USSAERO Version D
Computer Program Development
Using ANSI Standard FORTRAN 77
and DI-3000 Graphics

Michael R. Wiese

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USSAERO Version D
Computer Program Development
Using ANSI Standard FORTRAN 77
and DI-3000 Graphics

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Computer Sciences Corporation
Hampton, Virginia

Prepared for
Langley Research Center
under Contract NAS1-17999
The D00 version of the Unified Subsonic and Supersonic Aerodynamics Analysis (USSAERO) program is the result of numerous modifications and enhancements to the B01 version.

Both versions calculate the pressure distribution and aerodynamic characteristics of aeronautical configurations in subsonic and supersonic potential flow.

The changes which resulted in the D00 version include conversion to ANSI standard FORTRAN 77 and the DI-3000 graphics package; removal of the CDC overlay structure; adding an input data analyzer routine; increasing the number of fuselage, fin and canard segments; enhancing the computer code to include the analysis of multiple pods, pylons and finned external stores; and modifying the wing analysis code to allow for coplanar wings.
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**WING DEFINITION CARDS**

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**FUSELAGE SEGMENT DEFINITION CARDS**

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Section 1

INTRODUCTION

This FORTRAN 77 version (D00) of the Unified Subsonic and Supersonic Aerodynamic Analysis Computer Program (USSAERO) is the result of numerous enhancements to the B01 version.

These modifications include:

1) conversion to ANSI standard FORTRAN 77 and the DI-3000 graphics package
2) an input data error analysis routine
3) expanding the allowable number of fuselage, fin and canard segments
4) the analysis of multiple pods
5) enhancing the wing analysis to include coplanar wings
6) enabling the user to treat each aircraft component segment as a unique item
7) enhancing user control over the plotting capabilities
8) removal of the overlay structure

This report describes the D00 version program component limitations; presents the revised data input specifications and ordering; and gives a detailed description of every possible input card.

Appendix A describes the input and output files for version D00. Program features which are dependent upon the NASA Langley Research Center computer complex are presented in Appendix B. An example of the new input error analysis feature is shown in Appendix C and a comparison run between versions B01 and D00 is given in Appendix D.
Section 2

PROGRAM LIMITS

I. Aircraft components
   A. wing: maximum of one (1)
   B. fuselage: maximum of six (6)
   C. pod: maximum of six (6)
   D. fin: maximum of ten (10)
   E. canard: maximum of ten (10)

II. Body components (fuselages plus pods)
   A. axial stations: maximum of thirty (30)
   B. panels: maximum of six hundred (600)

III. Lifting surface components (wing plus fins plus canards)
   A. airfoil sections: maximum of twenty (20)
   B. panels: maximum of six hundred (600)

NOTE: if the non-planar boundary condition option is selected (LINBC = 0), then the total number of lifting surface panels will equal twice the number of lifting surface panels for the planar boundary condition option.
Section 3

INPUT SPECIFICATIONS AND ORDERING

This section is designed to aid the user in determining which input cards are required for a particular configuration and the order in which they must appear.

Every input deck to USSAERO is divided into two sections: the initial configuration geometry and the auxiliary input. The first section is the master description of the configuration's geometry and the second is the controller for the aerodynamic analysis.

The following charts present all possible input cards, their inclusion criteria, and their repetition factor.
## INPUT CARD REQUIREMENTS AND ORDER
### INITIAL CONFIGURATION GEOMETRY

<table>
<thead>
<tr>
<th>CARD/CARD CATEGORY</th>
<th>INCLUSION CRITERIA</th>
<th>REPETITION FACTOR</th>
</tr>
</thead>
<tbody>
<tr>
<td>TITLE</td>
<td>Mandatory</td>
<td></td>
</tr>
<tr>
<td>MAIN CONTROL</td>
<td>Mandatory</td>
<td></td>
</tr>
<tr>
<td>WING CONTROL</td>
<td>JWNG = 1 OR -1</td>
<td></td>
</tr>
<tr>
<td>FUSELAGE CONTROL</td>
<td>NFUS &gt; 0</td>
<td></td>
</tr>
<tr>
<td>POD CONTROL</td>
<td>NPOD &gt; 0</td>
<td></td>
</tr>
<tr>
<td>FIN CONTROL</td>
<td>NF &gt; 0</td>
<td></td>
</tr>
<tr>
<td>CANARD CONTROL</td>
<td>NCAN &gt; 0</td>
<td></td>
</tr>
<tr>
<td>REFERENCE AREA</td>
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### WING DEFINITION CARDS

