18157	0.00000	1.02155	1.18157	0.00000
1.67157	1.18157	0.00000	2.32917	1.18157	0.00000
2.93109	1.18157	0.00000	3.41946	1.18157	0.00000
3.74738	1.18157	0.00000	3.88341	1.18157	0.00000
.56321	1.40032	0.00000	.78812	1.40032	0.00000
1.14881	1.40032	0.00000	1.60965	1.40032	0.00000
2.12623	1.40032	0.00000	2.64884	1.40032	0.00000
3.12719	1.40032	0.00000	3.51530	1.40032	0.00000
3.77591	1.40032	0.00000	3.88401	1.40032	0.00000
1.36493	1.60462	0.00000	1.53558	1.60462	0.00000
1.80925	1.60462	0.00000	2.15891	1.60462	0.00000
2.55087	1.60462	0.00000	2.94739	1.60462	0.00000
3.31033	1.60462	0.00000	3.60481	1.60462	0.00000
3.80255	1.60462	0.00000	3.88457	1.60462	0.00000
2.07492	1.78555	0.00000	2.19751	1.78555	0.00000
2.39412	1.78555	0.00000	2.64532	1.78555	0.00000
2.92691	1.78555	0.00000	3.21178	1.78555	0.00000
3.47252	1.78555	0.00000	3.68408	1.78555	0.00000
3.82614	1.78555	0.00000	3.88507	1.78555	0.00000
2.66214	1.93520	0.00000	2.74499	1.93520	0.00000
2.87786	1.93520	0.00000	3.04763	1.93520	0.00000
3.23793	1.93520	0.00000	3.43045	1.93520	0.00000
3.60667	1.93520	0.00000	3.74965	1.93520	0.00000
3.84565	1.93520	0.00000	3.88548	1.93520	0.00000
3.10093	2.04702	0.00000	3.15409	2.04702	0.00000
3.23933	2.04702	0.00000	3.34825	2.04702	0.00000
3.47034	2.04702	0.00000	3.59386	2.04702	0.00000
3.70691	2.04702	0.00000	3.79864	2.04702	0.00000
3.86023	2.04702	0.00000	3.88578	2.04702	0.00000
3.37212	2.11612	0.00000	3.40692	2.11612	0.00000
3.46274	2.11612	0.00000	3.53404	2.11612	0.00000
3.61398	2.11612	0.00000	3.69484	2.11612	0.00000
3.76886	2.11612	0.00000	3.82892	2.11612	0.00000
3.86924	2.11612	0.00000	3.88597	2.11612	0.00000

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ATTACHED POTENTIAL FLOW RESULTS

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XX

PRESSURE DISTRIBUTION AT ALPHA = 10.000 DEG.

XX

VORTEX	XV	YV	CP
1	.00616	.01093	.38162
2	.05450	.01093	.25086
3	.14645	.01093	.21598
4	.27300	.01093	.16603
5	.42178	.01093	.16383
6	.57822	.01093	.12948
7	.72700	.01093	.11334
8	.85355	.01093	.08014
9	.94550	.01093	.09354
10	.99384	.01093	.12971
11	.00616	.04323	.56351
12	.05450	.04323	.28598
13	.14645	.04323	.23212
14	.27300	.04323	.16462
15	.42178	.04323	.15310
16	.57822	.04323	.12184
17	.72700	.04323	.10640
18	.85355	.04323	.07438
19	.94550	.04323	.09625
20	.99384	.04323	.12980
21	.00616	.09549	.74839
22	.05450	.09549	.34130
23	.14645	.09549	.25239
24	.27300	.09549	.18345
25	.42178	.09549	.16458
26	.57822	.09549	.12588
27	.72700	.09549	.11382
28	.85355	.09549	.07286
29	.94550	.09549	.10992
30	.99384	.09549	.13389
31	.00616	.16543	.80597
32	.05450	.16543	.37474
33	.14645	.16543	.26340
34	.27300	.16543	.19221
35	.42178	.16543	.16563
36	.57822	.16543	.13345
37	.72700	.16543	.12408
38	.85355	.16543	.09501
39	.94550	.16543	.11721
40	.99384	.16543	.13200
41	.00616	.25000	.85006
42	.05450	.25000	.40902

43	.14645	.25000	.28561
44	.27300	.25000	.21051
45	.42178	.25000	.18266
46	.57822	.25000	.15043
47	.72700	.25000	.13796
48	.85355	.25000	.12438
49	.94550	.25000	.13219
50	.99384	.25000	.13960
51	.00616	.34549	.88152
52	.05450	.34549	.41529
53	.14645	.34549	.25612
54	.27300	.34549	.21694
55	.42178	.34549	.19263
56	.57822	.34549	.14996
57	.72700	.34549	.15120
58	.85355	.34549	.13842
59	.94550	.34549	.13520
60	.99384	.34549	.14352
61	.00616	.44774	.96889
62	.05450	.44774	.42761
63	.14645	.44774	.24673
64	.27300	.44774	.24905
65	.42178	.44774	.19974
66	.57822	.44774	.15390
67	.72700	.44774	.17437
68	.85355	.44774	.14816
69	.94550	.44774	.16083
70	.99384	.44774	.17064
71	.00616	.55226	1.11440
72	.05450	.55226	.45898
73	.14645	.55226	.29403
74	.27300	.55226	.26286
75	.42178	.55226	.20998
76	.57822	.55226	.18097
77	.72700	.55226	.18591
78	.85355	.55226	.17577
79	.94550	.55226	.19647
80	.99384	.55226	.21164
81	.00616	.65451	1.14674
82	.05450	.65451	.62044
83	.14645	.65451	.37049
84	.27300	.65451	.29863
85	.42178	.65451	.25095
86	.57822	.65451	.21453
87	.72700	.65451	.20634
88	.85355	.65451	.21623
89	.94550	.65451	.24148
90	.99384	.65451	.25732
91	.00616	.75000	1.20151
92	.05450	.75000	.69360



93	.14645	.75000	.41345
94	.27300	.75000	.35234
95	.42178	.75000	.25463
96	.57822	.75000	.20977
97	.72700	.75000	.21121
98	.85355	.75000	.22680
99	.94550	.75000	.26675
100	.99384	.75000	.28958
101	.00616	.83457	2.38686
102	.05450	.83457	1.02281
103	.14645	.83457	.64907
104	.27300	.83457	.53624
105	.42178	.83457	.35091
106	.57822	.83457	.30252
107	.72700	.83457	.30940
108	.85355	.83457	.31887
109	.94550	.83457	.35134
110	.99384	.83457	.36953
111	.00616	.90451	2.22840
112	.05450	.90451	.94662
113	.14645	.90451	.53834
114	.27300	.90451	.39350
115	.42178	.90451	.32105
116	.57822	.90451	.29690
117	.72700	.90451	.26202
118	.85355	.90451	.21426
119	.94550	.90451	.19799
120	.99384	.90451	.18826
121	.00616	.95677	1.48892
122	.05450	.95677	.67354
123	.14645	.95677	.39357
124	.27300	.95677	.29601
125	.42178	.95677	.18055
126	.57822	.95677	.05801
127	.72700	.95677	-.13793
128	.85355	.95677	-.20291
129	.94550	.95677	-.14939
130	.99384	.95677	-.10468
131	.00616	.98907	6.55450
132	.05450	.98907	2.93730
133	.14645	.98907	1.75209
134	.27300	.98907	.98096
135	.42178	.98907	.65517
136	.57822	.98907	.85096
137	.72700	.98907	.88151
138	.85355	.98907	.89186
139	.94550	.98907	.98837
140	.99384	.98907	1.04680

Y/S	CL (RIGHT)	CL (LEFT)	CM	CDI	CS*C	CAV
.01093	.12638	.12638	.03018	.03181	.01613	.00008
.04323	.14075	.14075	.03175	.03287	.04180	.00022
.09549	.15672	.15672	.03060	.03288	.07124	.00033
.16543	.17553	.17553	.02484	.03340	.08002	-.00008
.25000	.19902	.19902	.01186	.03487	.08513	-.00055
.34549	.20533	.20533	-.00439	.03314	.09492	-.00093
.44774	.21847	.21847	-.02532	.03232	.11289	-.00122
.55226	.24397	.24397	-.05154	.03229	.13903	-.00141
.65451	.29648	.29648	-.08912	.03612	.15466	-.00372
.75000	.31337	.31337	-.11839	.02723	.17621	-.00393
.83457	.48272	.48272	-.21818	.03178	.20543	-.00672
.90451	.38871	.38871	-.19610	.00165	.22734	-.01264
.95677	.10303	.10303	-.05010	-.06299	.23208	-.02334
.98907	.22602	.22602	-.12934	-.08417	.22854	-.04385

TOTAL LIFT COEFFICIENT = .21433

TOTAL INDUCED DRAG COEFFICIENT = .03139

THE INDUCED DRAG PARAMETER = .68331

TOTAL PITCHING MOMENT COEFFICIENT = -.01942

THE FOLLOWING BENDING MOMENT COEFFICIENT IS BASED ON  $Q*S*(B/2)$ ,  
WHERE S = 20.21614 AND B/2 = 2.13950

Y/S	BM (RIGHT)	BM (LEFT)
.01093	.04439	.04439
.04323	.04097	.04097
.09549	.03574	.03574
.16543	.02933	.02933
.25000	.02254	.02254
.34549	.01610	.01610
.44774	.01058	.01058
.55226	.00623	.00623
.65451	.00317	.00317
.75000	.00132	.00132
.83457	.00036	.00036
.90451	.00006	.00006
.95677	.00001	.00001
.98907	.00000	.00000

THE BENDING MOMENT COEFFICIENT BASED ON WING HALF SPAN AND WING AREA  
AT THE WING ROOT = .045570 (RIGHT), = .045570 (LEFT)

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ATTACHED POTENTIAL FLOW RESULTS

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XX

PRESSURE DISTRIBUTION AT ALPHA = 20.000 DEG.

XX

VORTEX	XV	YV	CP
1	.00616	.01093	.76710
2	.05450	.01093	.42524
3	.14645	.01093	.35045
4	.27300	.01093	.28513
5	.42178	.01093	.28905
6	.57822	.01093	.25060
7	.72700	.01093	.24565
8	.85355	.01093	.21769
9	.94550	.01093	.23049
10	.99384	.01093	.27887
11	.00616	.04323	1.15886
12	.05450	.04323	.51719
13	.14645	.04323	.38522
14	.27300	.04323	.27410
15	.42178	.04323	.25223
16	.57822	.04323	.22475
17	.72700	.04323	.21314
18	.85355	.04323	.18440
19	.94550	.04323	.19659
20	.99384	.04323	.23296
21	.00616	.09549	1.58442
22	.05450	.09549	.67001
23	.14645	.09549	.43984
24	.27300	.09549	.31524
25	.42178	.09549	.27566
26	.57822	.09549	.23531
27	.72700	.09549	.22764
28	.85355	.09549	.19422
29	.94550	.09549	.22714
30	.99384	.09549	.24765
31	.00616	.16543	1.75764
32	.05450	.16543	.75355
33	.14645	.16543	.45885
34	.27300	.16543	.32143
35	.42178	.16543	.26933
36	.57822	.16543	.23444
37	.72700	.16543	.23226
38	.85355	.16543	.21328
39	.94550	.16543	.23265
40	.99384	.16543	.24583
41	.00616	.25000	1.88760
42	.05450	.25000	.82947
43	.14645	.25000	.51584
44	.27300	.25000	.35451
45	.42178	.25000	.29264
46	.57822	.25000	.25377
47	.72700	.25000	.24115
48	.85355	.25000	.23384

49	.94550	.25000	.24383
50	.99384	.25000	.25009
51	.00616	.34549	1.84034
52	.05450	.34549	.78888
53	.14645	.34549	.44603
54	.27300	.34549	.32876
55	.42178	.34549	.28046
56	.57822	.34549	.23417
57	.72700	.34549	.23103
58	.85355	.34549	.22715
59	.94550	.34549	.22627
60	.99384	.34549	.23702
61	.00616	.44774	1.91598
62	.05450	.44774	.77177
63	.14645	.44774	.39991
64	.27300	.44774	.35662
65	.42178	.44774	.27624
66	.57822	.44774	.22332
67	.72700	.44774	.23912
68	.85355	.44774	.21889
69	.94550	.44774	.23677
70	.99384	.44774	.24924
71	.00616	.55226	2.15532
72	.05450	.55226	.77473
73	.14645	.55226	.45892
74	.27300	.55226	.37656
75	.42178	.55226	.28631
76	.57822	.55226	.24971
77	.72700	.55226	.24433
78	.85355	.55226	.23311
79	.94550	.55226	.25605
80	.99384	.55226	.27331
81	.00616	.65451	1.88506
82	.05450	.65451	1.16313
83	.14645	.65451	.63885
84	.27300	.65451	.46741
85	.42178	.65451	.36238
86	.57822	.65451	.30629
87	.72700	.65451	.28114
88	.85355	.65451	.28476
89	.94550	.65451	.30400
90	.99384	.65451	.31806
91	.00616	.75000	1.52908
92	.05450	.75000	1.18598
93	.14645	.75000	.64420
94	.27300	.75000	.54977
95	.42178	.75000	.34014
96	.57822	.75000	.26561
97	.72700	.75000	.25530
98	.85355	.75000	.25871

99	.94550	.75000	.28923
100	.99384	.75000	.30954
101	.00616	.83457	5.29916
102	.05450	.83457	2.10768
103	.14645	.83457	1.29269
104	.27300	.83457	1.07333
105	.42178	.83457	.66865
106	.57822	.83457	.53028
107	.72700	.83457	.49933
108	.85355	.83457	.48844
109	.94550	.83457	.49260
110	.99384	.83457	.49465
111	.00616	.90451	3.66705
112	.05450	.90451	1.39483
113	.14645	.90451	.72995
114	.27300	.90451	.52498
115	.42178	.90451	.41146
116	.57822	.90451	.34035
117	.72700	.90451	.24722
118	.85355	.90451	.12419
119	.94550	.90451	.02497
120	.99384	.90451	-.03396
121	.00616	.95677	-.53347
122	.05450	.95677	-.18246
123	.14645	.95677	-.11884
124	.27300	.95677	-.08309
125	.42178	.95677	-.20897
126	.57822	.95677	-.47873
127	.72700	.95677	-.87548
128	.85355	.95677	-1.10607
129	.94550	.95677	-1.13077
130	.99384	.95677	-1.10542
131	.00616	.98907	18.15734
132	.05450	.98907	8.18461
133	.14645	.98907	5.02490
134	.27300	.98907	3.01498
135	.42178	.98907	2.53814
136	.57822	.98907	3.01019
137	.72700	.98907	3.13394
138	.85355	.98907	3.04458
139	.94550	.98907	3.10342
140	.99384	.98907	3.15423

Y/S	CL (RIGHT)	CL (LFFT)	CM	CDI	CS*C	CAV
.01093	.22547	.22547	.04503	.09892	.03988	.00023
.04323	.24316	.24316	.05143	.10184	.10557	.00064
.09549	.28141	.28141	.05283	.11012	.18634	.00094
.16543	.30955	.30955	.04567	.11357	.23942	-.00024
.25000	.34640	.34640	.02709	.11954	.29075	-.00175
.34549	.33141	.33141	.00003	.10572	.35138	-.00253
.44774	.33038	.33038	-.03130	.09604	.42946	-.00311
.55226	.35592	.35592	-.06823	.09220	.52314	-.00363
.65451	.45220	.45220	-.12881	.10932	.59709	-.00672
.75000	.44279	.44279	-.15955	.07301	.69041	-.02078
.83457	.90141	.90141	-.40126	.16060	.80204	-.01773
.90451	.50820	.50820	-.23734	-.03195	.89535	-.00964
.95677	-.19923	-.19923	.17038	-.35970	.94248	0.00000
.98907	.77158	.77158	-.40821	-.23829	.94781	0.00000

TOTAL LIFT COEFFICIENT = .34672

TOTAL INDUCED DRAG COEFFICIENT = .09951

THE INDUCED DRAG PARAMETER = .82779

TOTAL PITCHING MOMENT COEFFICIENT = -.02220

THE FOLLOWING BENDING MOMENT COEFFICIENT IS BASED ON  $Q \cdot S \cdot (B/2)$ ,  
 WHERE  $S = 20.21614$  AND  $B/2 = 2.13950$

Y/S	RM(RIGHT)	RM(LFFT)
.01093	.07189	.07189
.04323	.06613	.06613
.09549	.05735	.05735
.16543	.04672	.04672
.25000	.03563	.03563
.34549	.02535	.02535
.44774	.01665	.01665
.55226	.00982	.00982
.65451	.00499	.00499
.75000	.00202	.00202
.83457	.00046	.00046
.90451	.00005	.00005
.95677	.00003	.00003
.98907	.00000	.00000

THE BENDING MOMENT COEFFICIENT BASED ON WING HALF SPAN AND WING AREA  
 AT THE WING ROOT = .073898 (RIGHT). = .073898 (LEFT)

XX

OVER-ALL AERODYNAMIC CHARACTERISTICS

XX

ATTACHED FLOW

ALPHA	CL	CDI	CM	CB
10.0000	.21433	.03139	-.01942	.04557
20.0000	.34672	.09951	-.02220	.07390

SEPARATED FLOW

ALPHA	CLP	CLV,LE	CLV,SE	CL
10.0000	.21349	.02781	.00691	.24822
20.0000	.33934	.09979	.02572	.46485

ALPHA	CDP	CDV,LE	CDV,SE	CDI	CAV
10.0000	.03809	.00331	.00069	.04209	-.00157
20.0000	.12372	.03278	.00720	.16370	-.00333

ALPHA	CMP	CMV,LE	CMV,SE	CM
10.0000	-.01942	-.00104	-.00422	-.02468
20.0000	-.02220	-.00702	-.01621	-.04543

## FORTRAN PROGRAM LISTING

This program was written in Fortran IV language and is operational on CDC Cyber 175 computer system at Langley Research Center. For other computer systems, the library subroutine for matrix inversion may have to be changed. It is located in subroutines CONTRL and SOLUTN.

The following table is an index to the program listing.

<u>Program or subroutine</u>	<u>Main Purpose</u>	<u>Page</u>
SSCAMSU	executive routine, and to compute total forces and moments	56
PMWAVE	solve Prandtl-Meyer function	85
CONTRL	find control point locations	86
SOLUTN	solve simultaneous equations	89
OUPY	print summary of forces and moments	92
ZCDX	define analytical camber slopes	93
TWST	determine twist angles	94
ZCR	determine camber slopes numerically	95
PNLEF	determine control point location within or without a flat L.E. flap.	96
ZCAM	cubic spline interpolation of camber slopes	97
BENDIN	compute bending moment distribution	99
ADICMX	compute influence coefficient matrix	101
F	double precision calculation in ADICMX	108
PANEL	paneling of lifting surfaces	109
DRAG	compute far-field induced drag	111
VMSEQN	vector method for solving simultaneous equations	113
GAMAX	compute side-edge suction	114
SPLINE	cubic spline subroutine	121