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<tr>
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<th>JWNG = 1 OR -1</th>
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<tr>
<td>AIRFOIL ORDINATES' CHORD LOCATIONS</td>
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</tr>
<tr>
<td>AIRFOILS' ORIGIN/CHORD LENGTH</td>
<td>Mandatory</td>
</tr>
<tr>
<td>MEAN CAMBER LINES</td>
<td>JWNG = 1</td>
</tr>
<tr>
<td>ORDINATES (upper)</td>
<td>Mandatory</td>
</tr>
<tr>
<td>ORDINATES (lower)</td>
<td>NWAF &lt; 0</td>
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<tr>
<td>-------------------------------------------</td>
<td>--------------------</td>
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</tr>
<tr>
<td>CAMBER LINE ORDINATES</td>
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<td>Y-ORDINATES</td>
<td>J2TEST = 3</td>
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<tr>
<td>Z-ORDINATES</td>
<td>J2TEST = 3</td>
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<tr>
<td>CROSS-SECTIONAL AREAS</td>
<td>J2TEST = 1 or 2</td>
</tr>
<tr>
<td>POD SEGMENT DEFINITION CARDS</td>
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<tr>
<td>X-ORDINATES</td>
<td>Mandatory</td>
</tr>
<tr>
<td>Y-ORDINATES</td>
<td>J3TEST = -1 or 1</td>
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<tr>
<td>Z-ORDINATES</td>
<td>J3TEST = -1 or 1</td>
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<tr>
<td>CROSS-SECTIONAL AREAS</td>
<td>J3TEST = 0</td>
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<tr>
<td>AIRFOILS' ORIGIN/CHORD LENGTH</td>
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<tr>
<td>AIRFOIL ORDINATES' CHORD LOCATIONS</td>
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<tr>
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## INPUT CARD REQUIREMENTS AND ORDER (cont.)

**INITIAL CONFIGURATION GEOMETRY**

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<th>REPETITION FACTOR</th>
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<td>AIRFOIL ORDINATES' CHORD LOCATIONS</td>
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<td>NCAN times</td>
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<td>ORDINATES (lower)</td>
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<td>until KDE = 1</td>
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# INPUT CARD REQUIREMENTS AND ORDER (cont.)

## AUXILIARY INPUT

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<td>CONTROL</td>
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<tr>
<td>FUSELAGE CONTROL</td>
<td>NFUS &gt; 0, K2 &lt; 0</td>
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<tr>
<td>POD CONTROL</td>
<td>NP0D &gt; 0, K3 &lt; 0</td>
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<tr>
<td>FIN CONTROL</td>
<td>NF &gt; 0, K4 &lt; 0</td>
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<td>CANARD LEADING-EDGE CONTROL</td>
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<td>JWNG = 1 OR -1, K1 &lt; 0 OR K1 = 3</td>
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<td>RADII</td>
<td>K1 = ± 3</td>
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## INPUT CARD REQUIREMENTS AND ORDER (cont.)

### AUXILIARY INPUT

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<td><strong>MERIDIAN ANGLES</strong></td>
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<td><strong>X-ORDINATES</strong></td>
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<td><strong>Y-ORDINATES</strong></td>
<td>KAN &gt; 0</td>
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<tr>
<td><strong>PLOT CARDS</strong></td>
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<td>until KODE = 1</td>
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### AUXILIARY INPUT

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<tr>
<td>NOTE: if MACH = -1.0 then omit all</td>
<td></td>
<td></td>
</tr>
<tr>
<td>of the following cards</td>
<td></td>
<td></td>
</tr>
<tr>
<td>PRESSURE PLOT CONTROL</td>
<td>MPLOT = -1</td>
<td></td>
</tr>
<tr>
<td>FUSELAGE PRESSURE CONTROL</td>
<td>KPLOTB = -1</td>
<td></td>
</tr>
<tr>
<td>POD PRESSURE CONTROL</td>
<td>KPLOTP = -1</td>
<td></td>
</tr>
<tr>
<td>FIN PRESSURE CONTROL</td>
<td>KPLOTF = -1</td>
<td></td>
</tr>
<tr>
<td>CANARD PRESSURE CONTROL</td>
<td>KPLOTC = -1</td>
<td></td>
</tr>
<tr>
<td>NORMAL VELOCITY INPUT</td>
<td>NORVEL = 1.0</td>
<td></td>
</tr>
<tr>
<td>FIELD POINT</td>
<td>FLDPTS &gt; 0.0</td>
<td>FLDPTS times</td>
</tr>
<tr>
<td>TERMINATION</td>
<td>Mandatory</td>
<td></td>
</tr>
</tbody>
</table>
Section 4

INPUT CARDS

This section presents all possible input cards in the order which they must appear (if used). Each chart lists the input variable/variables name, allowable value(s), card columns where variable must go, and a description of the variable. Note that the card identifier label which goes in columns 73 through 80 is optional.
## INITIAL CONFIGURATION GEOMETRY INPUT
**TITLE CARD**

<table>
<thead>
<tr>
<th>COLUMNS</th>
<th>VARIABLE</th>
<th>VALUE</th>
<th>DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 + 70</td>
<td>TITLE1</td>
<td>Alphanumeric</td>
<td>Identifying Information</td>
</tr>
<tr>
<td>73 + 80</td>
<td>TITLEA</td>
<td>Card identifier</td>
<td></td>
</tr>
</tbody>
</table>
### INITIAL CONFIGURATION GEOMETRY INPUT

#### WING CONTROL CARD

*(omit if JWNG=0)*

<table>
<thead>
<tr>
<th>COLUMNS</th>
<th>VARIABLE</th>
<th>VALUE</th>
<th>DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 + 3</td>
<td>NWAF</td>
<td>2 + 20</td>
<td>Number of wing airfoil sections</td>
</tr>
<tr>
<td>4 + 6</td>
<td>NWAFOR</td>
<td>±3 + ±30</td>
<td>Number of ordinates used to define each wing airfoil section. If NWAFOR is negative then upper and lower ordinates must be input.</td>
</tr>
<tr>
<td>73 + 80</td>
<td>WCNTRL</td>
<td></td>
<td>Card identifier</td>
</tr>
</tbody>
</table>
## INITIAL CONFIGURATION GEOMETRY INPUT

**FUSELAGE CONTROL CARD**

(omit if NFUS=0)

<table>
<thead>
<tr>
<th>COLUMNS</th>
<th>VARIABLE</th>
<th>VALUE</th>
<th>DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 + 3</td>
<td>J2TEST (1)</td>
<td>1</td>
<td>Circular shape for first fuselage</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2</td>
<td>Circular cambered shape for first fuselage</td>
</tr>
<tr>
<td></td>
<td></td>
<td>3</td>
<td>Arbitrary shape for first fuselage</td>
</tr>
<tr>
<td>4 + 6</td>
<td>NRADX (1)</td>
<td>3 + 20</td>
<td>Number of meridian lines used to define panel edges of first fuselage</td>
</tr>
<tr>
<td>7 + 9</td>
<td>NFORX (1)</td>
<td>2 + 30</td>
<td>Number of axial stations for first fuselage</td>
</tr>
<tr>
<td>10 + 12</td>
<td>J2TEST (2)</td>
<td>0, 1, 2, 3</td>
<td>Second fuselage</td>
</tr>
<tr>
<td>13 + 15</td>
<td>NRADX (2)</td>
<td>0, 3 + 20</td>
<td>Second fuselage</td>
</tr>
<tr>
<td>16 + 18</td>
<td>NFORX (2)</td>
<td>0, 2 + 30</td>
<td>Second fuselage</td>
</tr>
<tr>
<td>19 + 21</td>
<td>J2TEST (3)</td>
<td>0, 1, 2, 3</td>
<td>Third fuselage</td>
</tr>
<tr>
<td>22 + 24</td>
<td>NRADX (3)</td>
<td>0, 3 + 20</td>
<td>Third fuselage</td>
</tr>
<tr>
<td>25 + 27</td>
<td>NFORX (3)</td>
<td>0, 2 + 30</td>
<td>Third fuselage</td>
</tr>
<tr>
<td>28 + 30</td>
<td>J2TEST (4)</td>
<td>0, 1, 2, 3</td>
<td>Fourth fuselage</td>
</tr>
<tr>
<td>31 + 33</td>
<td>NRADX (4)</td>
<td>0, 3 + 20</td>
<td>Fourth fuselage</td>
</tr>
<tr>
<td>34 + 36</td>
<td>NFORX (4)</td>
<td>0, 2 + 30</td>
<td>Fourth fuselage</td>
</tr>
</tbody>
</table>
**INITIAL CONFIGURATION GEOMETRY INPUT**