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PROGRAM SSCAMSU(INPUT,OUTPUT,TAPE5=INPUT,TAPE6=OUTPUT,TAPE1,TAPE2, SSC 2
1TAPE3) SSC 3
C *** THIS LIFTING-SURFACE PROGRAM IS BASED ON IMPROVED WOODWARD'S SSC 4
C PANEL METHOD FOR SUBSONIC AND SUPERSONIC FLOWS. SSC 5
C SSC 6
C *** GAMMA MUST BE DIMENSIONED TO HAVE AT LEAST (N+1)**2/4 ELEMENTS, SSC 7
C WHERE N IS THE SIZE OF THE MATRIX SSC 8
C SSC 9
DIMENSION DQ(140,140) SSC 10
DIMENSION GAMMA(19600), ZRV(200), ZBDXV(200), ZBDYV(200) SSC 11
DIMENSION TP(20,2), WST(200,4), VST(200,4), CTDS(20,2) SSC 12
DIMENSION CP(200), AW(205), CA(205), SVP(20,10), D7DYT(20,2) SSC 13
DIMENSION XXL(2), YL(2), xXT(2), CPCWL(21), CPSWL(31), YBREAK(10) SSC 14
DIMENSION ALPH(50), SNALP(50), CLS(50), DCOS(5), DSIN(5), CLY(50) SSC 15
DIMENSION BREAK(10), SWP(20,10), CHORDT(4), TFLP(5), CTP(2) SSC 16
DIMENSION BMR(50), BML(50), DF(5), TITLE(13), CSU(50), YCN(6) SSC 17
DIMENSION PERCT(20), F(5,20), ZBDX(200), ZB(200), DUM(200), CAVS(5 SSC 18
10) SSC 19
EQUIVALENCE (DQ(1,1),GAMMA(1)) SSC 20
EQUIVALENCE (VST(1,1),GAMMA(1000)), (WST(1,1),GAMMA(1)) SSC 21
C SSC 22
COMMON /SCHEME/ C(2),X(21,41),Y(21,41),SLOPE(21),XL(2,21),XTT(41), SSC 23
1XLL(41) SSC 24
COMMON /GEOM/ HALFSW,XCP(200),YCP(200),ZCP(200),XLE(100),YLE(100), SSC 25
1XTE(100),PSI(30),CH(100),XV(200),YV(200),SN(20,2),XN(200,4),YN(200 SSC 26
2,4),RPPIM(200,4),WIDTH(7),YCON(51),SWEEP(100),HALFB,SJ(31,7) SSC 27
3,ZN(200,4) SSC 28
COMMON /AERO/ AM,B,CL(50),CT(50),CD(50),CM(50) SSC 29
COMMON /CONST/ NCS,NCW,M1(7),MJW1(2,5),MJW2(2,5),NJW(5),NFP,NW(2) SSC 30
COMMON /CAMB/ ICAM,IM(10),XT(10,21),AAM(10,20),BBM(10,20), SSC 31
1CCM(10,20),DDM(10,20),YT(10),CURV(10),CHND(10) SSC 32
COMMON /TWST1/ NYM,YTS(21),AY(1,20),BY(1,20),CCY(1,20),DY(1,20) SSC 33
COMMON /LEFLP/ YLEF(10,2),XNF(10),YNF(10),ZNF(10),XLF(10,4),YLF(10 SSC 34
1,4),SLP1(10) SSC 35
C SSC 36
C SSC 37
IQ = 140 SSC 38
PI=3.14159265 SSC 39
NCON=1 SSC 40
1 CONTINUE SSC 41
REWIND 01 SSC 42
WRITE (6,200) ASH 1

```

200	FORMAT (1H1)	ASH	2
C	*** CASE TITLE ***	SSC	43
	READ(5,150) (TITLE(I),I=1,13)	SSC	44
	IF(EOF(5))139,999	SSC	45
	999 CONTINUE	SSC	46
	WRITE (6, 144)	SSC	47
	WRITE (6, 150) (TITLE(I),I=1,13)	SSC	48
	WRITE (6, 144)	SSC	49
	NCS=0	SSC	50
	IPANEL=1	SSC	51
	DO 2 I=1,5	SSC	52
	DF(I) = 0.	SSC	53
2	TFLP(I) = 0.	SSC	54
	WRITE (6, 145)	SSC	55
C		SSC	56
C	*** NC = TOTAL NUMBER OF SPANWISE SECTIONS	SSC	57
C	*** M1(I) = NUMBER OF SPANWISE STRIPS IN EACH SECTION	SSC	58
C	*** IWING = LAST WING VORTEX STRIP NUMBER IF A TAIL IS PRESENT	SSC	59
C	= 0 OTHERWISE	SSC	60
C	*** NWING = THE NUMERICAL ORDER OF LAST WING SPANWISE SECTION	SSC	61
C	*** IWGLT = 1 IF A WINGLET TO BE REPRESENTED BY A TAIL IS PRESENT	SSC	62
C	= 2 IF THE WINGLET IS AT A LOCATION AWAY FROM THE WING TIP	SSC	63
C		SSC	64
	READ (5, 141) NC,(M1(I),I=1,NC),IWING,NWING,IWGLT	SSC	65
	WRITE (6, 141) NC,(M1(I),I=1,NC),IWING,NWING,IWGLT	SSC	66
	DO 3 I = 1,NC	SSC	67
3	M1(I) = M1(I) + 1	SSC	68
C		SSC	69
C	*** NFP = NUMBER OF FLAP SPANS, LIMITED TO FIVE.	SSC	70
C	*** NJW(I) = THE NUMERICAL ORDERS OF FLAP SPANS	SSC	71
C	*** FOR A CLEAN OR FULL-SPAN FLAP CONFIGURATION, PUT NFP = NJW(1) = 1	SSC	72
C	NVRTX = VORTEX STRIP NUMBER ATEND OUTBOARD OF WHICH THE L.E. VORTE	SSC	73
C	X LIFT EFFECT IS NOT INCLUDED. IF IT IS ZERO, TOTAL VORTEX LIFT	SSC	74
C	EFFECT IS ASSUMED.	SSC	75
C		SSC	76
	READ (5, 141) NFP,(NJW(I),I=1,NFP),NVRTX	SSC	77
	WRITE (6, 141) NFP,(NJW(I),I=1,NFP),NVRTX	SSC	78
C		SSC	79
C	*** NW(I) = NUMBER OF CHORDWISE VORTEX ELEMENTS IN CHORDWISE SECTIONS.	SSC	80
C	NW(?) = 0 FOR CLEAN CONFIGURATIONS.	SSC	81
C	ICAM = CAMBER CODE	SSC	82
C	= 0 FOR ZERO CAMBER	SSC	83

C	= 1 FOR CAMBER ORDINATES TO BE READ IN	SSC	84
C	= 2 IF CAMBER FUNCTION IS DEFINED ANALYTICALLY IN SUBROUTINE	SSC	85
C	ZCDX	SSC	86
C	= 3 IF THERE ARE PLANE L.E. FLAPS ATTACHED TO A PLANE WING.	SSC	87
C	IN THIS CASE, IST IS THE NUMBER OF L.E. FLAPS.	SSC	88
C	IST = NUMBER OF SPANWISE STATIONS AT WHICH CAMBER ORDINATES ARE	SSC	89
C	READ IN. LIMITED TO 10.	SSC	90
C	*** NOTE : IF THE TAIL HAS CAMBER, USE THE LAST STATION ( =IST ) TO	SSC	91
C	DESCRIBE IT. ONLY CUBIC SPLINE IS USED TO CALCULATE THE CAMBER	SSC	92
C	SLOPE. ***	SSC	93
C		SSC	94
C	READ (5, 141) (NW(I),I=1,2),ICAM,IST	SSC	95
C	WRITE (6, 141) (NW(I),I=1,2),ICAM,IST	SSC	96
C		SSC	97
C	*** IF ICAM = 1, READ IN THE x-COORDINATES AND THE CAMBER ORDINATES	SSC	98
C	YT = Y STATION AT WHICH CAMBER ORDINATES ARE TO BE READ IN.	SSC	99
C	XNUM = NUMBER OF CAMBER ORDINATES TO BE READ IN, LIMITED TO 21.	SSC	100
C	CURV = 0. IF CAMBER IS FORMED BY CONNECTING STRAIGHT SEGMENTS,	SSC	101
C	WITH FIRST SEGMENT BEING LEADING EDGE FLAP.	SSC	102
C	= 1. IF CUBIC SPLINE INTERPOLATION IS USED	SSC	103
C	= 2. IF CURIC SPLINE INTERPOLATION IS USED, WITH FIRST	SSC	104
C	SEGMENT BEING LEADING EDGE FLAP	SSC	105
C	CHND = CHORD LENGTH AT YT STATION	SSC	106
C	XT = NONDIMENSIONAL X COORDINATES	SSC	107
C	CA = NONDIMENSIONAL CAMBER ORDINATES	SSC	108
C	IF CHND = 0., USE ACTUAL DIMENSIONAL CAMBER ORDINATE	SSC	109
C		SSC	110
C	IF (ICAM .NE. 1) GO TO 9	SSC	111
C	DO 8 I=1,IST	SSC	112
C	JJ = I	SSC	113
C	READ (5, 140) YT(I),XNUM,CURV(I),CHND(I)	SSC	114
C	WRITE (6, 140) YT(I),XNUM,CURV(I),CHND(I)	SSC	115
C	IM(I) = XNUM	SSC	116
C	IP = IM(I)	SSC	117
C	ICV = CURV(I)	SSC	118
C	READ (5, 140) (XT(I,J),J=1,IP)	SSC	119
C	READ (5, 140) (CA(J),J = 1,IP)	SSC	120
C	WRITE (6, 140) (XT(I,J),J = 1,IP)	SSC	121
C	WRITE (6, 140) (CA(J), J = 1,IP)	SSC	122
C	DO 4 K = 1,IP	SSC	123
4	AW(K) = XT(I,K)	SSC	124
C	IF (ICV .EQ. 0) GO TO 5	SSC	125