**FUSELAGE CONTROL CARD (cont.)**

<table>
<thead>
<tr>
<th>COLUMNS</th>
<th>VARIABLE</th>
<th>VALUE</th>
<th>DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>37 + 39</td>
<td>J2TEST(5)</td>
<td>0, 1, 2, 3</td>
<td>Fifth fuselage</td>
</tr>
<tr>
<td>40 + 42</td>
<td>NRADX(5)</td>
<td>0, 3 + 20</td>
<td>Fifth fuselage</td>
</tr>
<tr>
<td>43 + 45</td>
<td>NFORX(5)</td>
<td>0, 2 + 30</td>
<td>Fifth fuselage</td>
</tr>
<tr>
<td>46 + 48</td>
<td>J2TEST(6)</td>
<td>0, 1, 2, 3</td>
<td>Sixth fuselage</td>
</tr>
<tr>
<td>49 + 51</td>
<td>NRADX(6)</td>
<td>0, 3 + 20</td>
<td>Sixth fuselage</td>
</tr>
<tr>
<td>52 + 54</td>
<td>NFORX(6)</td>
<td>0, 2 + 30</td>
<td>Sixth fuselage</td>
</tr>
<tr>
<td>73 + 80</td>
<td>---</td>
<td>FCNTRL</td>
<td>Card identifier</td>
</tr>
</tbody>
</table>
**INITIAL CONFIGURATION GEOMETRY INPUT**

**POD CONTROL CARD**

(omit if NPOM = 0)

<table>
<thead>
<tr>
<th>COLUMNS</th>
<th>VARIABLE</th>
<th>VALUE</th>
<th>DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 + 3</td>
<td>J3TEST (1)</td>
<td>-1</td>
<td>Completely arbitrary shape for first pod</td>
</tr>
<tr>
<td></td>
<td></td>
<td>0</td>
<td>Circular shape for first pod</td>
</tr>
<tr>
<td></td>
<td></td>
<td>1</td>
<td>Axis-symmetric arbitrary shape for first pod</td>
</tr>
<tr>
<td>4 + 6</td>
<td>NPRADX (1)</td>
<td>3 + 10</td>
<td>Number of meridian lines used to define panel edges of first pod</td>
</tr>
<tr>
<td></td>
<td></td>
<td>3 + 20</td>
<td>If J3TEST = 0 or -1</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>If J3TEST = 1</td>
</tr>
<tr>
<td>7 + 9</td>
<td>NPORX (1)</td>
<td>2 + 30</td>
<td>Number of axial stations for first pod</td>
</tr>
<tr>
<td>10 + 12</td>
<td>J3TEST (2)</td>
<td>-1, 0, 1</td>
<td>Second pod</td>
</tr>
<tr>
<td>13 + 15</td>
<td>NPRADX (2)</td>
<td>0, 3 + 10, 3 + 20</td>
<td>Second pod</td>
</tr>
<tr>
<td>16 + 18</td>
<td>NPORX (2)</td>
<td>0, 2 + 30</td>
<td>Second pod</td>
</tr>
<tr>
<td>19 + 21</td>
<td>J3TEST (3)</td>
<td>-1, 0, 1</td>
<td>Third pod</td>
</tr>
<tr>
<td>22 + 24</td>
<td>NPRADX (3)</td>
<td>0, 3 + 10, 3 + 20</td>
<td>Third pod</td>
</tr>
<tr>
<td>25 + 27</td>
<td>NPORX (3)</td>
<td>0, 2 + 30</td>
<td>Third pod</td>
</tr>
<tr>
<td>28 + 30</td>
<td>J3TEST (4)</td>
<td>-1, 0, 1</td>
<td>Fourth pod</td>
</tr>
<tr>
<td>31 + 33</td>
<td>NPRADX (4)</td>
<td>0, 3 + 10, 3 + 20</td>
<td>Fourth pod</td>
</tr>
</tbody>
</table>
### INITIAL CONFIGURATION GEOMETRY INPUT
### POD CONTROL CARD (cont.)