```

CALL SPLINE (IP,AW,CA,AAM,BBM,CCM,DDM,JJ,10) SSC 126
GO TO 8 SSC 127
5 DO 7 J = 2,IP SSC 128
AAM(I,J-1) = 0. SSC 129
BBM(I,J-1) = 0. SSC 130
IF (ABS(AW(J)-AW(J-1)) .LE. 1.E-20) GO TO 6 SSC 131
CCM(I,J-1) = (CA(J) - CA(J-1)) / (AW(J) - AW(J-1)) SSC 132
6 DDM(I,J-1) = CA(J-1) SSC 133
7 CONTINUE SSC 134
8 CONTINUE SSC 135
9 CONTINUE SSC 136
IF (ICAM .NE. 3) GO TO 11 SSC 137
C SSC 138
C YLEF(I,1) = EXTREME INBOARD Y-COORDINATE OF A L.E. FLAP. SSC 139
C YLEF(I,2) = EXTREME OUTBOARD Y-COORDINATE OF A L.E. FLAP. SSC 140
C X1,Y1,Z1, ETC. ARE CORNER POINT COORDINATES OF A L.E. FLAP, INPUT SSC 141
C IN CLOCKWISE ORDER, FIRST FROM THE MOST INBOARD POINT. SSC 142
C SSC 143
DO 10 I=1,IST SSC 144
READ (5, 140) (YLEF(I,K),K=1,2) SSC 145
WRITE (6, 140) (YLEF(I,K),K=1,2) SSC 146
READ (5, 140) XLF(I,1),YLF(I,1),Z1,XLF(I,2),YLF(I,2),Z2 SSC 147
READ (5, 140) XLF(I,3),YLF(I,3),Z3,XLF(I,4),YLF(I,4),Z4 SSC 148
WRITE (6, 140) XLF(I,1),YLF(I,1),Z1,XLF(I,2),YLF(I,2),Z2 SSC 149
WRITE (6, 140) XLF(I,3),YLF(I,3),Z3,XLF(I,4),YLF(I,4),Z4 SSC 150
IF (ABS(XLF(I,4)-XLF(I,1)).GT.1.E-18) SLP1(I)=(YLF(I,4)-YLF(I,1))/ SSC 151
1 (XLF(I,4)-XLF(I,1)) SSC 152
IF (ABS(XLF(I,4)-XLF(I,1)).LE.1.E-18) SLP1(I)=1.E18 SSC 153
XNF(I)=(YLF(I,4)-YLF(I,1))*(Z3-Z2)-(YLF(I,3)-YLF(I,2))*(Z4-Z1) SSC 154
YNF(I)=(XLF(I,3)-XLF(I,2))*(Z4-Z1)-(XLF(I,4)-XLF(I,1))*(Z3-Z2) SSC 155
ZNF(I)=(XLF(I,4)-XLF(I,1))*(YLF(I,3)-YLF(I,2))-(XLF(I,3)-XLF(I,2)) SSC 157
1*(YLF(I,4)-YLF(I,1)) SSC 157
IF (ABS(ZNF(I)) .GT. 1.E-3) GO TO 10 ASH 4
XNF(I)=(YLF(I,4)-YLF(I,1))*(Z2-Z1)-(YLF(I,2)-YLF(I,1))*(Z4-Z1) ASH 5
YNF(I)=(XLF(I,2)-XLF(I,1))*(Z4-Z1)-(XLF(I,4)-XLF(I,1))*(Z2-Z1) ASH 6
ZNF(I)=(XLF(I,4)-XLF(I,1))*(YLF(I,2)-YLF(I,1))-(XLF(I,2)-XLF(I,1)) ASH 7
1*(YLF(I,4)-YLF(I,1)) ASH 8
10 CONTINUE ASH 9
11 CONTINUE SSC 158
IF (ICAM .EQ. 0) IST=1 SSC 159
LAT = 0 SSC 160
C SSC 161

```

C *** AM = MACH NUMBER	SSC 162
C *** HALFSW = REFERENCE HALF WING AREA	SSC 163
C *** CREF = REFERENCE CHORD	SSC 164
C *** ALPCON = CONTROL INPUT FOR LARGE ALPHA COMPUTATION	SSC 165
C       = 1. IF ALPHA = 1. RADIAN (IN THIS CASE, PUT DF(I) = 0.)	SSC 166
C       = 0. OTHERWISE	SSC 167
C *** DF(I) = FLAP ANGLES IN DEGREES	SSC 168
C	SSC 169
READ (5, 140) AM,HALFSW,CREF,ALPCON,(DF(I),I=1,NFP)	SSC 170
WRITE (6, 140) AM,HALFSW,CREF,ALPCON,(DF(I),I=1,NFP)	SSC 171
DO 12 I=1,NFP	SSC 172
DF(I) = DF(I)*PI/180.	SSC 173
12 TFLP(I) = -DF(I)	SSC 174
C	SSC 175
C *** FALP = NUMBER OF ALPHA TO BE EVALUATED	SSC 176
C *** ALPI = SMALLEST ALPHA IN DEGREES	SSC 177
C *** ALPIN = INCREMENTAL ALPHA IN DEGREES	SSC 178
C *** PTION = 1. IF PRESSURE DISTRIBUTION, SPAN LOADING AND BENDING	SSC 179
C       MOMENT DISTRIBUTION ARE TO BE PRINTED OUT	SSC 180
C       = 0. OTHERWISE	SSC 181
C SUP = 1. IF AN EFFECTIVE ANGLE OF ATTACK IN SUPERSONIC FLOW IS TO	ASH 10
C       BE USED.	ASH 11
C       = 0. OTHERWISE	ASH 12
C	SSC 182
READ(5,140) FALP,ALPI,ALPIN,PTION,SUP	ASH 13
WRITE(6,140)FALP,ALPI,ALPIN,PTION,SUP	ASH 14
NALP = FALP	SSC 185
IF (NALP.EQ.0) NALP=1	SSC 186
ALPI = ALPI * PI / 180.	SSC 187
ALPIN = ALPIN * PI / 180.	SSC 188
IPT = PTION	SSC 189
ISUP = SUP	ASH 15
ALP = ALPI	SSC 190
NCW=NW(1)	SSC 191
L=1	SSC 192
CHORDT(2)=0.	SSC 193
CHORDT(3)=0.	SSC 194
CHORDT(4)=0.	SSC 195
IV=0	SSC 196
IDIH=0	SSC 197
13 CONTINUE	SSC 198
NCPCWL = NCW + 1	SSC 199

	N1 = NCW - 1	SSC 200
	CPCWL(1) = 0.	SSC 201
	LL=1	SSC 202
	FN=NCW	SSC 203
	DO 14 I=1,NCW	SSC 204
	FI=I	SSC 205
	CPCWL(I+1) = .5 * (1. - COS(FI * PI / FN)) * 100.	SSC 206
	SN(I,L) = SIN((2. * FI - 1.) * PI / (2. * FN))	SSC 207
	XP = .5 * (1. - COS((2. * FI - 1.) * PI / (2. * FN))) * 100.	SSC 208
14	PERCT(I) = (XP-CPCWL(I))/(CPCWL(I+1)-CPCWL(I))	SSC 209
	CPCWL(NCW+1) = 100.	SSC 210
	KZ=0	SSC 211
	DO 27 KK = 1,NC	SSC 212
C		SSC 213
C	*** COORDINATES OF BREAK CHORDS BOUNDING SPANWISE SECTIONS,	SSC 214
C	FROM ROOT TO TIP ON THE RIGHT WING	SSC 215
C	*** DIHED = THE DIHEDRAL ANGLE IN DEGREES FOR THE SECTION	SSC 216
C		SSC 217
	READ (5, 140) ((XXL(I),XXT(I),YL(I),I=1,2),ZS,DIHED)	SSC 218
	WRITE (6, 140) ((XXL(I),XXT(I),YL(I),I=1,2),ZS,DIHED)	SSC 219
		SSC 220
C	*** FCN = 1 IF CONTROL POINTS ARE TO BE CALCULATED FOR THIS SECTION	SSC 221
C	= 0 IF PREVIOUSLY CALCULATED CONTROL POINTS ARE TO BE USED	SSC 222
C	NOTE. FOR THE SECOND CHORDWISE SECTION, FCN SHOULD BE THE SAME AS	SSC 223
C	THE CORRESPONDING FIRST CHORDWISE SECTION.	SSC 224
C	*** SWK=L.E. SWEEP ANGLE OF THE SECTION IN DEGREES.	SSC 225
C	*** E = HINGE LINE LOCATION IN FRACTION OF LOCAL CHORD	SSC 226
C	= 1. FOR CLEAN CONFIGURATION	SSC 227
C	TR= TAPER RATIO FOR THE SECTION	ASH 16
C		SSC 228
	READ(5,140)FCN,SWK,E,TR	ASH 17
	WRITE(6,140)FCN,SWK,E,TR	ASH 18
	YBREAK(KK)=YL(?)	SSC 231
	FM=M1(KK)	SSC 232
	NSW=M1(KK)	SSC 233
	SWEP = SWK	SSC 234
	DO 15 J=1,NSW	SSC 235
	FJ=J	SSC 236
	CPSWL(J)=0.5*(1.-COS((2.*FJ-1.)*PI/(2.*FM)))*100.	SSC 237
	YCON(J)=0.5*(1.-COS(FJ*PI/FM))	SSC 238
	SJ(J, KK)=SIN(FJ*PI/FM)	SSC 239
15	CONTINUE	SSC 240

	IF (DIHED .GT. 5.) IDIH = 1	SSC 241
	DCOS(KK) = COS(DIHED * PI / 180.)	SSC 242
	DSIN(KK)=SIN(DIHED *PI/180.)	SSC 243
	IF (IWING .NE. 0 .AND. DCOS(KK) .LE. 0.001) IV=1	SSC 244
	IF (KK .EQ. NC) GO TO 16	SSC 245
	IF (IWING .NE. 0 .AND. KK .EQ. NWING) GO TO 16	SSC 246
	CPSWL(1)=0.	SSC 247
	CPSWL(NSW)=100.	SSC 248
	GO TO 17	SSC 249
16	CPSWL(1)=0.	SSC 250
	IF (IWGLT .EQ. 1 .AND. KK .EQ. NWING) CPSWL(NSW)=100.	SSC 251
17	IF (KK .EQ. NJW(LL)) MJW1(L,LL)=IPANEL	SSC 252
	LR=(L-1)*NC+KK	SSC 253
	MC = FCN	SSC 254
	NCP = 0	SSC 255
	DETA = 0.	SSC 256
	IF (MC .NE. 0) KZ = KZ + 1	SSC 257
	CORR = 0.	SSC 258
	CORK = 0.	ASH 19
	COPL = 0.	ASH 20
	IF (L .EQ. 2) GO TO 22	SSC 259
	IF (MC.EQ.0) GO TO 19	SSC 260
	IF (NW(2).EQ.0) GO TO 18	SSC 261
	IF (KK.NE.NJW(LL)) GO TO 18	SSC 262
	NCP = 1	SSC 263
	DETA = DF(LL)	SSC 264
18	CONTINUE	SSC 265
C	DETERMINE CONTROL POINT LOCATIONS BY 2-D THEORY	SSC 266
	CALL CONTRL (F,NW(1),NW(2),E,DETA,ALP,CPCWL,NCP,KZ)	SSC 267
19	CORR = 0.	SSC 268
	IF (AM .LT. 1. ) GO TO 20	SSC 269
	CORR = 0.03	SSC 270
20	IF (SWEP .GT. 60.) CORK = .0035*(SWEP-60.)	ASH 21
	IF (KK .NE. NC) GO TO 185	ASH 22
	AR=YL(2)*YL(2)*2./HALFSW	ASH 23
	IF (TR .GT. 1.) TR = 1.	ASH 24
	COPL = .14*(1.-TR)**3/(2.+AR)	ASH 25
185	CONTINUE	ASH 26
	IF (CORL .GT. CORK) CORK = CORL	ASH 27
	COPR= CORR + COPK	ASH 28
	F(KZ,1)=F(KZ,1)+CORP	SSC 272
	N1 = NCW - 1	SSC 273

	DO 21 KQ = 2,N1	SSC 274
21	F(KZ,KQ)=F(KZ,KQ)+CORR*(NCW-KQ)/FLOAT(NCW)	SSC 275
22	CONTINUE	SSC 276
	CALL PANEL (XXL,YL,XXT,CPCWL,CPSWL,NSW,IPANEL,LPANEL,F,PERCT,SWP,	SSC 277
	1 LR,ZS,SVP,KZ,L)	SSC 278
	F(KZ,1)=F(KZ,1)-CORR	SSC 279
	DO 23 KQ = 2,N1	SSC 280
23	F(KZ,KQ)=F(KZ,KQ)-CORR*(NCW-KQ)/FLOAT(NCW)	SSC 281
	IPANEL=LPANEL+1	SSC 282
	NCS=NCS+NSW-1	SSC 283
	WIDTH(KK)=YL(2)-YL(1)	SSC 284
	BREAK(KK)=YL(1)	SSC 285
	BREAK(KK+1) = YL(2)	SSC 286
	IF (KK .EQ. NJW(LL)) MJW2(L,LL)=LPANEL	SSC 287
	IF (IHING .NE. 0 .AND. KK .EQ. NHING) GO TO 24	SSC 288
	IF (KK .NE. NC) GO TO 26	SSC 289
24	IF (KK .EQ. NC .AND. IHING .NE. 0) GO TO 25	SSC 290
	CHORDT(L)=XXT(2)-XXL(2)	SSC 291
	HALFB=YL(2)	SSC 292
	YCN(L) = XXL(2)	SSC 293
	GO TO 26	SSC 294
25	CHORDT(L+2) = XXT(2) - XXL(2)	SSC 295
	HALFBH = YL(2)	SSC 296
	YCN(L+2) = XXL(2)	SSC 297
26	IF (KK .EQ. NJW(LL)) LL = LL + 1	SSC 298
27	CONTINUE	SSC 299
	IF (L .EQ. 2) GO TO 30	SSC 300
	LPAN1 = LPANEL	SSC 301
	IF (NW(2) .EQ. 0) GO TO 28	SSC 302
	L = 2	SSC 303
	NCW = NW(2)	SSC 304
	GO TO 13	SSC 305
28	DO 29 I = 1,NFP	SSC 306
	MJW1(2,I) = 0	SSC 307
29	MJW2(?,I)=0	SSC 308
	NCS=NCS*2	SSC 309
30	CONTINUE	SSC 310
	NCS=NCS/2	SSC 311
	NCW=NW(1)+NW(2)	SSC 312
	IF (NVRTX .EQ. 0) NVRTX = NCS + 1	SSC 313
	DF(2)=0.	SSC 314
	DF(3)=0.	SSC 315



IF (IWGLT .NE. 0) IV=0	SSC 316
CAMLE1=0.	SSC 317
CAMLE2=0.	SSC 318
CAMLE3=0.	SSC 319
YTW=HALFB	SSC 320
TINC=0.	SSC 321
IALP=ALPCON	SSC 322
POS=0.	SSC 323
TWIST1 = 0.	SSC 324
ITWST = 0	SSC 325
ICAMB = 0	SSC 326
HALFSH = 0.	SSC 327
C	SSC 328
C *** THE FOLLOWING DATA ARE NOT NEEDED IF ALPCON = 1.	SSC 329
C *** TWIST1 = 0. IF NO TWIST IS PRESENT	SSC 330
C       = 1. IF THERE IS TWIST	SSC 331
C *** RINC = ROOT CHORD INCIDENCE	SSC 332
C	SSC 335
IF (IALP .EQ. 1) GO TO 31	SSC 336
READ(5,140) TWIST1,RINC	ASH 29
WRITE(6,140)TWIST1,RINC	ASH 30
31 CONTINUE	SSC 339
IF (TWIST1 .GT. 0.) ITWST = 1	SSC 340
IF (ICAM .EQ. 2) ICAMB = 1	SSC 341
IF (ITWST .EQ. 0) GO TO 34	SSC 342
C	SSC 343
C *** YNUM = NUMBER OF Y-COORDINATES TO BE INPUT TO DESCRIBE TWIST	SSC 344
C       DISTRIBUTION	SSC 345
C *** TCURV = 0. IF THE TWIST DISTRIBUTION IS GIVEN PIECEWISE LINEAR	SSC 346
C       VARIATION	SSC 347
C       = 1. OTHERWISE	SSC 348
C	SSC 349
READ (5, 140) YNUM,TCURV	SSC 350
WRITE (6, 140) YNUM,TCURV	SSC 351
NYM = YNUM	SSC 352
NTCV = TCURV	SSC 353
C	SSC 354
C *** READ IN THE NONDIMENSIONAL Y-COORDINATES AT WHICH TWIST ANGLES	SSC 355
C       ARE DEFINED. LIMITED TO 21.	SSC 356
C *** READ IN THE CORRESPONDING TWIST ANGLES IN DEGREES, I.E. THE	SSC 357
C       DIFFERENCE IN ANGLES OF ATTACK AT Y AND ROOT CHORD.	SSC 358
C       NEGATIVE FOR WASHOUT.	SSC 359

C	READ (5, 140) (YTS(I), I = 1,NYM)	SSC 360
	READ (5, 140) (CA(I), I = 1,NYM)	SSC 361
	WRITE (6, 140) (YTS(I), I = 1,NYM)	SSC 362
	WRITE (6, 140) (CA(I), I = 1,NYM)	SSC 363
	IF (NTCV .EQ. 0) GO TO 32	SSC 364
	CALL SPLINE (NYM,YTS,CA,AY,BY,CCY,DY,1,1)	SSC 365
	GO TO 34	SSC 366
32	DO 33 J = 2,NYM	SSC 367
	AY(1,J-1) = 0.	SSC 368
	BY(1,J-1) = 0.	SSC 369
	CCY(1,J-1) = (CA(J) - CA(J-1))/(YTS(J) - YTS(J-1))	SSC 370
33	DY(1,J-1) = CA(J-1)	SSC 371
34	CONTINUE	SSC 372
C		SSC 373
C	*** IF A TAIL IS PRESENT, READ IN	SSC 374
C	*** TINC = INCIDENCE ANGLE IN DEGREES	SSC 375
C	*** HALFSH = HALF TAIL AREA	SSC 376
C	*** IF THE TAIL IS TO REPRESENT THE WINGLET, PUT HALFSH = HALFSW	SSC 377
C	*** IF THE WINGLET IS INBOARD OF THE WING TIP, PUT HALFSH = WINGLET	SSC 378
C	AREA	SSC 379
C	*** POS = THE WINGLET POSITION INDICATOR WITH RESPECT TO WING TIP	SSC 380
C	FOR DETAIL SEE INSTRUCTIONS	SSC 381
C	*** CAMT = 0. IF THERE IS NO CAMBER	SSC 382
C	= 1. OTHERWISE.	SSC 383
C		SSC 384
	IF (IHING .EQ. 0) GO TO 35	SSC 385
	READ (5, 140) TINC,HALFSH,POS,CAMT	SSC 386
	WRITE (6, 140) TJNC,HALFSH,POS,CAMT	SSC 387
35	CONTINUE	SSC 388
	IPOS = POS	SSC 389
	ICAMT = CAMT	SSC 390
	IF (IALP .EQ. 1) GO TO 39	SSC 391
	RINC = RINC * PI / 180.	SSC 392
	TINC = TINC * PI / 180.	SSC 393
	TINP = TINC + ALP	SSC 394
	AVTW = 0.	SSC 395
	DO 38 I = 1,NCS	ASH 31
	IF (IHING .NE. 0. AND. I.GT.IHING) GO TO 36	SSC 397
	IF (ITWST .EQ. 1) GO TO 37	SSC 398
	ATW = 0.	SSC 399
	SNALP(I) = 0.	SSC 400
		SSC 401

	ALPH(I) = 1.	ASH 32
	GO TO 38	SSC 403
36	ALPH(I) = 1.	ASH 33
	SNALP(I) = 0.	SSC 405
	GO TO 38	SSC 406
37	YC = YLE(I)/HALFB	SSC 407
	CALL TWST(YC,ATW)	ASH 34
	SNALP(I) = SIN(ATW)	ASH 35
	ALPH(I) = COS(ATW)	ASH 36
	AVTW = AVTW + ATW	ASH 37
38	CONTINUE	SSC 412
39	CONTINUE	SSC 413
	AVTW = AVTW/NCS	ASH 38
	WRITE (6, 142) HALFSW,CREF	SSC 414
	JWING=IHING	SSC 415
	CM(50)=IV	SSC 416
	WRITE (6, 146)	SSC 417
	WRITE (6, 149)	SSC 418
	WRITE (6, 143) (XN(I,1),XN(I,2),YN(I,1),YN(I,2),BPRIM(I,1),BPRIM(I	SSC 419
	1,3),I=1,LPANEL)	SSC 420
	WRITE (6, 147)	SSC 421
	WRITE (6, 148)	SSC 422
	WRITE (6, 143) (XCP(I),YCP(I),ZCP(I),I=1,LPANEL)	SSC 423
	J1=LPANEL+1	SSC 424
	B1 = ARS(1.-AM*AM)	SSC 425
	MM = NW(1)	SSC 426
	NN = NW(1)	SSC 427
	IZ = 1	SSC 428
	B = B1	SSC 429
	IPN = 1	SSC 430
	IF (NW(2) .EQ. 0) GO TO 40	SSC 431
	II = 1+ NCS	SSC 432
	CHORD = CH(1) + CH(II)	SSC 433
	GO TO 41	SSC 434
40	CHORD = CH(1)	SSC 435
41	CONTINUE	SSC 436
	CSD = DCOS(1)	SSC 437
	SSD = DSIN(1)	SSC 438
	ZBDX(1) = 0.	SSC 439
	ZR = 0.	SSC 440
	IF (IALP.EQ.1) GO TO 43	SSC 441
	XC = (XCP(1)-XLE(IZ))/CHORD	SSC 442

	IF (ICAM .EQ. 3) XC = XCP(1)	SSC 443
	IF (ICAMB.EQ.1) GO TO 42	SSC 444
	YK1 = (YCP(1)-YN(1,1))/(YN(1,2)-YN(1,1))	SSC 445
	XK1 = XN(1,1)+(XN(1,2)-XN(1,1))*YK1	SSC 446
	XK2 = XN(1,3)+(XN(1,4)-XN(1,3))*YK1	SSC 447
	X1 = (XK1-XLE(I7))/CHORD	SSC 448
	X2 = (XK2-XLE(IZ))/CHORD	SSC 449
	CALL ZCR (XC,YCP(1),ZCA,ZR,ICAM,X1,X2,CHORD,ZY,0,IST)	ASH 39
	ZBDX(1) = ZR	SSC 451
	GO TO 43	SSC 452
42	YC = YLE(IZ)	SSC 453
	XC = XCP(1)	SSC 454
	CALL ZCDX (XC,YC,ZCA,ZR,ZY)	SSC 455
	ZBDX(1) = ZR	SSC 456
43	CONTINUE	SSC 457
	AVZC = ZBDX(1)	ASH 40
	IJ = 2	SSC 458
	NJ=LPANEL-1	SSC 459
	LL=1	SSC 460
44	CONTINUE	SSC 461
	ZBDX(IJ) = 0.	SSC 462
	IF (IALP.EQ.1) GO TO 52	SSC 463
	IF (NW(2) .EQ. 0) GO TO 45	SSC 464
	II=IZ+NCS	SSC 465
	CHORD = CH(IZ) + CH(II)	SSC 466
	GO TO 46	SSC 467
45	CHORD=CH(IZ)	SSC 468
46	CONTINUE	SSC 469
	XC = (XCP(IJ) - XLE(IZ))/CHORD	SSC 470
	IF (IZ .GT. JWING .AND. JWING .NE. 0 ) GO TO 51	SSC 471
	IF (ICAM .EQ. 3) XC = XCP(IJ)	SSC 472
	LCAM = 0	SSC 473
	IF (ICAMB.EQ.1) GO TO 47	SSC 474
	YK1 = (YCP(IJ)-YN(IJ,1))/(YN(IJ,2)-YN(IJ,1))	SSC 475
	XK1 = XN(IJ,1)+(XN(IJ,2)-XN(IJ,1))*YK1	SSC 476
	XK2 = XN(IJ,3)+(XN(IJ,4)-XN(IJ,3))*YK1	SSC 477
	X1 = (XK1-XLE(IZ))/CHORD	SSC 478
	X2 = (XK2-XLE(IZ))/CHORD	SSC 479
	ZR = 0.	SSC 480
	CALL ZCR (XC,YCP(IJ),ZCA,ZR,ICAM,X1,X2,CHORD,ZY,0,IST)	ASH 41
	ZPDX(IJ) = ZR	SSC 482
	GO TO 48	SSC 483

47	YC = YLE(IZ)	SSC 484
	XC = XCP(IJ)	SSC 485
	CALL ZCDX (XC,YC,ZCA,ZR,ZY)	SSC 486
	ZBDX(IJ) = ZP	SSC 487
48	CONTINUE	SSC 488
	IF (IJ .GE. MJW1(1,LL) .AND. IJ .LE. MJW2(1,LL)) GO TO 50	SSC 489
	IF (IJ .GE. MJW1(2,LL) .AND. IJ .LE. MJW2(2,LL)) GO TO 49	SSC 490
	GO TO 52	SSC 491
49	IF (LL.EQ.NAL) GO TO 52	SSC 492
	ZBDX(IJ) = ZRDX(IJ)+TFLP(LL)	SSC 493
	GO TO 52	SSC 494
50	IF (IJ .EQ. MM) ZBDX(IJ) = ZBDX(IJ) + .5*TFLP(LL)	SSC 495
	GO TO 52	SSC 496
51	IF (ICAMT .EQ. 0) GO TO 52	SSC 497
	CALL ZCR (XC,YCP(IJ),ZCA,ZR,ICAM,X1,X2,CHORD,ZY,IST,IST)	ASH 42
	ZBDX(IJ) = ZP	SSC 499
52	CONTINUE	SSC 500
	AVZC = AVZC + ZBDX(IJ)	ASH 43
	IF (IJ .GE. LPAN1 .AND. IJ .LT. LPANEL) GO TO 53	SSC 501
	IF (IJ .EQ. MJW2(1,LL)) LL = LL + 1	SSC 502
	GO TO 54	SSC 503
53	NN = NW(2)	SSC 504
	IF (IJ .EQ. MJW2(2,LL)) LL = LL + 1	SSC 505
54	CONTINUE	SSC 506
	IF (IJ .LT. MM) GO TO 56	SSC 507
	IF (IJ.LE.LPAN1) XLL(IZ) = SSD	SSC 508
	IF (IJ.LE.LPAN1) XTT(IZ) = CSD	SSC 509
	IZ=IZ+1	SSC 510
	MM=MM+NN	SSC 511
	IF (IHING .NF. 0 .AND. IZ .EQ. (IHING+1)) GO TO 55	SSC 512
	IF(IZ .GT. NCS) GO TO 55	ASH 44
	IF (YLE(IZ) .LT. YBREAK(IPN)) GO TO 56	SSC 513
55	CONTINUE	SSC 514
	IPN=IPN+1	SSC 515
	IF (IJ .EQ. LPAN1 .OR. IJ .EQ. LPANEL) IPN=1	SSC 516
	CSD=DCOS(IPN)	SSC 517
	SSD=DSIN(IPN)	SSC 518
56	IF (IJ .EQ. LPAN1) IZ=1	SSC 519
	IF (IJ .EQ. LPAN1) LL=1	SSC 520
	IJ=IJ+1	SSC 521
	NJ=NJ-1	SSC 522
	IF (IJ .LE. LPANEL) GO TO 44	SSC 523

	ZBDY=0.	SSC 524
	REWIND 02	SSC 525
C	CALCULATE THE DOWNWASH AND SIDEWASH INFLUENCE MATRICES BASED ON	SSC 526
C	LOCAL PANEL COORDINATES AND STORE ON FILE (02)	SSC 527
	CALL ADICMX (AM,XN,YN,ZN,XCP,YCP,ZCP,LPANEL,RPRIM,AW,CA,IWING,XTT,	SSC 528
	1 XLL,YBREAK,IWGLT,NC,WST,VST,NW,NCS,YLE,LPAN1,IV,M1,ZRDY)	SSC 529
	KNT = 0	SSC 530
	IF (NALP.GT.1) KNT=1	SSC 531
	ALP = ALPI	SSC 532
	AVZC = AVZC/LPANEL	ASH 46
	DO 138 JP = 1,NALP	SSC 533
	ALPHAQ = ALP	SSC 534
	ALPM = 0.	ASH 47
	ALAV = ALP+RINC+AVTW-ATAN(AVZC)	ASH 48
	SK = 1.	ASH 49
	IF (ALAV .LT. 0.) SK = -1.	ASH 50
	IF (ISUP .EQ. 1 .AND. AM .GT. 1.) ALPM = SK*(-ABS(ALAV)-SQRT(AM*AM	ASH 51
	1-1.)*.5*PMWAVE(ALAV,AM))	ASH 52
	ALPM = ALPM*.5	ASH 53
	IF (AM.GT.1.4) ALPM=ALPM*0.9797959/SQRT(AM*AM-1.)	ASH 54
	COSA = COS(ALP+RINC+ALPM)	ASH 55
	SINA = SIN(ALP+RINC+ALPM)	ASH 56
	COSAT = COS(ALP+TINC+ALPM)	ASH 57
	SINAT = SIN(ALP+TINC+ALPM)	ASH 58
	IF (IALP .EQ. 0) GO TO 57	SSC 539
	SINA = 1.	SSC 540
	COSA = 1.	SSC 541
	SINAT = 1.	SSC 542
	COSAT = 1.	SSC 543
57	CONTINUE	SSC 544
	IJP = JP	SSC 545
	CALL SOLUTN (GAMMA,AW,CA,LPANEL,LPAN1,XLL,XTT,SNALP,ALPH,ZPDX,ZRDY	SSC 546
	1,IALP,COSA,SINA,COSAT,SINAT,IWING,XCP,YCP,NW,IJP,KNT,DUM,DQ,IQ)	ASH 59
	CM(1)=ITWST	SSC 549
	DO 58 I=1,LPANEL	SSC 550
58	CP(I)=GAMMA(I)	SSC 551
C	CALCULATE EDGE SUCTION	SSC 552
	CTX = 0.	SSC 553
	CALL GAMAX (AW,CA,LPAN1,LPANEL,CP,NC,BREAK,SWP,CHORDT,IWING,NWING,	SSC 554
	1 HALFBH,YCN,CTP,CTX,IWGLT,IPOS,0,SVP,0,DZDYT,TP,CTDS)	SSC 555
	DO 59 I=1,LPANEL	SSC 556

59	GAMMA(I)=0.	SSC 557
	COSA = COS(ALP+RINC)	ASH 60
	SINA = SIN(ALP+RINC)	ASH 61
	COSAT = COS(ALP+TINC)	ASH 62
	SINAT = SIN(ALP+TINC)	ASH 63
	CLPP = 0.	SSC 558
	CDPP = 0.	SSC 559
	CDVL = 0.	SSC 560
	IPN = 1	SSC 561
	ZBB = 0.	SSC 562
	YR = 0.	SSC 563
	YBB = 0.	SSC 564
	CLT=0.	SSC 565
	CMT=0.	SSC 566
	CDT=0.	SSC 567
	CLL=0.	SSC 568
	CLW=0.	SSC 569
	CMW=0.	SSC 570
	CDW=0.	SSC 571
	CSL = 0.	SSC 572
	CSXL = 0.	SSC 573
	CAV = 0.	SSC 574
	KC=1	SSC 575
	NCOL=M1(1)	SSC 576
	KLL=0	SSC 577
	MM=0	SSC 578
	NCW1 = NCW+1	SSC 579
	NL = 1	SSC 580
	IF (JP .NE. 1) GO TO 80	SSC 581
	DO 73 I = 1,NCS	SSC 582
	IF (NW(2) .EQ. 0) GO TO 60	SSC 583
	I1 = I + NCS	SSC 584
	CHORD = CH(I) + CH(I1)	SSC 585
	GO TO 61	SSC 586
60	CHORD=CH(I)	SSC 587
61	CONTINUE	SSC 588
	DO 69 J = 1,NCW	SSC 589
	NN=J+MM	SSC 590
	IF (NW(2) .EQ. 0) GO TO 62	SSC 591
	IF (J .LE. NW(1)) GO TO 62	SSC 592
	LL = LPAN1 - NW(1) * I + NN + NW(2) * (I - 1)	SSC 593
	GO TO 63	SSC 594

62	LL = NN	SSC 595
63	CONTINUE	SSC 596
	XC = (XV(LL) - XLE(I))/CHORD	SSC 597
	IF (JWING.NE. 0 .AND. I .GT. JWING) GO TO 67	SSC 598
	IF (IALP.EQ.1) GO TO 67	SSC 599
	IF (ICAM .EQ. 3) XC = XV(LL)	SSC 600
	IF (ICAMB.EQ.1) GO TO 64	SSC 601
	YK1 = (YV(LL)-YN(LL,1))/(YN(LL,2)-YN(LL,1))	SSC 602
	XK1 = XN(LL,1)+(XN(LL,2)-XN(LL,1))*YK1	SSC 603
	XK2 = XN(LL,3)+(XN(LL,4)-XN(LL,3))*YK1	SSC 604
	X1 = (XK1-XLE(I))/CHORD	SSC 605
	X2 = (XK2-XLE(I))/CHORD	SSC 606
	CALL ZCR (XC,YV(LL),ZCA,ZR,ICAM,X1,X2,CHORD,ZY,0,IST)	ASH 64
	ZBV(LL) = ZCA * CHORD	SSC 608
	IF (ICAM .EQ. 3) ZBV(LL) = ZCA	SSC 609
	ZBDXV(LL) = ZR	SSC 610
	IF (ICAM .EQ. 3) ZRDYV(LL) = ZY	SSC 611
	GO TO 65	SSC 612
64	YC = YLE(I)	SSC 613
	XC = XV(LL)	SSC 614
	CALL ZCDX (XC,YC,ZCA,ZR,ZY)	SSC 615
	ZBV(LL) = ZCA	SSC 616
	ZBDYV(LL) = ZY	SSC 617
	ZBDXV(LL) = ZR	SSC 618
65	IF (LL.GE.MJW1(2,NL).AND.LL.LE.MJW2(2,NL)) GO TO 66	SSC 619
	GO TO 68	SSC 620
66	IF (NL.EQ.NAL) GO TO 68	SSC 621
	ZBV(LL) = ZBV(LL) + (XCP(LL) -XLE(I1)) * TFLP(NL)	SSC 622
	ZBDXV(LL) = ZPDXV(LL) + TFLP(NL)	SSC 623
	GO TO 68	SSC 624
67	ZRV(LL) = 0.	SSC 625
	ZBDXV(LL) = 0.	SSC 626
	IF (ICAMT .EQ. 0) GO TO 68	SSC 627
	CALL ZCR (XC,YV(LL),ZCA,ZR,ICAM,X1,X2,CHORD,ZY,IST,IST)	ASH 65
	ZPDXV(LL) = ZR	SSC 629
	ZBV(LL) = ZCA*CHORD	SSC 630
68	CONTINUE	SSC 631
69	CONTINUE	SSC 632
	MM = (NCW-NW(2))*I	SSC 633
	IF (LL.EQ.MJW2(2,NL)) NL = NL+1	SSC 634
	IF (IALP .EQ. 1) GO TO 71	SSC 635
	XC = 0.	SSC 636



	IF (ICAM .EQ. 3) XC = XLE(I)	SSC 637
	IF (JWING.NE.0.AND.I.GT.JWING) GO TO 71	SSC 638
	IF (ICAMB.EQ.1) GO TO 70	SSC 639
	CALL ZCR (XC,YLE(I),ZCA,ZR,ICAM,0.,0.,CHORD,ZY,0,IST)	ASH 66
	X(1,I) = ZR	SSC 641
	X(2,I) = ZCA * CHORD	SSC 642
	IF (ICAM .EQ. 3) X(3,I) = ZY	SSC 643
	IF (ICAM .EQ. 3) X(2,I) = ZCA	SSC 644
	GO TO 72	SSC 645
70	YC = YLE(I)	SSC 646
	XC = XLE(I)	SSC 647
	CALL ZCDX (XC,YC,ZCA,ZR,ZY)	SSC 648
	X(1,I) = ZR	SSC 649
	X(2,I) = ZCA	SSC 650
	X(3,I) = ZY	SSC 651
	GO TO 72	SSC 652
71	X(1,I) = 0.	SSC 653
	X(2,I) = 0.	SSC 654
	IF (.ICAMT .EQ. 0) GO TO 72	SSC 655
	CALL ZCR (XC,YLE(I),ZCA,ZP,ICAM,0.,0.,CHORD,ZY,IST,IST)	ASH 67
	X(1,I) = ZR	SSC 657
72	CONTINUE	SSC 658
73	CONTINUE	SSC 659
	IF (ICAMB .EQ. 1 .OR. ICAM .EQ. 3) GO TO 78	SSC 660
	DO 74 I = 1,NCS	SSC 661
74	X(3,I) = 0.	SSC 662
	IF (IALP.EQ.1) GO TO 78	SSC 663
	DO 75 I = 1,L PANEL	SSC 664
75	AW(I) = -ZBDXV(I) * 2.	SSC 665
C	CALCULATE DZCDY AT PRESSURE POINTS.	SSC 666
	CALL GAMAX (ZBV,ZBDYV,LPAN1,L PANEL,AW,NC,RPEAK,SWP,CHORDT,IWING,	SSC 667
	1 NWING,HALFRH, YCN,CTP,CTX,IWGLT,IPOS,1,SVP,0,DZDYT,TP,CTDS)	SSC 668
	DO 76 I = 1,NCS	SSC 669
	J = (I-1)*NW(1)+1	SSC 670
	ZRV(J) = X(?,I)	SSC 671
76	AW(J) = -X(1,I) * 2.	SSC 672
C	CALCULATE DZCDY ALONG THE LEADING EDGE	SSC 673
	CALL GAMAX (ZBV,DUM,LPAN1,L PANEL,AW,NC,BREAK,SWP,CHORDT,IWING,	SSC 674
	1 NWING,HALFRH, YCN,CTP,CTX,IWGLT,IPOS,2,SVP,0,DZDYT,TP,CTDS)	SSC 675
	DO 77 I = 1,NCS	SSC 676
	J = (I-1)*NW(1)+1	SSC 677
77	X(3,I) = DUM(J)	SSC 678

78	CONTINUE	SSC 679
	DO 79 I=1,LPANEL	SSC 680
	ZB(I) = SQRT(1. + ZRDYV(I)**2)	SSC 681
79	CONTINUE	SSC 682
80	CONTINUE	SSC 683
	MM = 0	SSC 684
	DO 83 I = 1,NCS	SSC 686
C	TO FIND L.E. SUCTION FROM L.E. THRUST, DZDY IS ASSUMED ZERO.	SSC 687
	ZDY = 0.	SSC 688
	FA = SIN(SWEEP(I))/COS(SWEEP(I))	SSC 689
	IF (IALP.EQ. 1) GO TO 81	SSC 690
	CK = XTT(I)	ASH 68
	IF (ABS(CK) .LE. 1.E-18) CK = 1.E-18	ASH 69
	DZCDX=(-SNALP(I)+X(1,I)*ALPH(I))/(CK*(ALPH(I)+X(1,I)*SNALP(I)))	ASH 70
	DZCDY = (XLL(I)*ALPH(I) + ZDY*CK)/(CK*ALPH(I) -ZDY*XLL(I))	ASH 71
	ZLDY = DZCDX*FA + DZCDY	ASH 72
	DRDY = SQRT(1. + FA*FA + ZLDY * ZLDY)	SSC 695
	FB = DZCDX	ASH 73
	F1 = SQRT(1. + FB * FB + DZCDY *DZCDY)	SSC 700
	F2= SQRT((DZCDY * ZLDY + 1. )**2 + (-FB + DZCDY * FA) **2)	SSC 701
	FT = F1 * DRDY / F2	SSC 702
	GO TO 82	SSC 703
81	FT = SQRT(1. + FA * FA)	SSC 704
82	CSU(I) = CT(I) * FT	SSC 705
83	CT(I) = ABS(CT(I))	SSC 706
	DO 102 I = 1,NCS	SSC 707
	IF (NW(2).EQ.0) GO TO 84	SSC 708
	II = I+NCS	SSC 709
	CHOPD = CH(I) + CH(II)	SSC 710
	GO TO 85	SSC 711
84	CHORD = CH(I)	SSC 712
85	CML = 0.	SSC 713
	CLS(I) = 0.	SSC 714
	CL(I)=0.	SSC 715
	CD(I)=0.	SSC 716
	CLY(I) = 0.	SSC 717
	CDPPS = 0.	SSC 718
	CLPPS = 0.	SSC 719
	CAVS(I) = 0.	SSC 720
	DO 92 J = 1, NCW	SSC 721
	NN = J+MM	SSC 722
	IF (NW(2).EQ.0) GO TO 86	SSC 723

	IF (J.LE.NW(1)) GO TO 86	SSC 724
	LL =LPAN1-NW(1)*I+NN+NW(2)*(I-1)	SSC 725
	IL = I	SSC 726
	JLL = J-NW(1)	SSC 727
	L = 2	SSC 728
	FN = NW(2)	SSC 729
	GO TO 87	SSC 730
86	LL = NN	SSC 731
	IL = I	SSC 732
	JLL = J	SSC 733
	L = 1	SSC 734
	FN = NW(1)	SSC 735
87	CONTINUE	SSC 736
	IF (IALP.EQ.1) GO TO 89	SSC 737
	CK = XTT(I)	ASH 74
	IF (ARS(CK) .LE. 1.E-18) CK = 1.E-18	ASH 75
	DZCDX = (-SNALP(I) + ZBDXV(LL)*ALPH(I))/(CK*(ALPH(I) + ZBDXV(LL))*	ASH 76
	1SNALP(I))	ASH 77
	CZY = (XLL(I)*ALPH(I)+ZBDYV(LL)*CK)/(CK*ALPH(I)-ZBDYV(LL)*XLL(I))	ASH 78
	CZYY = ZBDYV(LL)	ASH 79
	CS = COSA	SSC 743
	SS = SINA	SSC 744
	IF (JWING.NE.0.AND.I.GT.JWING) GO TO 88	SSC 745
	GO TO 90	SSC 746
88	CS = COSAT	SSC 747
	SS = SINAT	SSC 748
	GO TO 90	SSC 749
89	CS = 1.	SSC 750
	SS = 1.	SSC 751
	IF (ARS(XTT(I)).LE.1.E-18) CZY=1.E18	SSC 752
	IF (ARS(XTT(I)).GT.1.E-18) CZY=XLL(I)/XTT(I)	SSC 753
90	IF (IALP.EQ.1) ZX=0.	SSC 754
	IF (IALP .NE. 1) ZX = DZCDX	ASH 80
	SSQ=SS*ALPH(I)+CS*SNALP(I)	ASH 81
	CSQ=CS*ALPH(I)-SS*SNALP(I)	ASH 82
	CK=(ZX*SSQ+CSQ)/SQRT(1.+ZX*ZX)	ASH 83
	CP(LL)=CP(LL)*CK-CA(LL)*SS*(XLL(I)+ZBDYV(LL)*XTT(I))/ZB(LL)*2.	SSC 757
	CSD=XTT(I)	SSC 758
	GRS=.5*CP(LL)*SN(JLL,L)*CH(IL)/FN	SSC 759
	WRS = 0.	SSC 760
	IF (IALP .EQ. 1) FAC = 1./SQRT(1.+CZY*CZY)	SSC 761

	IF (IALP.EQ. 1) GO TO 91	SSC 762
	FAC = 1./SQRT(1. + ZX*ZX + CZY*CZY)	SSC 763
91	CONTINUE	SSC 764
	CFM=1.	SSC 765
	PL=CFM*(ZX*SS+CS)*FAC	SSC 766
	PD=CFM*(-ZX*CS+SS)*FAC	SSC 767
	PM=CFM*(XV(LL)+ZBV(LL)*ZX)*FAC	SSC 768
	CL(I) = CL(I)+GBS*PL	SSC 769
	CML = CML -GBS*PM	SSC 770
	CD(I)=CD(I) + GBS*PD	SSC 771
	CDPPS = CDPPS + GBS*CFM*(-ZX*CS + SS) * FAC	SSC 772
	CLPPS = CLPPS + GBS*CFM*( ZX*SS + CS) * FAC	SSC 773
	CLS(I) = CLS(I)+WBS	SSC 774
	CLY(I)=CLY(I)+GBS*CFM/SQRT(1.+ZX*ZX+CZYY*CZYY)	SSC 775
92	CONTINUE	SSC 776
	IF (IALP.EQ.1) GO TO 94	SSC 777
	ZX = (-SNALP(I)+X(1,I)*ALPH(I))/(ALPH(I)+X(1,I)*SNALP(I))	ASH 85
	FAA = 1./SQRT(1.+ZX*ZX)	SSC 780
	RR=ABS(CSU(I))*CHORD	SSC 781
	XC=XLE(I)+RP	SSC 782
	ZXX=100.	SSC 783
	XCC = XTE(I)	ASH 86
	IF (NW(2) .NE. 0) XCC = XTE(I) + XTE(I+NCS)	SSC 785
	IF (XC .LT. XCC) GO TO 93	SSC 786
	ZXX=0.	ASH 87
	CZY = 0.	ASH 88
	GO TO 190	ASH 89
93	CONTINUE	SSC 788
	XY=(XC-XLE(I))/CHORD	SSC 789
	IF (ICAM .LE. 1) CALL ZCR (XY,YLE(I),ZC,ZXX,ICAM,0.,0.,CHOPD,CZY,0	SSC 790
	1,IST)	ASH 90
	IF (ICAM.EQ.3) CALL ZCR (XC,YLE(I),ZC,ZXX,ICAM,XLE(I),RR,CHORD,CZY	SSC 792
	1,0,IST)	ASH 91
	IF (ICAM .EQ. 2) CALL ZCDX (XC,YLE(I),7A,ZXX,CZY)	SSC 794
190	CONTINUE	ASH 92
	CK = XTT(I)	ASH 93
	IF (ABS(CK) .LE. 1.E-18) CK = 1.E-18	ASH 94
	CZY = (XLL(I)*ALPH(I)+CZY*CK)/(CK*ALPH(I)-CZY*XLL(I))	ASH 95
	CYY = CZY	SSC 798
	FAC = 1./SQRT(1. + ZXX*ZXX + CYY*CYY)	SSC 799
	GO TO 95	SSC 800
94	ZX = 0.	SSC 801

	ZXX = 0.	SSC 802
	SS = 0.	SSC 803
	CS = 1.	SSC 804
	FAA = 1.	SSC 805
	FAC = 1.	SSC 806
95	CONTINUE	SSC 807
	CL(I) = CL(I)*PI/CHORD+CT(I)*(SS-CS*ZX)*FAA	SSC 808
	CM(I)=CML*PI/(CPFF*CHORD)	SSC 809
	CLPPS = CLPPS*PI/CHORD	SSC 810
	CDPPS = CDPPS*PI/CHORD	SSC 811
	CD(I) = CD(I)*PI/CHORD-CT(I)*(CS+SS*ZX)*FAA	SSC 812
	CLS(I)=CLS(I)*PI/CHORD	SSC 813
	CLY(I) = CLY(I)*PI/CHORD+CT(I)*(SS-CS*ZX)*FAA	SSC 814
	IF (I .LT. NCOL) GO TO 96	SSC 815
	KLL=NCOL-1	SSC 816
	KC=KC+1	SSC 817
	NCOL=NCOL+M1(KC)-1	SSC 818
96	KL=I-KLL	SSC 819
	FM=M1(KC)	SSC 820
	AA=CHORD*SJ(KL,KC)*WIDTH(KC)/FM	SSC 821
	CT(I)=CSU(I)*CHORD	SSC 822
	CLT=CLT+CL(I)*AA	SSC 823