<table>
<thead>
<tr>
<th>COLUMNS</th>
<th>VARIABLE</th>
<th>VALUE</th>
<th>DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>34-36</td>
<td>NPORX (4)</td>
<td>0, 2 + 30</td>
<td>Fourth pod</td>
</tr>
<tr>
<td>37-39</td>
<td>JTEST (5)</td>
<td>-1, 0, 1</td>
<td>Fifth pod</td>
</tr>
<tr>
<td>40-42</td>
<td>NPRADX (5)</td>
<td>0, 3 + 10, 3 + 20</td>
<td>Fifth pod</td>
</tr>
<tr>
<td>43-45</td>
<td>NPORX (5)</td>
<td>0, 2 + 30</td>
<td>Fifth pod</td>
</tr>
<tr>
<td>46-48</td>
<td>JTEST (6)</td>
<td>-1, 0, 1</td>
<td>Sixth pod</td>
</tr>
<tr>
<td>49-51</td>
<td>NPRADX (6)</td>
<td>0, 3 + 10, 3 + 20</td>
<td>Sixth pod</td>
</tr>
<tr>
<td>52-54</td>
<td>NPORX (6)</td>
<td>0, 2 + 30</td>
<td>Sixth pod</td>
</tr>
<tr>
<td>73-80</td>
<td>PCNTRL</td>
<td></td>
<td>Card identifier</td>
</tr>
<tr>
<td>COLUNMS</td>
<td>VARIABLE</td>
<td>VALUE</td>
<td>DESCRIPTION</td>
</tr>
<tr>
<td>---------</td>
<td>----------</td>
<td>-------</td>
<td>-------------</td>
</tr>
<tr>
<td>1 + 3</td>
<td>NFINOR 1</td>
<td>3 + 30</td>
<td>Number of ordinates used to define each airfoil section for first fin</td>
</tr>
<tr>
<td>4 + 6</td>
<td>NFINOR 2</td>
<td>0, 3 + 30</td>
<td>Second fin</td>
</tr>
<tr>
<td>7 + 9</td>
<td>NFINOR 3</td>
<td>0, 3 + 30</td>
<td>Third fin</td>
</tr>
<tr>
<td>10 + 12</td>
<td>NFINOR 4</td>
<td>0, 3 + 30</td>
<td>Fourth fin</td>
</tr>
<tr>
<td>13 + 15</td>
<td>NFINOR 5</td>
<td>0, 3 + 30</td>
<td>Fifth fin</td>
</tr>
<tr>
<td>16 + 18</td>
<td>NFINOR 6</td>
<td>0, 3 + 30</td>
<td>Sixth fin</td>
</tr>
<tr>
<td>19 + 21</td>
<td>NFINOR 7</td>
<td>0, 3 + 30</td>
<td>Seventh fin</td>
</tr>
<tr>
<td>22 + 24</td>
<td>NFINOR 8</td>
<td>0, 3 + 30</td>
<td>Eighth fin</td>
</tr>
<tr>
<td>25 + 27</td>
<td>NFINOR 9</td>
<td>0, 3 + 30</td>
<td>Ninth fin</td>
</tr>
<tr>
<td>28 + 30</td>
<td>NFINOR 10</td>
<td>0, 3 + 30</td>
<td>Tenth fin</td>
</tr>
<tr>
<td>73 + 80</td>
<td>FINCR</td>
<td></td>
<td>Card identifier</td>
</tr>
</tbody>
</table>
**INITIAL CONFIGURATION GEOMETRY INPUT**

**CANARD CONTROL CARD**

(omit if NCAN = 0)

<table>
<thead>
<tr>
<th>COLUMNS</th>
<th>VARIABLE</th>
<th>VALUE</th>
<th>DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 + 3</td>
<td>NCANOR (1)</td>
<td>±3 ±±30</td>
<td>Number of ordinates used to define each airfoil section for first canard.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>If NCANOR is negative then upper and lower ordinates must be input.</td>
</tr>
<tr>
<td>4 + 6</td>
<td>NCANOR (2)</td>
<td>0, ±3 ±±30</td>
<td>Second canard</td>
</tr>
<tr>
<td>7 + 9</td>
<td>NCANOR (3)</td>
<td>0, ±3 ±±30</td>
<td>Third canard</td>
</tr>
<tr>
<td>10 + 12</td>
<td>NCANOR (4)</td>
<td>0, ±3 ±±30</td>
<td>Fourth canard</td>
</tr>
<tr>
<td>13 + 15</td>
<td>NCANOR (5)</td>
<td>0, ±3 ±±30</td>
<td>Fifth canard</td>
</tr>
<tr>
<td>16 + 18</td>
<td>NCANOR (6)</td>
<td>0, ±3 ±±30</td>
<td>Sixth canard</td>
</tr>
<tr>
<td>19 + 21</td>
<td>NCANOR (7)</td>
<td>0, ±3 ±±30</td>
<td>Seventh canard</td>
</tr>
<tr>
<td>22 + 24</td>
<td>NCANOR (8)</td>
<td>0, ±3 ±±30</td>
<td>Eighth canard</td>
</tr>
<tr>
<td>25 + 27</td>
<td>NCANOR (9)</td>
<td>0, ±3 ±±30</td>
<td>Ninth canard</td>
</tr>
<tr>
<td>28 + 30</td>
<td>NCANOR (10)</td>
<td>0, ±3 ±±30</td>
<td>Tenth canard</td>
</tr>
<tr>
<td>73 + 80</td>
<td>----</td>
<td>CANCRL</td>
<td>Card identifier</td>
</tr>
<tr>
<td>COL</td>
<td>VNAME</td>
<td>VALUE</td>
<td>DESCRIPTION</td>
</tr>
<tr>
<td>----</td>
<td>-------</td>
<td>-------</td>
<td>-------------</td>
</tr>
<tr>
<td>1 + 7</td>
<td>REFA</td>
<td>real</td>
<td>Wing reference area</td>
</tr>
<tr>
<td>73 + 80</td>
<td></td>
<td></td>
<td>Card identifier</td>
</tr>
</tbody>
</table>
INITIAL CONFIGURATION GEOMETRY INPUT
WING DEFINITION CARDS
AIRFOIL ORDINATES' CHORD LOCATIONS
(omit if JWNG = 0)

<table>
<thead>
<tr>
<th>COLUMNS</th>
<th>VARIABLE</th>
<th>VALUE</th>
<th>DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 - 7</td>
<td>XAF</td>
<td>0.0 - 100.0</td>
<td>NWAFOR values describing the locations in percent chord at which the ordinates of all wing airfoils are to be specified. Each card contains up to 10 values, each value input in a 7-column field width as a real number. The order of input is wing leading-edge to trailing edge.</td>
</tr>
<tr>
<td>8 - 14</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>etc.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>73 - 80</td>
<td>----</td>
<td>XAFj</td>
<td>Card identifier, j is the card repetition number</td>
</tr>
</tbody>
</table>
## INITIAL CONFIGURATION GEOMETRY INPUT

**WING DEFINITION CARDS (cont.)**

**AIRFOILS' ORIGIN/CHORD LENGTH**

(omit if JWNG = 0)

<table>
<thead>
<tr>
<th>COLUMNS</th>
<th>VARIABLE</th>
<th>VALUE</th>
<th>DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 + 7</td>
<td>WAFORGX</td>
<td>real</td>
<td>X-ordinate of airfoil leading-edge</td>
</tr>
<tr>
<td>8 + 14</td>
<td>WAFORGY</td>
<td>real</td>
<td>Y-ordinate of airfoil leading-edge</td>
</tr>
<tr>
<td>15 + 21</td>
<td>WAFORGZ</td>
<td>real</td>
<td>Z-ordinate of airfoil leading-edge</td>
</tr>
<tr>
<td>22 + 28</td>
<td>WAFORGC</td>
<td>real</td>
<td>Airfoil streamwise chord length</td>
</tr>
<tr>
<td>73 + 80</td>
<td>WAFORKj</td>
<td></td>
<td>Card identifier, j is the airfoil number</td>
</tr>
</tbody>
</table>