	CMT=CMT+CM(I)*AA	SSC 824
	CDT=CDT+CD(I)*AA	SSC 825
	CLPP = CLPP + CLPPS * AA	SSC 826
	CDPP = CDPP + CDPPS * AA	SSC 827
	IF (I .GE. NVRTX) GO TO 97	SSC 828
	CDVL = CDVL + CSU(I)*(-ZXX*CS + SS)*FAC*AA	SSC 829
	CSL = CSL + CSU(I) * (ZXX*SS + CS) * FAC * AA	SSC 830
	CAVS(I) = CSU(I)*(-ZXX)*FAC	SSC 831
	CAV = CAV + CAVS(I)*AA	SSC 832
	XP = X(2,I)	SSC 833
	PM = XLE(I) + XP*ZXX	SSC 834
	CSXL = CSXL - CSU(I)*PM*FAC*AA	SSC 835
97	CONTINUE	SSC 836
	MM=(NCW-NW(2))*I	SSC 837
	IF (IHING .NE. 0 .AND. I .EQ. IHING) GO TO 98	SSC 838
	IF (I .EQ. NCS) GO TO 101	SSC 839
	IF (YLE(I+1) .LT. YBREAK(IPN)) GO TO 101	SSC 840
98	ZBB = 7BB + (YBREAK(IPN) - YB) * XLL(I)	SSC 841
	YBP = YBB + (YBREAK(IPN) - YB) * XTT(I)	SSC 842
	YB = YBREAK(IPN)	SSC 843

	IF (IHING .NE. 0.AND. I .EQ. IHING) GO TO 99	SSC 844
	GO TO 100	SSC 845
99	IF (IWGLT .EQ. 1) GO TO 100	SSC 846
	ZBB = 0.	SSC 847
	YB = 0.	SSC 848
	YBB = 0.	SSC 849
	IF (IWGLT .NE. 2) GO TO 100	SSC 850
	ZBB = YBREAK(NC-2) * XLL(1)	SSC 851
	YBB = YBPEAK(NC-2) * XTT(1)	SSC 852
	YB = YBREAK (NC-2)	SSC 853
100	CONTINUE	SSC 854
	IPN = IPN + 1	SSC 855
101	CONTINUE	SSC 856
	IF (LL .EQ. MJW2(2,NL)) NL = NL + 1	SSC 857
	IF (IHING .EQ. 0) GO TO 102	SSC 858
	IF (I .NE. JHING) GO TO 102	SSC 859
	CLW=CLT	SSC 860
	CMW=CMT	SSC 861
	CDW=CDT	SSC 862
102	CONTINUE	SSC 863
	IF (IALP.EQ.1) XLEBAR=CSXL/CSL	SSC 864
	CLT=CLT*PI/(2.*HALFSW)	SSC 865
	CMT=CMT*PI/(2.*HALFSW)	SSC 866
	CDT=CDT*PI/(2.*HALFSW)	SSC 867
	CLW=CLW*PI/(2.*HALFSW)	SSC 868
	CMW=CMW*PI/(2.*HALFSW)	SSC 869
	CDW=CDW*PI/(2.*HALFSW)	SSC 870
	CLPP = CLPP * PI / (2.* HALFSW)	SSC 871
	CDPP = CDPP * PI / (2.* HALFSW)	SSC 872
	CDVL = CDVL * PI / (2.* HALFSW)	SSC 873
	CAV = CAV*PI/(2.*HALFSW)	SSC 874
	IPS1 = IPOS/10	SSC 875
	IW = 1	SSC 876
	IF (IHING.NE.0) IW=2	SSC 877
	COVS = 0.	SSC 878
	CLVS = 0.	SSC 879
	CMVS = 0.	SSC 880
	DO 113 K = 1,IW	SSC 881
	IPZ = 1	SSC 882
	CDVSS = 0.	SSC 883
	CLVSS = 0.	SSC 884
	CMVSS = 0.	SSC 885

	IF (K.EQ.2) IP7 = 3	SSC 886
	IF (CHOPDT(IPZ).LE..001) GO TO 113	SSC 887
	ISN = 1	SSC 888
	FN = NW(1)	SSC 889
	CHD = CHORDT(IPZ)	SSC 890
	CHORD = CHD + CHORDT(IPZ+1)	SSC 891
	YQ = HALFB	SSC 892
	DO 112 I = 1,NCW	SSC 893
	J = I	SSC 894
	X1 = YCN(IPZ)	SSC 895
	IF (K.EQ.2) GO TO 103	SSC 896
	IF (IPS1.EQ.2.AND.I.GT.NW(1)) GO TO 112	SSC 897
	IF (IPS1.EQ.1) GO TO 112	SSC 898
103	CONTINUE	SSC 899
	IF (I.LE.NW(1)) GO TO 104	SSC 900
	ISN = 2	SSC 901
	FN = NW(2)	SSC 902
	J = I-NW(1)	SSC 903
	X1 = YCN(IPZ+1)	SSC 904
	CHD = CHORDT(IPZ+1)	SSC 905
104	FJ = J	SSC 906
	XM = X1+.5*CHD*(1.-COS((2.*FJ-1.)*PI/(2.*FN)))	SSC 907
	IK = NCS	SSC 908
	IF (K.EQ.1.AND.IWING.NE.0) IK = IWING	SSC 909
	IF (IALP.EQ.1) GO TO 109	SSC 910
	XC = (XM-X1)/CHORD	SSC 911
	IF (K.EQ.2) GO TO 108	SSC 912
	IF (ICAM.EQ.3) XC = XM	SSC 913
	IF (ICAMB.EQ.1) GO TO 105	SSC 914
	YC = .999*HALFB	SSC 915
	CALL ZCR (XC,YC,ZCA,ZR,ICAM,0.,0.,CHD,ZY,0,IST)	ASH 96
	DZX = ZR	SSC 917
	GO TO 106	SSC 918
105	YC = HALFB	SSC 919
	XC = XM	SSC 920
	CALL ZCDX (XC,YC,ZCA,ZR,ZY)	SSC 921
	DZX = ZR	SSC 922
	DZY = ZY	SSC 923
	GO TO 107	SSC 924
106	DZY = -DZX*TP(I,K)+DZDYT(I,K)	SSC 925
107	CONTINUE	SSC 926
	CK = XTT(IK)	ASH 97

	IF (ABS(CK) .LE. 1.E-18) CK = 1.E-18	ASH 98
	ZX = (-SNALP(IK) + DZX*ALPH(IK))/(CK*(ALPH(IK)+DZX*SNALP(IK)))	ASH 99
	CZY = XLL(IK)*ALPH(IK)	ASH 100
	CS = COSA	SSC 932
	SS = SINA	SSC 933
	GO TO 111	SSC 934
108	ZX = -SNALP(IK)	SSC 935
	CS = COSAT	SSC 936
	SS = SINAT	SSC 937
	IF (ICAMT .EQ. 0) GO TO 110	SSC 938
	YC = .999*HALFBH	SSC 939
	CALL ZCP (XC,YC,ZCA,DZX,ICAM,0.,0.,CHD,ZY,IST,IST)	ASH 101
	ZX = (-SNALP(IK)+DZX*ALPH(IK))/(CK*(ALPH(IK)+DZX*SNALP(IK)))	ASH 102
	GO TO 110	SSC 942
109	ZX = 0.	SSC 943
	CS = 1.	SSC 944
	SS = 1.	SSC 945
110	CONTINUE	SSC 946
	IF (ABS(XTT(IK)).LE.1.E-18) CZY=XLL(IK)*1.E18	SSC 947
	IF (ABS(XTT(IK)).GT.1.E-18) CZY=XLL(IK)/XTT(IK)	SSC 948
111	FAC = 1./SQRT(1.+ZX*ZX+CZY*CZY)	SSC 949
	CLVSS = CLVSS+CTDS(I,K)*(ZX*SS+CS)*FAC*SN(J,ISN)*CHD*CHORD/FN	SSC 950
	CDVSS = CDVSS+CTDS(I,K)*(-ZX*CS+SS)*FAC*SN(J,ISN)*CHD*CHORD/FN	SSC 951
	CMVSS = CMVSS-XM*CTDS(I,K)*FAC*SN(J,ISN)*CHD*CHORD/FN	SSC 952
112	CONTINUE	SSC 953
	CLVS = CLVS+CLVSS	SSC 954
	CDVS = CDVS+CDVSS	SSC 955
	CMVS = CMVS+CMVSS	SSC 956
113	CONTINUE	SSC 957
	CLVS = CLVS*PI/(2.*HALFSW)	SSC 958
	CDVS = CDVS*PI/(2.*HALFSW)	SSC 959
	CMVS = CMVS*PI/(2.*HALFSW*CREF)	SSC 960
	CTIP = CLVS	SSC 961
	IF (IALP.EQ.1.AND.CLVS.GT..001) CTX=CMVS/CLVS*CREF	SSC 962
	CDCL2=0.	SSC 963
	CSXL = CSXL*PI/(2.*HALFSW*CREF)	SSC 964
	CSL = CSL*PI/(2.*HALFSW)	SSC 965
	IF (IALP.EQ.1) XBP = CMT/CLT*CREF	SSC 966
	IF (ABS(CLT) .LE. 0.001) GO TO 114	SSC 967
	CDCL2=CDT/(CLT*CLT)	SSC 968
114	CONTINUE	SSC 969
	IF (LAT .NE. 0) GO TO 116	SSC 970



C	CALCULATE BENDING MOMENT DISTRIBUTION	SSC 971
	CALL BENDIN (NC,CLY,BMR,IWING,BREAK,CBMR,CBTR,NWING,HALFSH,HALFBH,	SSC 972
	1DCOS,DSIN,IWGLT)	SSC 973
	CBML=CBMR	SSC 974
	CBTL = CBTR	SSC 975
	DO 115 I=1,NCS	SSC 976
115	BML(I)=BMR(I)	SSC 977
	GO TO 119	SSC 978
116	DO 117 I=1,NCS	SSC 979
117	YCON(I)=CLY(I)+CLS(I)	SSC 980
	CALL BENDIN (NC,YCON,RMR,IWING,BREAK,CBMR,CBTR,NWING,HALFSH,HALFBH	SSC 981
	1,DCOS,DSIN,IWGLT)	SSC 982
	DO 118 I=1,NCS	SSC 983
118	YCON(I)=CLY(I)-CLS(I)	SSC 984
	CALL BENDIN (NC,YCON,BML,IWING,BREAK,CBML,CBTL,NWING,HALFSH,HALFRH	SSC 985
	1,DCOS,DSIN,IWGLT)	SSC 986
119	CONTINUE	SSC 987
	IF (IPT .EQ. 0) GO TO 130	SSC 988
	WRITE (6, 144)	SSC 989
	WRITE (6, 151)	SSC 990
	WRITE (6, 144)	SSC 991
	ALP=ALP*180./PI	SSC 992
	WRITE (6, 152)	SSC 993
	IF (IALP .NE. 1) WRITE (6, 153) ALP	SSC 994
	IF (IALP .EQ. 1) WRITE (6, 154)	SSC 995
	WRITE (6, 152)	SSC 996
	IF (LAT .EQ. 0) WRITE (6, 155)	SSC 997
	IF (LAT .NE. 0) WRITE (6, 156)	SSC 998
	K1=0	SSC 999
	JJ1=0	SSC 1000
	HAB=HALFB	SSC 1001
	IF (IWGLT .EQ. 1) IWING = NCS	SSC 1002
	DO 126 I=1,NCS	SSC 1003
	IF (I .GT. IWING .AND. IWING .NE. 0) HAB=HALFBH	SSC 1004
	IF (I .GT. IWING .AND. IWGLT .EQ. 2) HAB=HALFR	SSC 1005
	IF (NW(2) .EQ. 0) GO TO 120	SSC 1006
	I1=I+NCS	SSC 1007
	CHORD=CH(I)+CH(I1)	SSC 1008
	GO TO 121	SSC 1009
120	CHORD=CH(I)	SSC 1010
121	CONTINUE	SSC 1011
	DO 125 J=1,NCW	SSC 1012

	JJ=JJ1+J	SSC 1013
	KK=K1+J	SSC 1014
	IF (NW(2) .EQ. 0) GO TO 122	SSC 1015
	IF (J .LE. NW(1)) GO TO 122	SSC 1016
	LL=LPAN1-NW(1)*I+JJ+NW(2)*(I-1)	SSC 1017
	GO TO 123	SSC 1018
122	LL=JJ	SSC 1019
123	CONTINUE	SSC 1020
	XI=(XV(LL)-XLE(I))/CHORD	SSC 1021
	ETA=YV(LL)/HAB	SSC 1022
	IF (LAT .EQ. 0) GO TO 124	SSC 1023
	CPR=CP(LL)+GAMMA(LL)	SSC 1024
	CPL=CP(LL)-GAMMA(LL)	SSC 1025
	WRITE (6, 157) KK,XI,ETA,CPL,CPR	SSC 1026
	GO TO 125	SSC 1027
124	WRITE (6, 157) KK,XI,ETA,CP(LL)	SSC 1028
125	CONTINUE	SSC 1029
	JJ1=(NCW-NW(2))*I	SSC 1030
	K1=K1+NCW	SSC 1031
126	CONTINUE	SSC 1032
	WRITE (6, 158)	SSC 1033
	HAB=HALFB	SSC 1034
	DO 129 I=1,NCW	SSC 1035
	IF (IWGLT .EQ. 0) GO TO 127	SSC 1036
	IF (I .EQ. (JWING+1)) WRITE (6, 160)	SSC 1037
	GO TO 128	SSC 1038
127	CONTINUE	SSC 1039
	IF (JWING .NE. 0 .AND. I .EQ. (JWING+1)) WRITE (6, 159)	SSC 1040
128	CONTINUE	SSC 1041
	IF (IWING .NE. 0 .AND. I .GT. IWING) HAB=HALFRH	SSC 1042
	IF (I .GT. IWING .AND. IWGLT .EQ. 2) HAB=HALFB	SSC 1043
	YE=YLE(I)/HAB	SSC 1044
	CLPT=CL(I)+CLS(I)	SSC 1045
	CLLT=CL(I)-CLS(I)	SSC 1046
129	WRITE (6,161) YE,CLPT,CLLT,CM(I),CD(I),CT(I),CAVS(I)	SSC 1047
	WRITE (6, 162) CLT	SSC 1048
	WRITE (6, 163) CDT	SSC 1049
	WRITE (6, 164) CDCL2	SSC 1050
	WRITE (6, 165) CMT	SSC 1051
130	CONTINUE	SSC 1052
	IF (IALP .EQ. 0) GO TO 131	SSC 1053
	WRITE (6, 144)	SSC 1054

	WRITE (6, 168)	SSC 1055
	WRITE (6, 166) CLT,CSL,CTIP	SSC 1056
	WRITE (6, 167) XBP,XLEBAR,CTX	SSC 1057
	WRITE (6, 144)	SSC 1058
131	CONTINUE	SSC 1059
	IF (IPT.EQ.0) GO TO 133	SSC 1060
	IF (IHING .NE. 0) GO TO 132	SSC 1061
	IF (ABS(CLT) .LE. 0.001) GO TO 133	SSC 1062
	IF (IDIH .NE. 0) GO TO 133	SSC 1063
C	CALCULATE FAR-FIELD DRAG IN SUBSONIC PLANAR FLOW	SSC 1064
	IF (AM.LT.1.) CALL DRAG (CLT,YBREAK,NC,TFLP,NAL)	SSC 1065
	GO TO 133	SSC 1066
132	WRITE (6, 169) CLW	SSC 1067
	WRITE (6, 170) CDW	SSC 1068
	WRITE (6, 171) CMW	SSC 1069
	CLTLW=CLT-CLW	SSC 1070
	CLTLH=CLTLW*HALFSW/HALFSH	SSC 1071
	CMTAIL=CMT-CMW	SSC 1072
	WRITE (6, 172) CLTLW,CLTLH	SSC 1073
	WRITE (6, 173)	SSC 1074
	WRITE (6, 174) CMTAIL	SSC 1075
	WRITE (6, 175)	SSC 1076
133	CONTINUE	SSC 1077
	HW=2.*HALFSW	SSC 1078
	HSH=2.*HALFSH	SSC 1079
	WRITE (6, 176) HW,HALFB	SSC 1080
	HAR=HALFB	SSC 1081
	IF (IPT .EQ. 0) GO TO 137	SSC 1082
	WRITE (6, 177)	SSC 1083
	DO 136 I=1,NCS	SSC 1084
	IF (IWGLT .EQ. 0) GO TO 134	SSC 1085
	IF (I .EQ. (JWING+1)) WRITE (6, 179) HW,HALFB	SSC 1086
	GO TO 135	SSC 1087
134	CONTINUE	SSC 1088
	IF (JWING .NE. 0 .AND. I .EQ. (JWING+1)) WRITE (6, 178) HSH,HALFB	SSC 1089
	1H	SSC 1090
135	CONTINUE	SSC 1091
	IF (JWING .NE. 0 .AND. I .EQ. (JWING+1)) WRITE (6, 180)	SSC 1092
	IF (IHING .NE. 0 .AND. I .GT. IHING) HAB = HALFBH	SSC 1093
	IF (I .GT. IHING .AND. IWGLT .EQ. 2) HAB = HALFB	SSC 1094
	YE = YLE(I) / HAB	SSC 1095
136	WRITE (6, 161) YE,BMR(I),BML(I)	SSC 1096

137	CONTINUE	SSC 1097
	WRITE (6, 180)	SSC 1098
	WRITE (6, 181) CBMR,CBML	SSC 1099
	IF (IWGLT .EQ. 2) WRITE (6, 182)	SSC 1100
	WRITE (6, 180)	SSC 1101
	IF (IHING .NE. 0 .AND. IWGLT .NE. 1) WRITE (6, 183) CBTR,CBTL	SSC 1102
	IF (IWGLT .EQ. 1) WRITE (6, 184) CBTR,CBTL	SSC 1103
	X(4,JP) = ALPHAQ * 180. / PI	SSC 1104
	X(5,JP) = CLT	SSC 1105
	X(6,JP) = CDT	SSC 1106
	X(7,JP) = CMT	SSC 1107
	X(8,JP) = CRMR	SSC 1108
	Y(1,JP) = CLPP	SSC 1109
	Y(2,JP) = CSL	SSC 1110
	Y(3,JP) = CLVS	SSC 1111
	Y(4,JP) = CDPP	SSC 1112
	Y(5,JP) = CDVL	SSC 1113
	Y(6,JP) = CDVS	SSC 1114
	Y(7,JP) = CMT	SSC 1115
	Y(8,JP) = CSXL	SSC 1116
	Y(9,JP) = CMVS	SSC 1117
	Y(10,JP) = CAV	SSC 1118
	ALP = ALPHAQ + ALPIN	SSC 1119
	IHING = JHING	SSC 1120
138	CONTINUE	SSC 1121
	IF (IALP .EQ. 1) GO TO 1	SSC 1122
	CALL OUPY (X,Y,NALP)	SSC 1123
	GO TO 1	SSC 1124
139	STOP	SSC 1125
C		SSC 1126
140	FORMAT (8F10.6)	SSC 1127
141	FORMAT (8(6X,I4))	SSC 1128
142	FORMAT (10X,8HHALF SW=,E12.5,10X,5HCREF=,E12.5)	SSC 1129
143	FORMAT (6F10.5)	SSC 1130
144	FORMAT (1H0,40H*****)	SSC 1131
145	FORMAT (1H0,10HINPUT DATA)	SSC 1132
146	FORMAT (1H0,44HPANFL ENDPOINT COORDINATES AND FDGE SLOPES = )	SSC 1133
147	FORMAT (1H0,26HCONTROL POINT COORDINATES=)	SSC 1134
148	FORMAT (/4X,3HXCP,7X,3HYCP,7X,3HZCP,7X,3HXCP,7X,3HYCP,7X,3HZCP)	SSC 1135
149	FORMAT (/4X,2HX1,8X,2HX2,8X,2HY1,8X,2HY2,8X,2HRP,6X,2HRP)	SSC 1136
150	FORMAT (13A6)	SSC 1137
151	FORMAT (/6X,31HATTACHED POTENTIAL FLOW RESULTS )	SSC 1138

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152 FORMAT (/20X,42HXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX) SSC 1139
153 FORMAT (/20X,32HPRESSURE DISTRIBUTION AT ALPHA =,F8,3,2X,4HDEG.) SSC 1140
154 FORMAT (/20X,43HPRESSURE DISTRIBUTION AT ALPHA = 1.0 RADIAN) SSC 1141
155 FORMAT (/3X,6HVORTEX,14X,2HXV,17X,2HYV,19X,2HCP) SSC 1142
156 FORMAT (/3X,6HVORTEX,14X,2HXV,17X,2HYV,17X,8HCP(LEFT),12X, 9HCP(RI SSC 1143
1GHT)) SSC 1144
157 FORMAT (6X,I3,4(10X,F10.5)) SSC 1145
158 FORMAT(/9X,3HY/S,11X,9HCL(RIGHT),6X,8HCL(LEFT),10X,2HCM,12X,3HCDI, SSC 1146
112X,4HCS*C,11X,3HCAV) SSC 1147
159 FORMAT (/4X,42HTHE FOLLOWING ARE THE TAIL CHARACTERISTICS) SSC 1148
160 FORMAT (/4X,45HTHE FOLLOWING ARE THE WINGLEFT CHARACTERISTICS) SSC 1149
161 FORMAT (8(5X,F10.5)) SSC 1150
162 FORMAT (/2X,24HTOTAL LIFT COEFFICIENT =,F10.5) SSC 1151
163 FORMAT (/2X,32HTOTAL INDUCED DRAG COEFFICIENT =,F10.5) SSC 1152
164 FORMAT (/2X,28HTHE INDUCED DRAG PARAMETER =,F10.5) SSC 1153
165 FORMAT (/2X,35HTOTAL PITCHING MOMENT COEFFICIENT =,F10.5) SSC 1154
166 FORMAT (/2X,4HKP =,F10.5,3X,6HKVLE =,F10.5,3X,6HKVSE =,F10.5) SSC 1155
167 FORMAT (/2X,5HXRP =,F10.5,3X,6HXBLE =,F10.5,3X,6HXRSE =,F10.5) SSC 1156
168 FORMAT (/66HTHE FOLLOWING PARAMETERS ARE USED IN THE METHOD OF SUC SSC 1157
ITION ANALOGY) SSC 1158
169 FORMAT (/5X,27HTHE WING LIFT COEFFICIENT =,F10.5) SSC 1159
170 FORMAT (/5X,35HTHE WING INDUCED DRAG COEFFICIENT =,F10.5) SSC 1160
171 FORMAT (/5X,38HTHE WING PITCHING MOMENT COEFFICIENT =,F10.5) SSC 1161
172 FORMAT (/5X,27HTHE TAIL LIFT COEFFICIENT =,F10.5,21H(BASED ON WING SSC 1162
1 AREA),,2X,1H=,F10.5,20H(BASED ON TAIL AREA)) SSC 1163
173 FORMAT (/5X,65HTHE TAIL PITCHING MOMENT COEFFICIENT BASED ON REFER SSC 1164
1 ENCE WING AREA) SSC 1165
174 FORMAT (/10X,49HAND MEAN WING CHORD, AND REFERRED TO THE Y-AXIS =, SSC 1166