**NOTE:** Repeat this AIRFOILS' ORIGIN/CHORD LENGTH process NWAF times, order of input is inboard airfoil to outboard airfoil
## Initial Configuration Geometry Input

**WING Definition Cards (cont.)**

**Mean Camber Lines**

*(omit if JWNG = 0 or if JWNG = -1)*

<table>
<thead>
<tr>
<th>Columns</th>
<th>Variable</th>
<th>Value</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 - 7</td>
<td>TZORD</td>
<td>real</td>
<td>NWAFOR values of delta Z referenced to the Z-ordinate of the airfoil leading edge, each value corresponding to a specified percent chord location on the airfoil. Each card contains up to 10 values, each value input in a 7-column field width as a real number. The order of input is wing leading-edge to trailing-edge.</td>
</tr>
<tr>
<td>8 - 14</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>etc.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>73 - 80</td>
<td>---</td>
<td>TZORDjk</td>
<td>Card identifier, j is the airfoil number, k is the card repetition number</td>
</tr>
</tbody>
</table>

**Note:** Repeat this MEAN CAMBER LINES process NWAF times; order of input is inboard airfoil to outboard airfoil.
INITIAL CONFIGURATION GEOMETRY INPUT
WING DEFINITION CARDS (cont.)
ORDINATES
(omit if JWNG = 0)

<table>
<thead>
<tr>
<th>COLUMNS</th>
<th>VARIABLE</th>
<th>VALUE</th>
<th>DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 + 7</td>
<td>WAFORD</td>
<td>0.0</td>
<td>NWAFOR values of airfoil half-thickness expressed as percent chord, each value</td>
</tr>
<tr>
<td>8 + 14</td>
<td></td>
<td>100.0</td>
<td>corresponding to a specified percent chord location on the airfoil. Each card contains</td>
</tr>
<tr>
<td>etc.</td>
<td></td>
<td></td>
<td>up to 10 values, each value input in a 7-column field width as a real number. The order of input is wing leading edge to</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>trailing-edge.</td>
</tr>
<tr>
<td>73 + 80</td>
<td></td>
<td></td>
<td>Card identifier, j is the airfoil number, k is the card repetition number</td>
</tr>
</tbody>
</table>

NOTE: If NWAFOR < 0, repeat this ORDINATES process for the lower wing

NOTE: Repeat this ORDINATES process NWAF times, order of input is inboard airfoil to outboard airfoil
INITIAL CONFIGURATION GEOMETRY INPUT
FIRST FUSELAGE SEGMENT DEFINITION CARDS
X-ORDINATES
(omit if NFUS = 0)

<table>
<thead>
<tr>
<th>COLUMNS</th>
<th>VARIABLE</th>
<th>VALUE</th>
<th>DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 + 7</td>
<td>XFUS</td>
<td>real</td>
<td>NFORX values of the X-ordinates of the fuselage stations. Each card contains up to 10 values, each value input in a 7-column field width as a real number. The order of input is minimum X-ordinate to maximum.</td>
</tr>
<tr>
<td>8 + 14</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>etc.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>73 + 80</td>
<td>-----</td>
<td>XFUSjk</td>
<td>Card identifier, j is the fuselage segment number, k is the card repetition number</td>
</tr>
</tbody>
</table>


<table>
<thead>
<tr>
<th>Columns</th>
<th>Variable</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 + 7</td>
<td>ZFUS</td>
<td>Card identifier, ( j ) is the fuselage segment number, ( k ) is the card repetition number</td>
</tr>
<tr>
<td>8 + 14</td>
<td>etc.</td>
<td>Card Identifier, ( j ) is the fuselage segment number, ( k ) is the card repetition number</td>
</tr>
</tbody>
</table>