1 F10.5) SSC 1167
175 FORMAT (/5X,68H(NOTE. THE INDUCED DRAG COMPUTATION IS FOR SYMMETRI SSC 1168
1 CAL LOADING ONLY)) SSC 1169
176 FORMAT (/2X,63HTHE FOLLOWING BENDING MOMENT COEFFICIENT IS BASED SSC 1170
1 ON Q*S*(B/2),,/15X,9HWHERE S =,F10.5,2X,9HAND B/2 =,F10.5) SSC 1171
177 FORMAT (/9X,3HY/S,11X,9HRM(RIGHT),6X,8HRM(LFFT)) SSC 1172
178 FORMAT (/4X,66HTHE FOLLOWING ARE THE TAIL CHARACTERISTICS BASED ON SSC 1173
1 TAIL GEOMETRY,,/10X,9HWHERE S =,F10.5,2X,9HAND B/2 =,F10.5) SSC 1174
179 FORMAT (/4X,68HTHE FOLLOWING ARE THE WINGLET CHARACTERISTICS BASED SSC 1175
1 ON WING GEOMETRY, /10X,9HWHERE S =,F10.5,2X,9HAND B/2 =,F10.5) SSC 1176
180 FORMAT (1H0) SSC 1177
181 FORMAT (2X,68HTHE BENDING MOMENT COEFFICIENT BASED ON WING HALF SP SSC 1178
1 AN AND WING AREA, /15X,18HAT THE WING ROOT =,F10.6,2X,8H(RIGHT),, SSC 1179
22X,1H=,F10.6,2X,6H(LEFT)) SSC 1180
182 FORMAT (/2X,65H(NOTE. EFFECT OF WINGLET ON WING-ROOT BENDING MOMEN SSC 1181
1 T HAS NOT BEEN/8X,22HINCLUDED IN THE ABOVE)) SSC 1182
183 FORMAT (2X,68HTHE BENDING MOMENT COEFFICIENT BASED ON TAIL HALF SP SSC 1183
1 AN AND TAIL AREA,/15X,18HAT THE TAIL ROOT =,F10.6,2X,8H(RIGHT),, SSC 1184
22X,1H=,F10.6,2X,6H(LEFT)) SSC 1185
184 FORMAT (2X,68HTHE BENDING MOMENT COEFFICIENT BASED ON WING HALF SP SSC 1186
1 AN AND WING AREA/10X,21HAT THE WINGLET ROOT =,F10.6,2X,8H(RIGHT),, SSC 1187
2 2X,1H=,F10.6,2X,6H(LEFT)) SSC 1188
END SSC 1189

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FUNCTION PMWAVE(ALP,AM)	ASH 103
SIX = 2.4494897	ASH 104
AM2 = SQRT(AM*AM-1.)	ASH 105
BETAI = ATAN(1./AM2)	ASH 106
TANBI = SIN(BETAI)/COS(BETAI)	ASH 107
ATB = ATAN(SIX*TANBI)	ASH 108
BETA = BETAI - ABS(ALP)	ASH 109
N = 1	ASH 110
10 TANB = SIN(BETA)/COS(BETA)	ASH 111
F = -ARS(ALP)+BETA-BETAI-SIX*(ATAN(SIX*TANB)-ATB)	ASH 112
FP = -5./(1.+6.*TANB*TANB)	ASH 113
BET = BETA -F/FP	ASH 114
IF (N .GE. 10) GO TO 20	ASH 115
IF (ABS(BET-BETA) .LE. 1.E-4) GO TO 20	ASH 116
N = N + 1	ASH 117
BETA = BET	ASH 118
GO TO 10	ASH 119
20 SB = SIN(BET)**2/(1.4-COS(2.*BET))	ASH 120
SBI = SIN(BETAI)**2/(1.4-COS(2.*BETAI))	ASH 121
PMWAVE = 2./(1.4*AM*AM)*((SB/SBI)**3.5-1.)	ASH 122
RETURN	ASH 123
END	ASH 124

	SUBROUTINE CONTRL (F,N1,N2,E,DETA,ALP,XK,NCON,KZ)	CON	2
	DIMENSION F(5,20), XK(1), XI(20), CPN(20), CPX(20), CP(20), C(20),	CON	3
1	XJ(20)	CON	4
	DIMENSION A(20,20), B(20,20), S(20), D(20)	CON	5
	DIMENSION KARRAY(7)	ASH	125
	PI = 3.14159265	CON	6
C	SETDIM IS TO SET UP APRAY TABLES FOR MATRIX INVERSION, AND MAY NOT	CON	7
C	BE NEEDED IN OTHER COMPUTER SYSTEMS	CON	8
	LC = 5	CON	10
	SINA = SIN (ALP)	CON	11
	IF (N2.NE.0) LC = 6	CON	12
	N = N1+N2	CON	13
	IF (N2.NE.0) GO TO 3	CON	14
	DO 1 I = 1,N	CON	15
	F(KZ,I) = .95	CON	16
1	XJ(I)=XK(I)/100.	CON	17
	XJ(N+1)=1.	CON	18
	DO 2 I=1,N	CON	19
	XP= 0.5*(1.-COS((2.*I-1.)*PI/(2.*N)))	CON	20
2	CPN(I)=4.*SQRT((1.-XP)/XP)	CON	21
	GO TO 8	CON	22
3	TAU=ACOS(2.*E-1.)	ASH	126
	DO 4 I= 1,N	CON	24
4	F(KZ,I) = .95	CON	25
	XF = 0.	CON	26
	E1 = F	CON	27
	NW = N1	CON	28
	IN = 1	CON	29
	JJ = 0	CON	30
5	CONTINUE	CON	31
	DO 7 I = 1,NW	CON	32
	J1 = I+JJ	CON	33
	XJ(J1) = XE + 0.5*(1.-COS((I-1.)*PI/NW))*E1	CON	34
	XP = XE+0.5*(1.-COS((2.*I-1.)*PI/(2.*NW)))*E1	CON	35
	IF (NCON.EQ.0) GO TO 6	CON	36
	PHI=ACOS(2.*XP-1.)	ASH	127
	CPN(J1) =4.*DETA/PI*(TAU*SQRT((1.-XP)/XP)+ALOG(ABS(SIN((PHI+TAU)/2	CON	38
	1.))/ABS(SIN((PHI-TAU)/2.)))+4.*SINA*SQRT((1.-XP)/XP)	CON	39
	GO TO 7	CON	40
6	CPN(J1) = 4. * SQRT((1. - XP) / XP)	CON	41
7	CONTINUE	CON	42
	IF (IN.EQ.2) GO TO 8	CON	43

	IN = IN+1	CON	44
	JJ = NW	CON	45
	NW = N2	CON	46
	XE = E	CON	47
	E1 = 1.-E	CON	48
	GO TO 5	CON	49
8	XJ(N+1) = 1.	CON	50
	L = 1	CON	51
9	CONTINUE	CON	52
	DO 10 J = 1,N	CON	53
10	XI(J) = XJ(J) + F(KZ,J) * (XJ(J+1) - XJ(J))	CON	54
	DO 11 I = 1,N	CON	55
	DO 11 J=1,N	CON	56
	R = ABS((XJ(J)-XI(I))/(XJ(J+1)-XI(I)))	CON	57
	B(I,J) = ALOG(R)	CON	58
11	CONTINUE	CON	59
C	HEMINV IS A MATRIX INVERSION ROUTINE. B IS THE MATRIX TO BE	CON	60
C	INVERTED, N IS THE MATRIX SIZE, AND D IS A WORKING ARRAY. THE	CON	61
C	INVERTED MATRIX IS RETURNED IN B.	CON	62
	KARRAY(1) = 10	ASH	128
	KARRAY(2) = N	ASH	129
	KARRAY(3) = N	ASH	130
	KARRAY(4) = 0	ASH	131
	KAPRAY(5) = 20	ASH	132
	KARRAY(6) = 0	ASH	133
	KARRAY(7) = 0	ASH	134
	CALL MATOPS(KAPRAY,R,J,JEL)	ASH	135
	DO 13 I=1,N	CON	64
	CP(I) = 0.	CON	65
	DO 13 J=1,N	CON	66
	IF (NCON.NE.0) GO TO 12	CON	67
	W = 4.*PI	CON	68
	GO TO 13	CON	69
12	W = SINA * 4. * PI	CON	70
	IF (J.EQ.N1) W=W+2.*PI*DETA	CON	71
	IF (J .GT. N1) W = 4. * PI * (DETA + SINA)	CON	72
13	CP(I) = CP(I)+B(I,J)*W	CON	73
	SUM = 0.	CON	74
	DO 14 I=1,N	CON	75
14	SUM = SUM + (CPN(I)-CP(I))*(CPN(I)-CP(I))	CON	76
	S(L) = SQRT(SUM)	CON	77
	IF (L. EQ . 1) GO TO 15	CON	78



	IF (S(L).GE.S(L-1)) GO TO 21	CON 79
15	CONTINUE	CON 80
	DO 16 I=1,N	CON 81
	CPX(I) = 0.	CON 82
	DO 16 K = 1,N	CON 83
16	CPX(I) = CPX(I) + CP(K)*(1./(XJ(K)-XI(I))-1./(XJ(K+1)-XI(I)) )	CON 84
	DO 18 I = 1,N	CON 85
	DO 17 J = 1,N	CON 86
	A(J,I) = 0.	CON 87
	DO 17 K =1,N	CON 88
	W = 0.	CON 89
	IF (K.EQ.I) W = CPX(I)	CON 90
17	A(J,I) = A(J,I)+B(J,K)*W	CON 91
18	CONTINUE	CON 92
	CALL MATOPS(KARRAY,A,J,JEL)	ASH 136
	DO 19 I = 1,N	CON 94
	C(I) = 0.	CON 95
	DO 19 K = 1,N	CON 96
19	C(I)=C(I)+A(I,K)*(CPN(K)-CP(K))	CON 97
	DO 20 I = 1,N	CON 98
	XI(I) = XI(I)+C(I)	CON 99
	F(KZ,I) = (XI(I)-XJ(I))/(XJ(I+1)-XJ(I))	CON 100
	IF (F(KZ,I) .GT. 1.) F(KZ,I) = .95	CON 101
	IF (F(KZ,I) .LT. 0.) F(KZ,I) = .85	CON 102
20	CONTINUE	CON 103
	L = L + 1	CON 104
	IF (L.LE.LC) GO TO 9	CON 105
21	RETURN	CON 106
	END	CON 107

	SUBROUTINE SOLUTN (GAMMA,AW,CA,LPANEL,LPAN1,SSD,CSD,TA,ALPH,ZBDX,	SOL	2
	IZBDY,IALP,COSA,SINA,COSAT,SINAT,IWING,XCP,YCP,NW,JP,KNT,DUM,DQ,IQ)	ASH	137
	DIMENSION GAMMA(1), AW(1), CA(1), SSD(1), CSD(1), TA(1), ALPH(1),	SOL	5
	IZBDX(1), XCP(1), YCP(1), NW(1), BW(200)	SOL	6
	DIMENSION DUM(1), DQ(IQ,IQ)	SOL	7
	DIMENSION KAPPAY(7)	ASH	138
	REWIND 03	SOL	8
	REWIND 02	SOL	9
	IZ = 1	SOL	11
	L1 = LPANEL + 1	SOL	12
	NCW=NW(1)+NW(2)	SOL	13
	MM=NCW	SOL	14
	NN=NCW	SOL	15
	NJ=LPANEL	SOL	16
	DO 13 NI=1,LPANEL	SOL	17
	IA=NI-MM+NCW	SOL	18
	IF (IA.GT.NW(1)) GO TO 1	SOL	19
	I=NI-NW(2)*(IZ-1)	SOL	20
	GO TO 2	SOL	21
1	I=NI+LPAN1-NW(1)*IZ	SOL	22
2	CONTINUE	SOL	23
	CSX = CSD(IZ)	SOL	24
	CZY = SSD(IZ)	SOL	25
	IF (KNT .EQ. 1 .AND. JP .NE. 1) GO TO 4	SOL	26
	READ (02) (AW(K),K=1,LPANEL)	SOL	27
	READ (02) (RW(K),K=1,LPANEL)	SOL	28
	M1 =NCW	SOL	29
	N1=NCW	SOL	30
	IP=1	SOL	31
	DO 3 K=1,LPANEL	SOL	32
	CD= CSD(IP)	SOL	33
	SD = SSD(IP)	SOL	34
	DWASH = AW(K)*CD + BW(K)*SD	SOL	35
	SWASH = -AW(K)*SD + BW(K)*CD	SOL	36
	AW(K) = CSX*DWASH - SWASH*CZY	SOL	37
	IF (K .LT. M1) GO TO 3	SOL	38
	M1 = M1 + N1	SOL	39
	IP = IP + 1	SOL	40
3	CONTINUE	SOL	41
4	CONTINUE	SOL	42
	IF (IALP.EQ.1) GO TO 6	SOL	43
	FAC = 1.	SOL	44

	CS = COSA	SOL 45
	SS = SINA	SOL 46
	IF (IWING.NE.0.AND.IZ.GT.IWING) GO TO 5	SOL 47
	GO TO 7	SOL 48
5	CS = COSAT	SOL 49
	SS = SINAT	SOL 50
	GO TO 7	SOL 51
6	CS = 0.	SOL 52
	SS = 1.	SOL 53
	FAC = 1.	SOL 54
	CDZDX = 0.	ASH 139
	GO TO 22	ASH 140
7	CDZDX = (-TA(IZ)+ZBDX(I)*ALPH(IZ))/(ALPH(IZ)+ZBDX(I)*TA(IZ))	ASH 141
22	CONTINUE	ASH 142
	AW(L1) = (-CDZDX*CS + CSX*SS)*2.	ASH 143
	DUM(NI)=AW(L1)	SOL 56
	IF (KNT .EQ. 0) GO TO 9	SOL 57
	IF (JP .NE. 1) GO TO 12	SOL 58
	DO 8 K = 1,LPANEL	SOL 59
8	DQ(NI,K)=AW(K)	SOL 60
	GO TO 12	SOL 61
9	CONTINUE	SOL 62
	IF (NI.EQ.1) GO TO 10	SOL 63
	IK=NI	SOL 64
C		SOL 65
C	VMSEQN IS A SURROUTINE TO SOLVE SIMUTANEOUS EQUATIONS BY VECTOR	SOL 66
C	METHOD. WHILE THE MATRIX IS NOT INVERTED.	SOL 67
C		SOL 68
	CALL VMSEQN (NJ,IK,AW,GAMMA,CA)	SOL 69
	GO TO 12	SOL 70
10	DO 11 K = 1,LPANEL	SOL 71
11	GAMMA(K) = -AW(K+1)/AW(1)	SOL 72
12	NJ = NJ-1	SOL 73
	IF (NI.LT.MM) GO TO 13	SOL 74
	MM = MM+NN	SOL 75
	IZ = IZ + 1	SOL 76
13	CONTINUE	SOL 77
	IF (KNT .EQ. 0) GO TO 17	SOL 78
	IF (JP .NE. 1) GO TO 15	SOL 79
	IJQ = IQ	SOL 80
	KAPRAY(1)=10	ASH 144
	KARRAY(2)=LPANEL	ASH 145

	KARRAY(3)=LPANEL	ASH 146
	KARRAY(4)=0	ASH 147
	KARRAY(5)=IJQ	ASH 148
	KARRAY(6)=0	ASH 149
	KARRAY(7)=0	ASH 150
	CALL MATOPS(KARRAY,DQ,J,JEL)	ASH 151
	DO 14 I = 1,LPANEL	SOL 83
14	WRITE (03) (DQ(I,K),K=1,LPANEL)	SOL 84
15	REWIND 03	SOL 85
	DO 16 I = 1,LPANEL	SOL 86
	GAMMA(I) = 0.	SOL 87
	READ (03) (AW(K),K=1,LPANEL)	SOL 88
	DO 16 J = 1,LPANEL	SOL 89
16	GAMMA(I) = GAMMA(I) - AW(J) * DUM(J)	SOL 90
17	CONTINUE	SOL 91
	DO 18 I=1,LPANEL	SOL 92
18	AW(I)=GAMMA(I)	SOL 93
	MM=NCW	SOL 94
	IZ=1	SOL 95
	DO 21 NI=1,LPANEL	SOL 96
	IA=NI-MM+NCW	SOL 97
	IF (IA.GT.NW(1)) GO TO 19	SOL 98
	I=NI-NW(2)*(IZ-1)	SOL 99
	GO TO 20	SOL 100
19	I=NI+LPANI-NW(1)*IZ	SOL 101
20	GAMMA(I)=AW(NI)	SOL 102
	IF (NI.LT.MM) GO TO 21	SOL 103
	MM=MM+NN	SOL 104
	IZ=IZ+1	SOL 105
21	CONTINUE	SOL 106
	RETURN	SOL 107
	END	SOL 108

	SUBROUTINE OOPT (X,Y,NALP)	OUT 2
	DIMENSION X(21,41), Y(21,41)	OUT 3
	WRITE (6, 5)	OUT 4
	WRITE (6, 6)	OUT 5
	WRITE (6, 5)	OUT 6
	WRITE (6, 7)	OUT 7
	WRITE (6, 8)	OUT 8
	DO 1 I = 1,NALP	OUT 9
1	WRITE (6, 9) X(4,I),X(5,I),X(6,I),X(7,I),X(8,I)	OUT 10
	WRITE (6, 10)	OUT 11
	WRITE (6, 11)	OUT 12
	DO 2 I = 1,NALP	OUT 13
	T = Y(1,I) + Y(2,I) + Y(3,I)	OUT 14
2	WRITE (6, 9) X(4,I),Y(1,I),Y(2,I),Y(3,I),T	OUT 15
	WRITE (6, 12)	OUT 16
	DO 3 I = 1,NALP	OUT 17
	T = Y(4,I) + Y(5,I) + Y(6,I)	OUT 18
3	WRITE (6, 9) X(4,I),Y(4,I),Y(5,I),Y(6,I),T,Y(10,I)	OUT 19
	WRITE (6, 13)	OUT 20
	DO 4 I = 1,NALP	OUT 21
	T = Y(7,I) + Y(8,I) + Y(9,I)	OUT 22
4	WRITE (6, 9) X(4,I),Y(7,I),Y(8,I),Y(9,I),T	OUT 23
	RETURN	OUT 24
C		OUT 25
5	FORMAT (/5X,40HXX)	OUT 26
6	FORMAT (/7X,36HOVER-ALL AERODYNAMIC CHARACTERISTICS)	OUT 27
7	FORMAT (/18X,13HATTACHED FLOW)	OUT 28
8	FORMAT (/4X,5HALPHA,7X,2HCL,7X,3HCDI,8X,2HCM,8X,2HCB/)	OUT 29
9	FORMAT (3X,F8.4,5(2X,F8.5))	OUT 30
10	FORMAT (/18X,14HSEPARATED FLOW)	OUT 31
11	FORMAT (/4X,5HALPHA,5X,3HCLP,7X,6HCLV,LE,5X,6HCLV,SE,6X,3HCL /)	OUT 32
12	FORMAT (/4X,5HALPHA,5X,3HCDP,7X,6HCDV,LE,5X,6HCDV,SE,6X,3HCDI,7X,	OUT 33
	13HCAV/)	OUT 34
13	FORMAT (/4X,5HALPHA,5X,3HCMV,7X,6HCMV,LE,5X,6HCMV,SE,6X,3HCM /)	OUT 35
	END	OUT 36

. C C . .	SUBROUTINE ZCDX (X,Y,ZC,ZCX,ZCY) CAMBER SURFACE FOR L.C. SQUIRE'S WING 7 IN ARC CP-924 F1 = 4.*Y/X F2 = F1**6 F3 = F2*F1 ZC = -.075*X*F3 ZCX = .45*F3 ZCY = -2.1*F2 RETURN END	ZCD 2 ZCD 3 ZCD 4 ZCD 5 ZCD 6 ZCD 7 ZCD 8 ZCD 9 ZCD 10 ZCD 11 ZCD 12
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	SUBROUTINE TWST(Y,ATW)	ASH 152
	COMMON /TWST1/ NYM,YTS(21),AY(1,20),BY(1,20),CCY(1,20),DY(1,20)	TWS 3
	PI = 3.14159265	TWS 4
	K = 1	TWS 5
1	IF (Y .GE. YTS(K) .AND. Y .LT. YTS(K+1)) GO TO 2	TWS 6
	K = K + 1	TWS 7
	IF (K .GE. NYM) GO TO 3	TWS 8
	GO TO 1	TWS 9
2	SM = Y - YTS(K)	TWS 10
	ATW = AY(1,K) *SM*SM*SM + BY(1,K) *SM*SM + CCY(1,K) * SM + DY(1,K)	TWS 11
	ATW = ATW * PI / 180.	TWS 13
	GO TO 5	TWS 15
3	IF (Y .LT. YTS(1)) GO TO 4	TWS 16
	K = NYM - 1	TWS 17
	GO TO 2	TWS 18
4	K = 1	TWS 19
	GO TO 2	TWS 20
5	CONTINUE	TWS 21
	RETURN	TWS 22
	END	TWS 23

	SURROUTINE ZCP (X,Y,ZCX,ZR,ICAM,X1,X2,CHORD,DZDY,IMT,IST)	ASH 153
	COMMON /LEFLP/ YLEF(10,2),XNF(10),YNF(10),ZNF(10),XLF(10,4),YLF(10	ZCR 3
	1,4),SLP1(10)	ZCR 4
	KK=ZR	ZCR 5
	ZR = 0.	ZCR 6
	ZCX=0.	ZCR 7
	DZDY = 0.	ZCR 8
	IF (ICAM .EQ. 1) GO TO 5	ZCR 9
	IF (ICAM .NE. 3) GO TO 6	ZCR 10
	I = 1	ZCR 11
1	IF (Y .GE. YLEF(I,1) .AND. Y .LT. YLEF(I,2)) GO TO 2	ZCR 12
	IF( I .GE. IST) GO TO 6	ASH 154
	I = I + 1	ZCR 13
	IF (I .EQ. 11) GO TO 6	ZCR 14
	GO TO 1	ZCR 15
2	YR=YLF(I,1)+SLP1(I)*(X-XLF(I,1))	ZCR 16
	KCON=0	ZCR 17
	IF (KCON.NE.100) GO TO 3	ZCR 18
	XB=XLF(I,1)	ZCR 19
	IF (SLP1(I).GT.1.E-18) XB=XLF(I,1)+(Y-YLF(I,1))/SLP1(I)	ZCR 20
	DX=X2/(XB-X1)	ZCR 21
	IF (ABS(1.-DX).LE.0.1) KCON=1	ZCR 22
	IF (KCON.EQ.1) GO TO 4	ZCR 23
3	CONTINUE	ZCR 24
	IF (Y .LT. YR) RETURN	ZCR 25
4	CONTINUE	ZCR 26
	TEST1=PNLEF(X,Y,XLF,YLF,I,1,2)	ZCR 27
	IF (ABS(TEST1) .LT. 1.E-8 .AND. Y .GE. YLF(I,1)) TEST1 = 1.E-8	ASH 155
	IF (TEST1.LT.0.) RETURN	ZCR 28
	TEST2=PNLEF(X,Y,XLF,YLF,I,4,3)	ZCR 29
	IF (ABS(TEST2) .LT. 1.E-8 .AND. Y .LE. YLF(I,3)) TEST2 = -1.E-8	ASH 156
	IF (TEST2.GT.0.) RETURN	ZCR 30
	ZR = -XNF(I)/ZNF(I)	ZCR 31
	DZDY = -YNF(I)/ZNF(I)	ZCR 32
	D=-XNF(I)*XLF(I,1)-YNF(I)*YLF(I,1)	ZCR 33
	ZCX = -(D + XNF(I)*X + YNF(I)*Y) / ZNF(I)	ZCR 34
	IF (KCON.EQ.0) GO TO 6	ZCR 35
	ZR=0.5*ZR	ZCR 36
	DZDY=0.5*DZDY	ZCR 37
	ZCX=0.	ZCR 38
	GO TO 6	ZCR 39
5	CALL ZCAM(X,Y,ZR,ZCX,X1,X2,CHORD,IMT,IST)	ASH 157
		ZCR 41
6	RETURN	ZCR 42
	END	



```
FUNCTION PNLEF (X,Y,XLF,YLF,I,J,K)          PNL 2
DIMENSION XLF(10,4), YLF(10,4)             PNL 3
PNLEF=(X-XLF(I,J))*(YLF(I,K)-YLF(I,J))-(XLF(I,K)-XLF(I,J))*(Y-YLF(I,J)) PNL 4
1I,J))                                       PNL 5
RETURN                                       PNL 6
END                                           PNL 7
```

	SUBROUTINE ZCAM(X,Y,ZR,ZCX,X1,X2,CHORD,IMT,IST)	ASH 158
	COMMON /CAMP/ ICAM,IM(10),XT(10,21),AAM(10,20),BBM(10,20),	ZCM 3
	ICCM(10,20),DDM(10,20),YT(10),CURV(10),CHND(10)	ZCM 4
	DIMENSION ZZ(2), ZX(2), XX(2), ZY(2), ZQ(2), C(15)	ZCM 5
	I = IMT	ZCM 6
	ZZ(2) = 0.	ZCM 7
	IF (J .NE. 0) GO TO 2	ZCM 8
	I = 1	ZCM 9
1	IF (Y .GE. YT(I) .AND. Y .LT. YT(I+1)) GO TO 2	ZCM 10
	I = I + 1	ZCM 11
	IF (I .GT. IST) GO TO 17	ASH 159
	GO TO 1	ASH 160
17	IF (Y .LT. YT(1)) I=1	ASH 161
	IF (Y .GT. YT(IST)) I = IST-1	ASH 162
2	CONTINUE	ZCM 14
	IK = 1	ZCM 15
	XF = 0.	ZCM 16
	YF = Y	ZCM 17
	ICV = CURV(I)	ZCM 18
	IF (ICV .EQ. 1) GO TO 3	ZCM 19
	XF1 = XT(I,2) * CHND(I)	ZCM 20
	IF (ARS(DDM(I,1)) .LE. .0001) XF1 = XT(I,1)*CHND(I)	ZCM 21
	XF2 = XT(I+1,2) * CHND(I+1)	ZCM 22
	YF = (Y-YT(I)) / (YT(I+1)-YT(I))	ZCM 23
	XF = (XF1+(XF2-XF1)*YF)/CHORD	ZCM 24
	IF (X1 .GE. XF) GO TO 3	ZCM 25
	FAC = CHND(I+1)	ZCM 26
	IF (FAC .LE. .0001) FAC = 1.	ZCM 27
	DELTA = DDM(I,1)*CHND(I) + (DDM(I+1,1)*FAC - DDM(I,1)*CHND(I))*YF	ZCM 28
	DELTA = DELTA/CHORD	ZCM 29
	IF (IM(I) .GT. 2) ZQ(1) = DDM(I,2) * CHND(I)	ZCM 30
	IF (IM(I) .LE. 2) ZQ(1) = (CCM(I,1) + DDM(I,1)) * CHND(I)	ZCM 31
	IF (IM(I+1) .GT. 2) ZQ(2) = DDM(I+1,2)*FAC	ZCM 32
	IF (IM(I+1) .LE. 2) ZQ(2) = (CCM(I+1,1) + DDM(I+1,1)) * FAC	ZCM 33
	DK = (ZQ(1) + (ZQ(2) - ZQ(1)) * YF) / CHORD	ZCM 34
	DELTA = DELTA - DK	ZCM 35
	GO TO 10	ZCM 36
3	K = 1	ZCM 37
	ZP = 0.	ZCM 38
	ZCX = 0.	ZCM 39
	IF (ICV .EQ. 0) GO TO 16	ZCM 40
4	IF (X .GE. XT(I,K) .AND. X .LT. XT(I,K+1)) GO TO 5	ZCM 41

	K=K+1	ZCM 42
	IF (K .GE. IM(I)) GO TO 6	ZCM 43
	GO TO 4	ZCM 44
5	SM=X-XT(I,K)	ZCM 45
	ZZ(IK) = 3.*AAM(I,K)*SM*SM + 2.*BBM(I,K)*SM + CCM(I,K)	ZCM 46
	ZX(IK) = AAM(I,K)*SM*SM*SM + BBM(I,K)*SM*SM + CCM(I,K)*SM + DDM(I,	ZCM 47
	IK)	ZCM 48
	GO TO 8	ZCM 49
6	IF (X .LT. XT(I,1)) GO TO 7	ZCM 50
	K = IM(I) - 1	ZCM 51
	GO TO 5	ZCM 52
7	K=1	ZCM 53
	GO TO 5	ZCM 54
8	IF (IK .EQ. 2) GO TO 9	ZCM 55
	IF (IMT .NE. 0) GO TO 15	ZCM 56
	I = I + 1	ZCM 57
	IK = IK + 1	ZCM 58
	GO TO 3	ZCM 59
9	YF = (Y - YT(I-1)) / (YT(I) - YT(I-1))	ZCM 60
	ZCX = ZX(1) - (ZX(1)-ZX(2))*YF	ZCM 61
	ZR = ZZ(1) - (ZZ(1) - ZZ(2)) * YF	ZCM 62
	GO TO 16	ZCM 63
10	CONTINUE	ZCM 64
	IF (XF .GT. X1 .AND. XF .LT. X2) GO TO 11	ZCM 65
	IF (X2 .LE. XF) GO TO 14	ZCM 66
	IF (X1 .GE. XF) ZR = 0.	ZCM 67
	GO TO 16	ZCM 68
11	PI = 3.14159265	ZCM 69
	IF (X .LT. XF) ZCX = DELTA*(1.-X/XF) + DK	ZCM 70
	IF (X .GE. XF) ZCX = 0.	ZCM 71
	JR = 15	ZCM 72
	C(1) = -DELTA	ZCM 73
	DO 12 J=2,JP	ZCM 74
	XNPIXF = (J-1)*PI*XF	ZCM 75
	C(J) = -2.*DELTA*SIN(XNPIXF)/XNPIXF	ZCM 76
12	CONTINUE	ZCM 77
	ZR = 0.	ZCM 78
	DO 13 J=1,JP	ZCM 79
	XNPIX = (J-1)*PI*X	ZCM 80
	ZR = ZR + C(J)*COS(XNPIX)	ZCM 81
13	CONTINUE	ZCM 82
	GO TO 16	ZCM 83
14	ZR = -DELTA/XF	ZCM 84
	ZCX = DELTA*(1.-X/XF) + DK	ZCM 85
	GO TO 16	ZCM 86
15	ZR = ZZ(1)	ZCM 87
	ZCX = ZX(1)	ZCM 88
16	CONTINUE	ZCM 89
	RETURN	ZCM 90
	END	ZCM 91

SUBROUTINE BENDIN (NC,CL,RM,IWING,BREAK,SUMM,SUMT,NWING,HALFSH,HAL	BEN	2
IFRH,DC,DS,IWGLT)	BEN	3
DIMENSION A(30), BM(1), H(30), PHI(30), BREAK(1), CL(I)	BEN	4
DIMENSION DC(1), DS(1)	BEN	5
COMMON /GEOM/ HALFSW,XCP(200),YCP(200),ZCP(200),XLE(100),YLE(100),	BEN	6
1XTE(100),PSI(30),CH(100),XV(200),YV(200),SN(20,2),XN(200,4),YN(200	BEN	7
2,4),BPRIM(200,4),WIDTH(7),YCON(51),SWEEP(100),HALFR,SJ(31.7)	BEN	8
3,ZN(200,4)	BEN	9
COMMON /CONST/ NCS,NCW,M1(7),MJW1(2,5),MJW2(2,5),NJW(5),NFP,NW(2)	BEN	10
PI=3.14159265	BEN	11
NST=NCS-M1(NC)+1	BEN	12
SUMF=0.	BEN	13
SUMM=0.	BEN	14
SUMS=0.	BEN	15
AREA=HALFSH	BEN	16
HAR=HALFRH	BEN	17
IF (IWGLT .EQ. 1) HAR=HALFR	BEN	18
IF (IWGLT .EQ. 2) AREA=HALFSW	BEN	19
IF (IWGLT .EQ. 2) HAR=HALFR	BEN	20
DO 10 I=1,NC	BEN	21
M=NC-I+1	BEN	22
IF (I.NE.NC) DIHEFC=DC(M)*DC(M-1)+DS(M)*DS(M-1)	BEN	23
IF (I.NE.NC) DIHEFS=DS(M)*DC(M-1)-DC(M)*DS(M-1)	BEN	24
IF (I .EQ. NC) DIHEFC=1.	BEN	25
IF (I .EQ. NC) DIHEFS=0.	BEN	26
WSPAN=WIDTH(M)*0.5	BEN	27
MM=M1(M)-1	BEN	28
MM1 = M1(M)	BEN	29
FM = MM1	BEN	30
IF (M .EQ. NWING) AREA=HALFSW	BEN	31
IF (M .EQ. NWING) HAR=HALFR	BEN	32
DO 1 J=1,MM	BEN	33
FJ = J	BEN	34
JJ=NST+J	BEN	35
CHORD=CH(JJ)	BEN	36
IF (NW(2) .NE. 0) CHORD=CHORD+CH(JJ+NCS)	BEN	37
PHI(J)=FJ*PI/FM	BEN	38
H(J)=CL(JJ)*CHORD*SJ(J,M)	BEN	39
CONTINUE	BEN	40
DO 3 J=1,MM1	BEN	41
A(J)=0.	BEN	42
FJ = J	BEN	43

1

	DO 2 K=1,MM	BEN 44
2	A(J) = A(J)+H(K)*COS((FJ-1.)*PHI(K))	BEN 45
	IF (J.EQ. 1) A(J) = A(J)/FM	BEN 46
	IF (J.NE. 1) A(J)=A(J)*2./FM	BEN 47
3	CONTINUE	BEN 48
	DO 6 K=1,MM1	BEN 49
	JK=MM1-K	BEN 50
	KK=JK+NST	BEN 51
	IF (K.EQ. MM1) GO TO 5	BEN 52
	BSPAN=RBREAK(M)-YLE(KK)+WSPAN	BEN 53
	SUM=A(1)*((PI-PHI(JK))*BSPAN+SIN(PHI(JK))*WSPAN)-0.5*A(2)*WSPAN*(	BEN 54
	1PI-PHI(JK)-SIN(2.*PHI(JK))/2.)-A(2)*SIN(PHI(JK))*BSPAN	BEN 55
	DO 4 J=2,MM	BEN 56
	FJ=J	BEN 57
4	SUM=SUM-BSPAN*A(J+1)*SIN(FJ*PHI(JK))/FJ+WSPAN*0.5*A(J+1)*(SIN((FJ+	BEN 58
	11.)*PHI(JK))/(FJ+1.))+SIN((FJ-1.)*PHI(JK))/(FJ-1.))	BEN 59
	BM(KK)=WSPAN*SUM/(2.*AREA*HAB) +SUMM+SUMF*(BREAK(M+1)-YLE(KK))	BEN 60
	GO TO 6	BEN 61
5	BSPAN=WSPAN	BEN 62
	SUM=(A(1)*BSPAN-0.5*A(2)*WSPAN)*PI	BEN 63
	SUMM=WSPAN*SUM/(2.*AREA*HAB) +SUMM+SUMF*(BREAK(M+1)-BREAK(M))	BEN 64
6	CONTINUE	BEN 65
	P1=A(1)*PI*WSPAN/(2.*AREA*HAB)	BEN 67
	SUMF=(SUMF+P1)*DIHEFC-SUMS*DIHEFS	BEN 68
	SUMS=(SUMF+P1)*DIHEFS+SUMS*DIHEFC	BEN 69
	IF (M.EQ. (NWING+1) .AND. IWING .NE. 0) GO TO 7	BEN 70
	GO TO 8	BEN 71
7	SUMT=SUMM	BEN 72
	IF (IWGLT .EQ. 1) GO TO 8	BEN 73
	SUMM=0.	BEN 74
	SUMF=0.	BEN 75
8	CONTINUE	BEN 76
	IF (I.EQ. NC) GO TO 9	BEN 77
	NST=NST-M1(M-1)+1	BEN 78
	GO TO 10	BEN 79
9	NST=0	BEN 80
10	CONTINUE	BEN 81
	RETURN	BEN 82
	END	BEN 83

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SUBROUTINE ADICMX (AM,XN,YN,ZN,XCP,YCP,ZCP,N,BPRIM,AW,BW,MAX,DCOS, ADI 2
1 DSIN,YBREAK,IWGL,NC,WSTUFF,VST,NW,NCS,YLE,N1,IV,M1,7BDY) ADI 3
C ADI 4
C***** ADI 5
C ADI 6
C ADICMX COMPUTES AERODYNAMIC DOWNWASH INFLUENCE COEFFICIENT MATRIX ADI 7
C USING WOODWARD'S METHOD. AN OPTIMIZATION ALGORITHM ELIMINATES ADI 8
C REDUNDANT EVALUATIONS OF THE LIFTING SURFACE INTEGRAL AT CORNERS ADI 9
C COMMON TO TWO OR MORE PANELS ADI 10
C ADI 11
C***** ADI 12
C ADI 13
C DIMENSION XN(200,4), YN(200,4), ZN(200,4), BPRIM(200,4), WSTUFF(20 ADI 14
10,4), XCP(1), YCP(1), ZCP(1), AW(1), YBREAK(1), B(2), BW(1), V(4), ADI 15
2 DCOS(1), DSIN(1), VST(200,4), W(4), TWO(2), CON(2), A(2) ADI 16
DIMENSION NW(1), YLE(1), M1(1) ADI 17
DATA TWO/1.,-1./,CON/.25,.5/,EPSLON/1.E-8/ ADI 18
PAI = 3.14159265 ADI 19
PI2 = PAI/2. ADI 20
IHING = MAX ADI 21
C ADI 22
C MACH NUMBER REGIME ADI 23
IJ=1 ADI 24
IF (AM.GE.1.0) IJ=2 ADI 25
BETA1=1.0/SQRT(ABS(1.0-AM*AM)) ADI 26
C ADI 27
C MULTIPLY PANEL SLOPES BY TANGENT OF MACH ANGLE ADI 28
PAIBET=1.0/(BETA1*PAI) ADI 29
DO 1 I=1,N ADI 30
DO 1 J=1,4 ADI 31
1 BPRIM(I,J)=BETA1*BPRIM(I,J) ADI 32
C ADI 33
C DOWNWASH MATRIX COMPUTATION ADI 34
C I IS INFLUENCED PANEL ADI 35
C J IS INFLUENCING PANEL ADI 36
C K IS CORNER OF PANEL J ADI 37
C II IS THE SIDE OF SYMMETRIC AIRPLANE BEING CONSIDERED ADI 38
C ADI 39
F5=0.0 ADI 40
IPN = 1 ADI 41
IZ = 1 ADI 42
NCW=NW(1)+NW(2) ADI 43

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	MM=NCW	ADI 44
	NN=NCW	ADI 45
	ZR = 0.	ADI 46
	YB = 0.	ADI 47
	YBB = 0.	ADI 48
	DO 46 NI=1,N	ADI 49
	IA=NI-MM+NCW	ADI 50
	IF (IA.GT.NW(1)) GO TO 2	ADI 51
	I=NI-NW(2)*(I7-1)	ADI 52
	GO TO 3	ADI 53
2	I=NI+NI-NW(1)*I7	ADI 54
3	CONTINUE	ADI 55
	IPM = 1	ADI 56
	IW = 1	ADI 57
	NL=NCW	ADI 58
	NM=NCW	ADI 59
	LZ = 1	ADI 60
	LCON = M1(1) - 1	ADI 61
	ZA = 0.	ADI 62
	YA = 0.	ADI 63
	YAA = 0.	ADI 64
	IY=0	ADI 65
	DO 42 NJ=1,N	ADI 66
	IB=NJ-NM+NCW	ADI 67
	IF (IB.GT.NW(1)) GO TO 4	ADI 68
	J=NJ-NW(2)*(IW-1)	ADI 69
	GO TO 5	ADI 70
4	J=NJ+NI-NW(1)*IW	ADI 71
5	CONTINUE	ADI 72
	JQ=NJ-IY	ADI 73
	DO 36 K=1,4	ADI 74
	IF (IW.EQ.1) GO TO 10	ADI 75
	IF (IW.EQ.(LCON+1)) GO TO 10	ADI 76
	IF (JQ.EQ.1) GO TO 9	ADI 77
	IF (K.EQ.4) GO TO 11	ADI 78
	IF (K-2) 8, 7, 6	ADI 79
6	W(K)=WSTUFF(NJ-NL,4)	ADI 80
	V(K)=VST(NJ-NL,4)	ADI 81
	GO TO 35	ADI 82
7	W(K)=WSTUFF(NJ-1,4)	ADI 83
	V(K)=VST(NJ-1,4)	ADI 84
	GO TO 35	ADI 85

8	W(K)=WSTUFF(NJ-1,3)	ADI 86
	V(K)=VST(NJ-1,3)	ADI 87
	GO TO 35	ADI 88
9	IF (K.EQ.2.OR.K.EQ.4) GO TO 11	ADI 89
	IF (K.EQ.3) GO TO 6	ADI 90
	W(K)=WSTUFF(NJ-NL,2)	ADI 91
	V(K)=VST(NJ-NL,2)	ADI 92
	GO TO 35	ADI 93
10	IF (JQ.EQ.1) GO TO 11	ADI 94
	IF (K.EQ.3.OR.K.EQ.4) GO TO 11	ADI 95
	IF (K.EQ.1) GO TO 8	ADI 96
	IF (K.EQ.2) GO TO 7	ADI 97
C		ADI 98
C	COMPUTATIONS COMMON TO SUBSONIC AND SUPERSONIC REGIMES.	ADI 99
11	CONTINUE	ADI 100
	BPM=BPRIM(J,K)	ADI 101
	XIPRIM=(XCP(I)-XN(J,K))*BETA1	ADI 102
C		ADI 103
C	KK IS PANEL SLOPE SIGN FLAG	ADI 104
	KK=1	ADI 105
	IF (BPM.GE.0.0) GO TO 12	ADI 106
	KK=2	ADI 107
	BPM=-RPM	ADI 108
12	IF (BPM.LE.EPSLON) BPM=0.0	ADI 109
	IF (ABS(BPM-1.).LE.EPSLON) BPM=1.0	ADI 110
	BPM2=RPM*BPM	ADI 111
	BR=ABS(1.-BPM2)	ADI 112
	IF (IJ.EQ.2) BR=SQRT(BR)	ADI 113
	IF (BR.GT.EPSLON) GO TO 13	ADI 114
	RPM=1.0	ADI 115
	BR=0.0	ADI 116
13	B1=XIPRIM*XIPRIM	ADI 117
C		ADI 118
C	Y-PRIME DEPENDS ON II	ADI 119
	ISM = 2	ADI 120
C	CHECK IF VERTICAL TAIL EXISTS	ADI 121
	IF (IV.EQ.1.AND.IW.GT.IWING) ISM=1	ADI 122
	A(2) = 0.	ADI 123
	B(2) = 0.	ADI 124
	DO 34 II=1,ISM	ADI 125
	PS = DSIN(IW)	ADI 126
	PC = DCOS(IW)	ADI 127



	QS = DSIN(IZ)	ADI 128
	QC = DCOS(IZ)	ADI 129
	ZC = ZCP(I)+ZB+(YCP(I)-YB)*QS	ADI 130
	ZK = ZN(J,K)+ZA+(YN(J,K)-YA)*PS	ADI 131
	DELZ = ZC-ZK	ADI 132
	YC = YRB+(YCP(I)-YB)*QC	ADI 133
	YK = YAA+(YN(J,K)-YA)*PC	ADI 134
	DELY = TWO(II)*YC-YK	ADI 135
	ZPRIM = -DELY*PS+DELZ*PC	ADI 136
	SZ=SIGN(1.,ZPRIM)	ADI 137
	YPRIM = DELY*PC+DELZ*PS	ADI 138
	IF (KK.EQ.2) YPRIM=-YPRIM	ADI 139
	B2=YPRIM*YPRIM+ZPRIM*ZPRIM	ADI 140
	GO TO ( 14, 18), IJ	ADI 141
C		ADI 142
C	SUBSONIC REGIME	ADI 143
C		ADI 144
C	FOP COMPUTERS OTHER THAN THE CDC 6000 SERIES, THE FOLLOWING	ADI 145
C	COMPUTATIONS MAY REQUIRE DOUBLE PRECISION EVALUATION IF	ADI 146
C	EITHER A11 OR A4 IS LESS THAN (-1000.)	ADI 147
C		ADI 148
14	RPM = SQRT(B2)	ADI 149
	DPM = SQRT(B1+B2)	ADI 150
	A1 = XIPRIM+DPM	ADI 151
	BQ = SQRT(B2)	ADI 152
	A11=XIPRIM/BQ	ADI 153
	A2=BPM*XIPRIM+YPRIM	ADI 154
	A3=XIPRIM-BPM*YPRIM	ADI 155
	A33=(RPM2+1.0)*ZPRIM*ZPRIM	ADI 156
	SQ = SQRT(A3*A3+A33)	ADI 157
	SQA3=1./SQ	ADI 158
	A4=A2*SQA3	ADI 159
	IF (A11.GT.(-1000.)) F1 = ALOG(A11+SQRT(A11*A11+1.))	ADI 160
	IF (A11.LE.(-1000.)) CALL F (XIPRIM,BQ,F1)	ADI 161
	IF (A4.LE.(-1000.)) GO TO 15	ADI 162
	A7=SQRT(A4*A4+1)	ADI 163
	A8=A4+A7	ADI 164
	A6=ALOG(A8)	ADI 165
	GO TO 16	ADI 166
15	CALL F (A2,SQ,A6)	ADI 167
16	CONTINUE	ADI 168
	F2=A6/SQRT(1.+RPM2)	ADI 169

C	END DOUBLE PRECISION SECTION	ADI 170
C		ADI 171
	A5=BPM*SQRT(B2)*SQA3	ADI 172
	F5=0.0	ADI 173
	IF (A5.GT.EPSLON) F5=ALOG(A5)	ADI 174
	F6=A1/R2	ADI 175
	IF (ABS(ZPRIM).LT.EPSLON) GO TO 17	ADI 176
	G1=BPM*RPM*RPM-XIPRIM*YPRIM	ADI 177
	F3 = ATAN2(ZPRIM*DPM,G1)	ADI 178
	F4 = -ATAN2(ZPRIM,YPRIM)	ADI 179
	GO TO 33	ADI 180
17	AK = XIPRIM-BPM*YPRIM	ADI 181
	F3 = 0.	ADI 182
	F4 = 0.	ADI 183
	AKY = -YPRIM*AK	ADI 184
	IF (ABS(AKY) .GE. EPSLON) F3 = ATAN2(0.,AKY)	ADI 185
	IF (ABS(YPRIM) .GE. EPSLON) F4 = -ATAN2(0.,YPRIM)	ADI 186
	GO TO 33	ADI 187
C		ADI 188
C	SUPERSONIC REGIME	ADI 189
18	A1=B2	ADI 190
	A2=SQRT(A1)	ADI 191
	F3 = 0.	ADI 192
	F4 = 0.	ADI 193
	F5 = 0.	ADI 194
	IF (XIPRIM.GT.A2) GO TO 22	ADI 195
	F1=0.0	ADI 196
	F2=0.0	ADI 197
	F6=0.0	ADI 198
	IF (BPM2.GE.1.) GO TO 33	ADI 199
	TEST=YPRIM-RPM*XIPRIM	ADI 200
	IF (XIPRIM.EQ.A2) GO TO 19	ADI 201
	IF (YPRIM .LE. 0.) GO TO 33	ADI 202
	CONTL=RPM*YPRIM+RPM*ABS(ZPRIM)	ADI 203
	IF (XIPRIM-CONTL) 33, 20, 19	ADI 204
19	IF (TEST) 33, 20, 21	ADI 205
20	F2=1.57079633/BB	ADI 206
	F3=PI2*SZ	ADI 207
	GO TO 33	ADI 208
21	F2=PAI/BB	ADI 209
	F3=PAI*SZ	ADI 210
	GO TO 33	ADI 211

22	A3=XIPRIM/A1	ADI 212
	SQXI=SQRT(XIPRIM*XIPRIM-A1)	ADI 213
	F6=SQXI/A1	ADI 214
	A11=XIPRIM/A2	ADI 215
	F1=ALOG(A11+SQRT(A11*A11-1.0))	ADI 216
	A4=XIPRIM-BPM*YPRIM	ADI 217
	A5=(BPM2-1.0)*ZPRIM*ZPRIM	ADI 218
	A6=SQRT(A4*A4+A5)	ADI 219
	A7=BPM*XIPRIM-YPRIM	ADI 220
	IF (BPM2.EQ.1.) GO TO 31	ADI 221
	IF (BPM2.GT.1.0) GO TO 32	ADI 222
	F2=(1./BB) * ACOS(A7/A6)	ASH 163
23	G1=BPM*A1-XIPRIM*YPRIM	ADI 224
	IF (ZPRIM) 24, 25, 24	ADI 225
24	FTR=G1/SQRT(A1*(A4*A4+A5))	ADI 226
	IF (FTR .LE. -1.) GO TO 29	ADI 227
	IF (FTR .GE. 1.) GO TO 26	ADI 228
	FTR=ACOS(FTR)*S7	ASH 164
	GO TO 30	ADI 230
25	IF (PPM) 26, 28, 27	ADI 231
26	FTR=0.	ADI 232
	GO TO 30	ADI 233
27	IF (A4) 26, 28, 29	ADI 234
28	FTR=PI2	ADI 235
	GO TO 30	ADI 236
29	FTR=PAI*SZ	ADI 237
30	F3=FTR	ADI 238
	GO TO 33	ADI 239
31	F2=SQXI/(XIPRIM-YPRIM)	ADI 240
	GO TO 23	ADI 241
32	A8=A7/A6	ADI 242
	F2=(1./BB)*ALOG(A8+SQRT(A8*A8-1.0))	ADI 243
	GO TO 23	ADI 244
33	A(II)=CON(IJ)*PAIRET*((BPM2+TWO(IJ))*F2-BPM*(F1-F5)	ADI 245
	1 -YPRIM*F6)*TWO(KK)	ADI 246
34	B(II)=-CON(IJ)*PAIRET*(BPM*(F3+F4)-ZPRIM*F6)	ADI 247
	SN2 = 2.*PS*PC	ADI 248
	CS2 = PC*PC-PS*PS	ADI 249
	W(K) = A(1)+A(2)*CS2+B(2)*SN2	ADI 250
	V(K) = B(1)+A(2)*SN2-B(2)*CS2	ADI 251
C		ADI 252
C	STORE W(K) IN WSTUFF TO AVOID RECOMPUTATION LATER.	ADI 253

C			ADI 254
35	CONTINUE		ADI 255
	WSTUFF(NJ,K)=W(K)		ADI 256
	VST(NJ,K)=V(K)		ADI 257
36	CONTINUE		ADI 258
	AW(NJ)=W(1)-W(2)-W(3)+W(4)		ADI 259
	BW(NJ)=V(1)-V(2)-V(3)+V(4)		ADI 260
	IF (NJ.LT.NM.OR.NJ.EQ.N) GO TO 42		ADI 261
	IF (IW.EQ.(LCON+1)) GO TO 37		ADI 262
	GO TO 38		ADI 263
37	LZ = LZ + 1		ADI 264
	LCON = LCON + M1(LZ) - 1		ADI 265
38	CONTINUE		ADI 266
	IW = IW+1		ADI 267
	NM = NM+NL		ADI 268
	IY = IY+NL		ADI 269
	IF (IWIING.NE.0.AND.IW.EQ.(IWIING+1)) GO TO 39		ADI 270
	IF (IW.EQ.(NCS+1)) GO TO 42		ADI 271
	IF (YLE(IW).LT.YBREAK(IPM)) GO TO 42		ADI 272
39	ZA = ZA + (YBREAK(IPM)-YA) * DSIN(IW-1)		ADI 273
	YAA = YAA + (YBREAK(IPM) - YA) * DCOS(IW-1)		ADI 274
	YA = YBREAK(IPM)		ADI 275
	IF (IWIING.NE.0.AND.IW.EQ.(IWIING+1)) GO TO 40		ADI 276
	GO TO 41		ADI 277
40	IF (IWGL.EQ.1) GO TO 41		ADI 278
	ZA = 0.		ADI 279
	YA = 0.		ADI 280
	YAA = 0.		ADI 281
	IF (IWGL.NE.2) GO TO 41		ADI 282
	ZA = YBREAK(NC-2)*DSIN(1)		ADI 283
	YAA = YBREAK(NC-2) * DCOS(1)		ADI 284
	YA = YBREAK(NC-2)		ADI 285
41	IPM = IPM+1		ADI 286
42	CONTINUE		ADI 287
	WRITE (02) (AW(J),J=1,N)		ADI 288
	WRITE (02) (BW(J),J=1,N)		ADI 289
	IF (NI.LT.MM) GO TO 46		ADI 290
	IZ = IZ+1		ADI 291
	MM = MM+NN		ADI 292
	IF (IWIING.NE.0.AND.IZ.EQ.(IWIING+1)) GO TO 43		ADI 293
	IF (IZ.EQ.(NCS+1)) GO TO 46		ADI 294
	IF (YLE(IZ).LT.YBREAK(IPN)) GO TO 46		ADI 295
43	ZB = ZB + (YBREAK(IPN)-YB) * DSIN(IZ-1)		ADI 296
	YBB = YBB + (YBREAK(IPN)-YB) * DCOS(IZ-1)		ADI 297
	YR = YBREAK(IPN)		ADI 298
	IF (IWIING.NE.0.AND.IZ.EQ.(IWIING+1)) GO TO 44		ADI 299
	GO TO 45		ADI 300
44	IF (IWGL.EQ.1) GO TO 45		ADI 301
	ZB = 0.		ADI 302
	YB = 0.		ADI 303
	YBB = 0.		ADI 304
	IF (IWGL.NE.2) GO TO 45		ADI 305
	ZB = YBREAK(NC-2)*DSIN(1)		ADI 306
	YBB = YBREAK(NC-2)*DCOS(1)		ADI 307
	YB = YBREAK(NC-2)		ADI 308
45	IPN = IPN+1		ADI 309
46	CONTINUE		ADI 310
	RETURN		ADI 311
	END		ADI 312

```
SUBROUTINE F (A2,A3,FUNCT)
DOUBLE PRECISION X2,X3,A6,A7
X2=A2
X3=A3
A6=X2/DABS(X3)
A7=DSQRT(A6*A6+1.)
FUNCT=DLOG(A6+A7)
RETURN
END
```

```
F 2
F 3
F 4
F 5
F 6
F 7
F 8
F 9
F 10
```

	SUBROUTINE PANEL (XXL,YL,XXT,CPCWL,CPSWL,NSW,IPANEL,LPANEL,F,PERCT	PAN	2
	1,SWP,LR,ZS,SVP,KZ,L)	PAN	3
	DIMENSION XXL(1), YL(1), XXT(1), CPCWL(1), CPSWL(1), PERCT(1)	PAN	4
	DIMENSION SWP(20,10), SVP(20,10), F(5,20)	PAN	5
	COMMON /SCHEME/ C(2),X(21,41),Y(21,41),SLOPE(21),XL(2,21),XTT(41),	PAN	6
	1XLL(41)	PAN	7
	COMMON /GEOM/ HALFSW,XCP(200),YCP(200),ZCP(200),XLE(100),YLE(100),	PAN	8
	1XTE(100),PSI(30),CH(100),XV(200),YV(200),SN(20,2),XN(200,4),YN(200	PAN	9
	2,4),BPPIM(200,4),WIDTH(7),YCON(51),SWEEP(100),HALFR,SJ(31,7)	PAN	10
	3,ZN(200,4)	PAN	11
	COMMON /CONST/ NCS,NCW,M1(7),MJW1(2,5),MJW2(2,5),NJW(5),NFP,NW(2)	PAN	12
	PI=3.14159265	PAN	13
	NSW1=NSW-1	PAN	14
	NCW1 = NCW+1	PAN	15
	IP = 0	PAN	16
	IF (L .EQ. 2) IP = NW(1)	PAN	17
	DO 1 I=1,2	PAN	18
	C(I)=XXT(I)-XXL(I)	PAN	19
	DO 1 J=1,NCW1	PAN	20
1	XL(I,J)=XXL(I)+CPCWL(J)*C(I)/100.	PAN	21
	SPAN=YL(2)-YL(1)	PAN	22
	DO 2 J = 1,NCW1	PAN	23
	SLOPE(J) = (XL(2,J) - XL(1,J)) / SPAN	PAN	24
2	CONTINUE	PAN	25
	DO 3 J = 1,NCW	PAN	26
	JJ = J + IP	PAN	27
	A = XL(1,J) + (XL(1,J+1) - XL(1,J)) * PERCT(J)	PAN	28
	B = XL(2,J) + (XL(2,J+1) - XL(2,J)) * PERCT(J)	PAN	29
	AB = (B - A)/SPAN	PAN	30
	SWP(J,LR) = ATAN(AB)	PAN	31
	C1 = XL(1,J) + (XL(1,J+1) - XL(1,J)) * F(KZ,JJ)	PAN	32
	C2 = XL(2,J) + (XL(2,J+1) - XL(2,J)) * F(K7,JJ)	PAN	33
	CD = (C2 - C1) / SPAN	PAN	34
	SVP(J,LP) = ATAN(CD)	PAN	35
3	CONTINUE	PAN	36
	DO 4 K=1,NSW	PAN	37
	YK=CPSWL(K)*SPAN/100.	PAN	38
	DO 4 J=1,NCW1	PAN	39
	Y(J,K)=YK+YL(1)	PAN	40
	X(J,K)=XL(1,J)+SLOPE(J)*(Y(J,K)-YL(1))	PAN	41
4	CONTINUE	PAN	42
	XLL(1)=XXL(1)	PAN	43

	XTT(1)=XXT(1)	PAN 44
	DO 5 I=2,NSW	PAN 45
	XLL(I)=XLL(I-1)+(XXL(2)-XXL(1))*(Y(1,I)-Y(1,I-1))/SPAN	PAN 46
5	XTT(I)=XTT(I-1)+(XXT(2)-XXT(1))*(Y(1,I)-Y(1,I-1))/SPAN	PAN 47
	DO 8 K=1,NSW1	PAN 48
	KK=NCS+K	PAN 49
	YLE(KK)=YCON(K)*SPAN+YL(1)	PAN 50
	XLE(KK)=XLL(K)+(XLL(K+1)-XLL(K))*(YLE(KK)-Y(1,K))/(Y(1,K+1)-Y(1,K))	PAN 51
1)		PAN 52
	XTE(KK)=XTT(K)+(XTT(K+1)-XTT(K))*(YLE(KK)-Y(1,K))/(Y(1,K+1)-Y(1,K))	PAN 53
1)		PAN 54
	CH(KK)=XTE(KK)-XLE(KK)	PAN 55
	SWEEP(KK)=ATAN((XXL(2)-XXL(1))/SPAN)	PAN 56
	YK = .5 * SPAN * (1. - COS(K*PI/FLOAT(NSW)))	PAN 57
	DO 8 J=1,NCW	PAN 58
	JJ = J + IP	PAN 59
	NPANEL=(K-1)*NCW +J-1+IPANEL	PAN 60
	DO 7 I = 1,4	PAN 61
	KI1 = K + I - 1	PAN 62
	KI3 = K+I-3	PAN 63
	IF (I .LE. 2) GO TO 6	PAN 64
	XN(NPANEL,I) = X(J+1,KI3)	PAN 65
	YN(NPANEL,I) = Y(J+1,KI3)	PAN 66
	ZN(NPANEL,I) =ZS	PAN 67
	BPRIM(NPANEL,I) = SLOPE(J+1)	PAN 68
	GO TO 7	PAN 69
6	XN(NPANEL,I) = X(J,KI1)	PAN 70
	YN(NPANEL,I) = Y(J,KI1)	PAN 71
	ZN(NPANEL,I) = ZS	PAN 72
	BPRIM(NPANEL,I) = SLOPE(J)	PAN 73
7	CONTINUE	PAN 74
	A1 = X(J+1,K)-X(J,K)	PAN 75
	A2 = X(J+1,K+1) - X(J,K+1)	PAN 76
	B = Y(J,K+1) - Y(J,K)	PAN 77
	YBAR = YK - CPSWL(K) * SPAN / 100.	PAN 78
	XBAR = X(J,K) + YBAR * (X(J,K+1) - X(J,K)) / B	PAN 79
	CBAR = A1 + (A2 - A1) * YBAR / B	PAN 80
	YCP(NPANEL) = Y(J,K) + YBAR	PAN 81
	XCP(NPANEL) = XBAR + F(KZ,JJ) * CBAR	PAN 82
	ZCP(NPANEL) = ZS	PAN 83
	XV(NPANEL) = XBAR + PERCT(J) * CBAR	PAN 84
	YV(NPANEL)=YCP(NPANEL)	PAN 85
8	CONTINUE	PAN 86
	LPANEL=NPANEL	PAN 87
	RETURN	PAN 88
	END	PAN 89

	SUBROUTINE DRAG (CLT,YBREAK,NC,TFLP,NAL)	DRG 2
	DIMENSION ALPHI(50), YBREAK(1), TFLP(1), XXV(50), YYV(50)	DRG 3
	COMMON /GEOM/ HALFSW,XCP(200),YCP(200),ZCP(200),XLE(100),YLE(100).	DRG 4
	IXTE(100),PSI(30),CH(100),XV(200),YV(200),SN(20,2),XN(200,4),YN(200	DRG 5
	2,4),BPRIM(200,4),WIDTH(7),YCON(51),SWEEP(100),HALFR,SJ(31,7)	DRG 6
	3,ZN(200,4)	DRG 7
	COMMON /AERO/ AM,B,CL(50),CT(50),CD(50),CM(50)	DRG 8
	COMMON /CONST/ NCS,NCW,M1(7),MJW1(2,5),MJW2(2,5),NJW(5),NFP,NW(2)	DRG 9
	M=41	DRG 10
	PI=3.14159265	DRG 11
	NS=(M+1)/2-1	DRG 12
	MM1=M-1	DRG 13
	FM=M	DRG 14
	DO 1 I=1,NS	DRG 15
	FI=I	DRG 16
	J=M-I	DRG 17
	XXV(I) = SIN(FI*PI/FM)	DRG 18
	XXV(J) = XXV(I)	DRG 19
	YYV(I) = -COS(FI*PI/FM)	DRG 20
1	YYV(J) = -YYV(I)	DRG 21
	DO 2 I=1,NCS	DRG 22
2	CM(I)=SQRT(1.-(YLE(I)/HALFR)**2)	DRG 23
	IC=1	DRG 24
	PREAK=YBREAK(1)	DRG 25
	MST=1	DRG 26
	MEND=M1(1)-1	DRG 27
	DO 8 I=1,NS	DRG 28
	YCON(I)=0.	DRG 29
	CD(I)=0.	DRG 30
	II=NS+I	DRG 31
	BB = YYV(II) * HALFR	DRG 32
	IF (BB .LE. PREAK) GO TO 3	DRG 33
	NK=M1(IC)-1	DRG 34
	IC=IC+1	DRG 35
	NQ=M1(IC)-1	DRG 36
	BREAK=YBREAK(IC)	DRG 37
	MST=MST+NK	DRG 38
	MEND=MEND+NQ	DRG 39
3	CONTINUE	DRG 40
	DO 7 J=MST,MEND	DRG 41
	IF (NW(2) .EQ. 0) GO TO 4	DRG 42
	J1 = J + NCS	DRG 43



	J1=J+NCS	DRG 44
	CHORD=CH(J)+CH(J1)	DRG 45
	GO TO 5	DRG 46
4	CHORD=CH(J)	DRG 47
5	CONTINUE	DRG 48
	A=1.	DRG 49
	DO 6 K=MST,MEND	DRG 50
	IF (K .EQ. J) GO TO 6	DRG 51
	A=A*(PB-YLF(K))/(YLE(J)-YLE(K))	DRG 52
6	CONTINUE	DRG 53
	CD(I)=CD(I)+A*CL(J)*CM(J)	DRG 54
7	YCON(I)=YCON(I)+A*CHORD	DRG 55
	CD(I) = CD(I)/SQRT(1.-YYV(II)**2)	DRG 56
8	CONTINUE	DRG 57
	DO 14 I=1,NS	DRG 58
	ALPHI(I)=0.	DRG 59
	IN=NS+I	DRG 60
	DO 13 J=1,MM1	DRG 61
	IF (J .EQ. IN) GO TO 9	DRG 62
	INDEX=IABS(J-IN)	DRG 63
	FACTOR = 2.*((-1.)**INDEX-1.)*XXV(J)/(FM*(YYV(J)-YYV(IN))**2)	DRG 64
	GO TO 10	DRG 65
9	FACTOR = FM/XXV(J)	DRG 66
10	IF (J .GT. NS) GO TO 11	DRG 67
	JJ=M-J-NS	DRG 68
	GO TO 12	DRG 69
11	JJ=J-NS	DRG 70
12	ALPHI(I)=ALPHI(I)+CD(JJ)*YCON(JJ)*FACTOR	DRG 71
13	CONTINUE	DRG 72
	ALPHI(I)=ALPHI(I)/(16.*HALFR)	DRG 73
14	CONTINUE	DRG 74
	CDI=0.	DRG 75
	DO 15 I=1,NS	DRG 76
	IN=NS+I	DRG 77
15	CDI = CDI + CD(I)*YCON(I)*ALPHI(I)*XXV(IN)	DRG 78
	CDI=CDI*HALFR*PI/(HALFSW*FM)	DRG 79
	CDL2 = CDI / (CLT * CLT)	DRG 80
	CDL2=CDI/(CLT*CLT)	DRG 81
	WRITE (6, 16) CDI	DRG 82
	WRITE (6, 17) CDL2	DRG 83
	RETURN	DRG 84
C		DRG 85
16	FORMAT (/2X,23HFAR-FIELD INDUCED DRAG=,F10.5)	DRG 86
17	FORMAT (/2X,33HFAR-FIELD INDUCED DRAG PARAMETER=,F10.5)	DRG 87
	END	DRG 88

	SUBROUTINE VMSEQN (NC1,K,AA,A,CA)	VMS 2
	DIMENSION AA(1), CA(1), A(1)	VMS 3
	NC=K*NC1	VMS 4
	SUM1=0.	VMS 5
	K1=K-1	VMS 6
	JJ=1	VMS 7
	DO 1 J=1,K1	VMS 8
	SUM1=SUM1+AA(J)*A(JJ)	VMS 9
1	JJ=JJ+NC1+1	VMS 10
	SUM1=SUM1+AA(K)	VMS 11
	DO 3 I=1,NC1	VMS 12
	SUM2=0.	VMS 13
	JJ=I+1	VMS 14
	DO 2 J=1,K1	VMS 15
	SUM2=SUM2+AA(J)*A(JJ)	VMS 16
2	JJ=JJ+NC1+1	VMS 17
	KK=K+I	VMS 18
	SUM2=SUM2+AA(KK)	VMS 19
3	CA(I)=-SUM2/SUM1	VMS 20
	M=1	VMS 21
	L=0	VMS 22
	KNC=(K-1)*NC1	VMS 23
	DO 6 I=1,NC	VMS 24
	IF (I.GT.KNC) GO TO 5	VMS 25
	MM=(M-1)*NC1+1	VMS 26
	IF (I.EQ.MM) GO TO 7	VMS 27
4	KK=KK+1	VMS 28
	IL=I+L	VMS 29
	A(I)=CA(KK)*BASE+A(IL)	VMS 30
	GO TO 6	VMS 31
5	II=I-KNC	VMS 32
	A(I)=CA(II)	VMS 33
6	CONTINUE	VMS 34
	GO TO 8	VMS 35
7	II=MM+M-1	VMS 36
	BASE=A(II)	VMS 37
	KK=0	VMS 38
	L=L+1	VMS 39
	M=M+1	VMS 40
	GO TO 4	VMS 41
8	CONTINUE	VMS 42
	RETURN	VMS 43
	END	VMS 44

	SUBROUTINE GAMAX (AW,CA,LPAN1,LPANEL,GAMMA,NC,BREAK,SWP,CHORDT,IWI	GAM	2
	ING,NWING,HALFRH,YCN,CTIP,CTX,IWGLT,IPOS,NCON,SVP,NC2,DYT,TP,CTDS)	GAM	3
	DIMENSION DYT(20,2), TP(20,2), CTDS(20,2), SWP(20,10), SVP(20,10)	GAM	4
	DIMENSION A(20), F(20), THETA(20), G(20,2)	GAM	5
	DIMENSION AW(1), CA(1), GAMMA(1), BREAK(1)	GAM	6
	DIMENSION CTIP(1), CHORDT(1), YCN(1)	GAM	7
	COMMON /GEOM/ HALFSW,XCP(200),YCP(200),ZCP(200),XLE(100),YLE(100),	GAM	8
	1XTE(100),PSI(30),CH(100),XV(200),YV(200),SN(20,2),XN(200,4),YN(200	GAM	9
	2,4),BPRIM(200,4),WIDTH(7),YCON(51),SWEEP(100),HALFR,SJ(31,7)	GAM	10
	3,ZN(200,4)	GAM	11
	COMMON /AERO/ AM,B,CL(50),CT(50),CD(50),CM(50)	GAM	12
	COMMON /CONST/ NCS,NCW,M1(7),MJW1(2,5),MJW2(2,5),NJW(5),NFP,NW(2)	GAM	13
	PI = 3.14159265	GAM	14
	IPS1=IPOS/10	GAM	15
	IPS2=IPOS-IPS1*10	GAM	16
	NK=0	GAM	17
	MK=LPAN1	GAM	18
	IF (NCON.NE.0) GO TO 12	GAM	19
	DO 11 I=1,NCS	GAM	20
	NA=1	GAM	21
	SUMI=0.	GAM	22
	NWW=NW(1)	GAM	23
	ISN=1	GAM	24
	FN=NW(1)	GAM	25
1	N1=NWW+1	GAM	26
	DO 2 J=1,NWW	GAM	27
	KK=NK+J	GAM	28
	IF (NA .EQ. 2) KK=MK+J	GAM	29
	FJ=J	GAM	30
	THETA(J)=(2.*FJ-1.)*PI/(2.*FN)	GAM	31
	F(J) = GAMMA(KK) * SN(J,ISN) * .5	GAM	32
2	CONTINUE	GAM	33
	THETA(N1)=PI	GAM	34
	DO 4 J=1,N1	GAM	35
	A(J)=0.	GAM	36
	FJ=J	GAM	37
	DO 3 K=1,NWW	GAM	38
3	A(J)=A(J)+F(K)*COS((FJ-1.)*THETA(K))	GAM	39
	IF (J .EQ. 1) A(J)=A(J)/FN	GAM	40
	IF (J .NE. 1) A(J)=A(J)*2./FN	GAM	41
4	CONTINUE	GAM	42
	IF (NA.EQ.2) GO TO 7	GAM	43

	CHORD=CH(I)	GAM 44
	IF (NW(2).NE.0) CHORD=CH(I)+CH(I+NCS)	GAM 45
	RF=CH(I)/CHORD	GAM 46
	CT(I) = A(1)	GAM 47
	DO 5 J = 1,NWW	GAM 48
5	CT(I) = CT(I)+A(J+1)	GAM 49
	SP = COS(SWEEP(I))	GAM 50
	AP = AM*AM*SP*SP	GAM 51
	IF (AP.GE.1.) GO TO 6	GAM 52
	AC = SQRT(1.-AP)	GAM 53
	CTL = PI*AC/(8.*SP)	GAM 54
	AKK = CT(I)	GAM 55
	FAC = 1.	GAM 56
	IF (AKK.LT.0.) FAC=-1.	GAM 57
	CT(I)=CTL*FAC*AKK*AKK*RF	GAM 58
	GO TO 7	GAM 59
6	CT(I) = 0.	GAM 60
7	CONTINUE	GAM 61
	DO 9 K=1,N1	GAM 62
	KK=NK+K	GAM 63
	IF (NA .EQ. 2) KK=MK+K	GAM 64
	SUM=A(1)*THETA(K)	GAM 65
	DO 8 J=1,NWW	GAM 66
	FJ=J	GAM 67
8	SUM=SUM+A(J+1)*SIN(FJ*THETA(K))/FJ	GAM 68
	IZ=I	GAM 69
	IF (NA .EQ. 2) IZ=I+NCS	GAM 70
	SUM=-0.5*CH(IZ)*SUM+SUMI	GAM 71
	IF (NA .EQ. 1 .AND. K .EQ. N1) GO TO 9	GAM 72
	AW(KK)=SUM	GAM 73
9	CONTINUE	GAM 74
	IF (NA .EQ. 2) GO TO 10	GAM 75
	IF (NCW .EQ. NW(1)) GO TO 10	GAM 76
	NWW=NW(2)	GAM 77
	NA=NA+1	GAM 78
	ISN=ISN+1	GAM 79
	FN=NWW	GAM 80
	SUMI=SUM	GAM 81
	GO TO 1	GAM 82
10	CONTINUE	GAM 83
	NK = NK + NW(1)	GAM 84
11	MK=MK+NW(2)	GAM 85

12	CONTINUE	GAM 86
	NKW = NCW	GAM 87
	IF (NCON.EQ.2) NKW = 1	GAM 88
	NK1=0	GAM 89
	NK2=LPAN1	GAM 90
	DO 44 I=1,NC	GAM 91
	M=M1(I)	GAM 92
	FM=M	GAM 93
	MM=M-1	GAM 94
	DO 43 J = 1, NKW	GAM 95
	IF (IWING .NE. 0 .AND. I .EQ. NWING) GO TO 13	GAM 96
	IF (I .EQ. NC) GO TO 13	GAM 97
	GO TO 14	GAM 98
13	CONTINUE	GAM 99
	IW=1	GAM 100
	IPZ=1	GAM 101
	IF (I .GT. NWING) IW=2	GAM 102
	IF (I .GT. NWING) IPZ=3	GAM 103
	G(J,IW)=0.	GAM 104
	DYT(J,IW) = 0.	GAM 105
14	CONTINUE	GAM 106
	IK=0	GAM 107
	IS=0	GAM 108
	HAB=HALFB	GAM 109
	AA=-1.	GAM 110
	BB=1.	GAM 111
	FT=1.	GAM 112
	BR=BBREAK(I)	GAM 113
	IF (J .GT. NW(1)) GO TO 19	GAM 114
	NK=NK1	GAM 115
	LK=0	GAM 116
	IR1=I	GAM 117
	JJ=J	GAM 118
	MK=NW(1)	GAM 119
	IF (I .GT. NWING) GO TO 15	GAM 120
	IF (IPS1 .EQ. 2) IS=1	GAM 121
	IF (IPS1 .EQ. 1) GO TO 16	GAM 122
	IF (IPS1 .EQ. 2) GO TO 17	GAM 123
	GO TO 21	GAM 124
15	IF (IPS2 .EQ. 1) GO TO 18	GAM 125
16	HAB=HALFBH	GAM 126
	IF (IWGLT .EQ. 2) HAB=WIDTH(I)	GAM 127

	IF (IWGLT .EQ. 2) BR=0.	GAM 128
	GO TO 21	GAM 129
17	HAB=HALFB	GAM 130
	GO TO 21	GAM 131
18	HC=HALFBH-HALFB	GAM 132
	AA=HALFB/HC	GAM 133
	BB=HALFBH/HC	GAM 134
	HAB=HC	GAM 135
	IK=1	GAM 136
	FT=2.	GAM 137
	GO TO 21	GAM 138
19	NK=NK2	GAM 139
	MK=NW(2)	GAM 140
	LK=NW(1)	GAM 141
	IR1=I+NC	GAM 142
	JJ=J-NW(1)	GAM 143
	IF (I .GT. NWIN) GO TO 20	GAM 144
	IF (IP1 .EQ. 1) IS=1	GAM 145
	IF (IP1 .EQ. 1) GO TO 17	GAM 146
	IF (IP1 .EQ. 2) GO TO 16	GAM 147
	GO TO 21	GAM 148
20	IF (IP2 .EQ. 2) GO TO 18	GAM 149
	GO TO 16	GAM 150
21	IF (J.EQ. 1 .OR. J .EQ. (NW(1)+1)) GO TO 22	GAM 151
	GO TO 25	GAM 152
22	CONTINUE	GAM 153
	DO 24 JP = 1,MM	GAM 154
	FJ=JP	GAM 155
	YCON(JP)=COS(FJ*PI/FM)	GAM 156
	IF (NCON.NE.0) GO TO 23	GAM 157
	Y=0.5*WIDTH(I)*(1.-YCON(JP))+BR	GAM 158
	PSI(JP) = SQRT((BB-Y/HAB)*(Y/HAB-AA))*FT	GAM 159
	GO TO 24	GAM 160
23	PSI(JP) = 1.	GAM 161
24	CONTINUE	GAM 162
25	CONTINUE	GAM 163
	L1=NK+J-LK	GAM 164
	L2=L1+MK	GAM 165
	L3=L2+MK	GAM 166
	IF (NCON .NE. 2 .AND. NC2 .EQ. 0) SP = SWP(JJ,IR1)	GAM 167
	IF (NCON .NE. 2 .AND. NC2 .EQ.1) SP = SVP(JJ,IR1)	GAM 168
	LA = MM*(I-1)+1	GAM 169

	IF (NCON.EQ.2) SP = SWEEP(LA)	GAM 170
	CS=COS(SP)	GAM 171
	TAN=SIN(SP)/CS	GAM 172
	SM=0.	GAM 173
	IF (IK .EQ. 1) GO TO 28	GAM 174
	DO 27 LQ=1,MM	GAM 175
	LP=L1+(LQ-1)*MK	GAM 176
	AA=1.	GAM 177
	DO 26 LS=1,MM	GAM 178
	LN=L1+(LS-1)*MK	GAM 179
	IF (LS .EQ. LQ) GO TO 26	GAM 180
	AA=AA*(BREAK(I)-YCP(LN))/(YCP(LP)-YCP(LN))	GAM 181
26	CONTINUE	GAM 182
27	SM=SM+AA*AW(LP)*PSI(LQ)	GAM 183
	GAMA0=SM	GAM 184
	GO TO 29	GAM 185
28	GAMA0=0.	GAM 186
29	CONTINUE	GAM 187
	IF ( NCON .NE. 0) GO TO 30	GAM 188
	IF (IS .EQ. 1) GO TO 33	GAM 189
	IF (IWING .NE. 0 .AND. I .EQ. NWING) GO TO 33	GAM 190
	IF (I .EQ. NC) GO TO 33	GAM 191
30	CONTINUE	GAM 192
	SM=0.	GAM 193
	DO 32 LQ=1,MM	GAM 194
	LP=L1+(LQ-1)*MK	GAM 195
	AA=1.	GAM 196
	DO 31 LS=1,MM	GAM 197
	LN=L1+(LS-1)*MK	GAM 198
	IF (LS .EQ. LQ) GO TO 31	GAM 199
	AA=AA*(BREAK(I+1)-YCP(LN))/(YCP(LP)-YCP(LN))	GAM 200
31	CONTINUE	GAM 201
32	SM=SM+AA*AW(LP)*PSI(LQ)	GAM 202
	GAMAN=SM	GAM 203
	GO TO 34	GAM 204
33	GAMAN=0.	GAM 205
34	DO 38 K=1,MM	GAM 206
	LL=NK+(K-1)*MK+J-LK	GAM 207
	CA(LL)=0.	GAM 208
	DO 36 KK=1,MM	GAM 209
	LI=NK+(KK-1)*MK+J-LK	GAM 210
	IF (KK .EQ. K) GO TO 35	GAM 211

	CA(LL)=CA(LL)+2.*(-1.)**(K+KK)* AW(LL)*PSI(KK)/(WIDTH(I)*(YCON(K	GAM 212
	IK)-YCON(K))	GAM 213
	GO TO 36	GAM 214
35	CA(LL)=CA(LL)+ AW(LL)*PSI(K)*YCON(K)/(WIDTH(I)*SJ(K,I)*SJ(K,I))	GAM 215
36	CONTINUE	GAM 216
	IF (IK .EQ. 0) FK=YCP(LL)/(HAB*HAB)	GAM 217
	IF (IK .EQ. 1) FK=-1.-2.*(YCP(LL)-HALFB)/HAB)/(0.5*HAB)	GAM 218
	IF (NCON.NE.0) FK = 0	GAM 219
	CA(LL)=CA(LL)+GAMA0*(-1.)**K/(1.-YCON(K))/WIDTH(I)-GAMA0*(-1.)**(M	GAM 220
	1+K)/(1.+YCON(K))/WIDTH(I)+AW(LL)*FK/PSI(K)	GAM 221
	CA(LL)=CA(LL)/PSI(K)	GAM 222
	CL(K) = CA(LL)	GAM 223
	IF (IHING .NE. 0 .AND. I .EQ. NHING) GO TO 37	GAM 224
	IF (I .EQ. NC) GO TO 37	GAM 225
	GO TO 38	GAM 226
37	CONTINUE	GAM 227
	IF (CHORDT(IPZ) .LE. 0.001) GO TO 38	GAM 228
	IF (NCON.NE.0) GO TO 38	GAM 229
	G(J,IW)=G(J,IW)+AW(LL)*PSI(K)*(-1.)**(K+M)/(1.+YCON(K))	GAM 230
38	CA(LL) = TAN*GAMMA(LL)*0.5+CA(LL)	GAM 231
	IF (J .EQ. NW(1)) NK1=LL	GAM 232
	IF (NCON .EQ. 2) NK1 = LL+NW(1)-1	GAM 233
	IF (NCON .EQ. 1 .AND. NC2 .EQ. 0) GO TO 40	GAM 234
	IF (NCON.NE.0) GO TO 43	GAM 235
	IF (I .EQ. NC) GO TO 39	GAM 236
	IF (IHING .NE. 0 .AND. I .EQ. NHING) GO TO 39	GAM 237
	GO TO 43	GAM 238
39	CONTINUE	GAM 239
	IF (CHORDT(IPZ) .LE. .001) GO TO 43	GAM 240
	G(J,IW)=2./WIDTH(I)*G(J,IW)+0.5*(-1.)**M*GAMA0/WIDTH(I)	GAM 241
	IF (IK .EQ. 0) G(J,IW)=G(J,IW)*SQRT(HAB)/2.828427124	GAM 242
	IF (IK .EQ. 1) G(J,IW)=G(J,IW)*SQRT(HAB)/4.	GAM 243
	GO TO 43	GAM 244
40	SM = 0.	GAM 245
	DO 42 LQ = 1,MM	GAM 246
	LP = L1+(LQ-1)*MK	GAM 247
	AA = 1.	GAM 248
	DO 41 LS=1,MM	GAM 249
	LN = L1+(LS-1)*MK	GAM 250
	IF (LS.EQ.LQ) GO TO 41	GAM 251
	AA = AA*(BREAK(I+1)-YCP(LN))/(YCP(LP)-YCP(LN))	GAM 252
41	CONTINUE	GAM 253



42	SM = SM+AA*CL(LQ)	GAM 254
	DYT(J,IW) = SM	GAM 255
	TP(J,IW) = TAN	GAM 256
43	CONTINUE	GAM 257
	NK2=LL	GAM 258
44	CONTINUE	GAM 259
	IF (NCON.NE.0) GO TO 48	GAM 260
	DO 47 K=1,IW	GAM 261
	CTIP(K)=0.	GAM 262
	IPZ = 1	GAM 263
	IF (K .EQ. 2) IPZ=3	GAM 264
	IF (CHORDT(IPZ) .LE. 0.001) GO TO 47	GAM 265
	CHD=CHORDT(IPZ)+CHORDT(IPZ+1)	GAM 266
	CHORD=CH(1)	GAM 267
	IF (NW(2) .NE. 0) CHORD=CH(1)+CH(1+NCS)	GAM 268
	DO 46 I=1,NCW	GAM 269
	J=I	GAM 270
	IF (I .GT. NW(1)) J=L PAN1+I-NW(1)	GAM 271
	XC=(XV(J)-XLE(1))/CHORD	GAM 272
	CTDS(I,K) = 0.	GAM 273
	IF (K .EQ. 2) GO TO 45	GAM 274
-	IF (IPSI .EQ. 2 .AND. I .GT. NW(1)) GO TO 46	GAM 275
	IF (IPSI .EQ. 1) GO TO 46	GAM 276
45	CONTINUE	GAM 277
	FCD = 1.	GAM 278
	IF (G(I,K) .LT. 0.) FCD = -1	GAM 279
	CTDS(I,K) = 2.*PI*G(I,K)*G(I,K)/CHD*FCD	GAM 280
46	CONTINUE	GAM 281
47	CONTINUE	GAM 282
48	RETURN	GAM 283
	END	GAM 284

	SUBROUTINE SPLINE (N,X,Y,A,B,C,D,LM,NP)	SPL 2
C	CUBIC SPLINE INTERPOLATION	SPL 3
	DIMENSION S(125), H(22), CA(22), X(1), Y(1)	SPL 4
	DIMENSION A(NP,20), B(NP,20), C(NP,20), D(NP,20)	SPL 5
	L =LM	SPL 6
	I=1	SPL 7
	NI=N+1	SPL 8
	N1=N-1	SPL 9
	H(NI)=0.	SPL 10
	H(1) = X(3) - X(2)	SPL 11
	H(2) = -X(3) + X(1)	SPL 12
	H(3) = X(2) - X(1)	SPL 13
	DO 1 K=4,N	SPL 14
1	H(K)=0.	SPL 15
	DO 2 K=1,N	SPL 16
2	S(K)=-H(K+1)/H(1)	SPL 17
	NJ=N-1	SPL 18
	DO 7 I=2,N	SPL 19
	IF (I.EQ. N) GO TO 3	SPL 20
	H(NI) = -6.*((Y(I+1) - Y(I)) / (X(I+1) - X(I)) - (Y(I) - Y(I-1)) /	SPL 21
1	(X(I) - X(I-1)))	SPL 22
	GO TO 4	SPL 23
3	H(NI)=0.	SPL 24
4	DO 6 J=1,N	SPL 25
	H(J)=0.	SPL 26
	IF (I.EQ. N) GO TO 5	SPL 27
	IF (J.LT. (I-1).OR. J.GT. (I+1)) GO TO 6	SPL 28
	H(I-1) = X(I) - X(I-1)	SPL 29
	H(I) = 2.* (X(I+1) - X(I-1))	SPL 30
	H(I+1) = X(I+1) - X(I)	SPL 31
	GO TO 6	SPL 32
5	H(N-2) = X(N) - X(N-1)	SPL 33
	H(N-1) = -X(N) + X(N-2)	SPL 34
	H(N) = X(N-1) - X(N-2)	SPL 35
6	CONTINUE	SPL 36
	II=I	SPL 37
	CALL VMSEQN (NJ,II,H,S,CA)	SPL 38
	NJ=NJ-1	SPL 39
7	CONTINUE	SPL 40
	DO 8 I=1,N1	SPL 41
	A(L,I) = (S(I+1) - S(I)) / (6. * (X(I+1) - X(I)))	SPL 42
	B(L,I) = S(I) / 2.	SPL 43
	C(L,I) = (Y(I+1) - Y(I)) / (X(I+1) - X(I)) - (X(I+1) - X(I)) * (2.*	SPL 44
	(S(I) + S(I+1)) / 6.	SPL 45
8	D(L,I) = Y(I)	SPL 46
	RETURN	SPL 47
	END	SPL 48

#### REFERENCES

1. Lan, C.E. and Chang, J.F., "Calculation of Vortex Lift Effect for Cambered Wings by the Suction Analogy", NASA CR-3449, 1981.
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16 Abstract  This report documents a user's guide to an improved version of Woodward's chord plane aerodynamic panel computer code which is applicable to cambered wings exhibiting edge-separated vortex flow, including those with leading-edge vortex flow at subsonic and supersonic speeds. Instead of assuming the rotated suction force to be normal to the wing surface at the leading edge, new orientations for the rotated suction force are employed based on the momentum principal. The supersonic suction analogy method is improved using an effective angle of attack defined through a semi-empirical method.					
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