The \( ZFUS \) values correspond to \( X \)-ordinate fuselage station. Each card contains up to 10 \( ZFUS \) values, each value input in a 7-column field width as a real number.
INITIAL CONFIGURATION GEOMETRY INPUT
FIRST FUSELAGE SEGMENT DEFINITION CARDS (cont.)
Y and Z-ORDINATES
(omit if NFUS = 0 or if J2TEST = 1 or 2)

<table>
<thead>
<tr>
<th>COLUMNS</th>
<th>VARIABLE</th>
<th>VALUE</th>
<th>DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 + 7</td>
<td>SFUS</td>
<td>real</td>
<td>NRADX values of the Y-ordinates of the first X-ordinate fuselage station. Each card contains up to 10 values, each value input in a 7-column field width as a real number. Order of input is bottom of fuselage to top.</td>
</tr>
<tr>
<td>8 + 14</td>
<td>(card 1)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>etc.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>73 + 80</td>
<td>----</td>
<td>YFjkl</td>
<td>Card identifier, j is the fuselage segment number, k is the fuselage station number, l is the card repetition number.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1 + 7</td>
<td>SFUS</td>
<td>real</td>
<td>NRADX values of the Z-ordinates of the first X-ordinate fuselage station</td>
</tr>
<tr>
<td>8 + 14</td>
<td>(card 2)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>etc.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>73 + 80</td>
<td>----</td>
<td>ZFjkl</td>
<td>Card identifier, j is the fuselage segment number, k is the fuselage station number, l is the card repetition number.</td>
</tr>
</tbody>
</table>

NOTE: Repeat this Y and Z-ORDINATES pairing process NFORX times
### INITIAL CONFIGURATION GEOMETRY INPUT
FIRST FUSELAGE SEGMENT DEFINITION CARDS (cont.)
CROSS-SECTIONAL AREAS
(omit if NFUS = 0 or if J2TEST = 3)

<table>
<thead>
<tr>
<th>COLUMNS</th>
<th>VARIABLE</th>
<th>VALUE</th>
<th>DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 + 7</td>
<td>FUSARD</td>
<td>real</td>
<td>NFORX values of cross-sectional area, each value corresponding to a X-ordinate fuselage station. Each card contains up to 10 values, each value input in a 7-column field width as a real number.</td>
</tr>
<tr>
<td>8 + 14</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>etc.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>73 + 80</td>
<td>FUSARjk</td>
<td></td>
<td>Card identifier, j is the fuselage segment number, k is the card repetition number</td>
</tr>
</tbody>
</table>

NOTE: Repeat this FUSELAGE SEGMENT DEFINITION CARDS process NFUS times
INITIAL CONFIGURATION GEOMETRY INPUT
FIRST POD SEGMENT DEFINITION CARDS
ORIGIN
(omit if NPOD = 0)

<table>
<thead>
<tr>
<th>COLUMNS</th>
<th>VARIABLE</th>
<th>VALUE</th>
<th>DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 + 7</td>
<td>PODORGX</td>
<td>real</td>
<td>X-ordinate of origin</td>
</tr>
<tr>
<td>8 + 14</td>
<td>PODORGY</td>
<td>real</td>
<td>Y-ordinate of origin</td>
</tr>
<tr>
<td>15 + 21</td>
<td>PODORGZ</td>
<td>real</td>
<td>Z-ordinate of origin</td>
</tr>
<tr>
<td>73 + 80</td>
<td>PODORGj</td>
<td></td>
<td>Card identifier, j is the pod segment number</td>
</tr>
</tbody>
</table>
INITIAL CONFIGURATION GEOMETRY INPUT
FIRST POD SEGMENT DEFINITION CARDS (cont.)
X-ORDINATES
(omit if NPOD = 0)

<table>
<thead>
<tr>
<th>COLUMNS</th>
<th>VARIABLE</th>
<th>VALUE</th>
<th>DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 + 7</td>
<td>XPOD</td>
<td>real</td>
<td>NPORX values of the X-ordinates of the pod stations referenced to the pod origin. Each card contains up to 10 values, each value input in a 7-column field width as a real number. The order of input is minimum X-ordinate to maximum, where the first value is 0.0 and the last is the pod length.</td>
</tr>
<tr>
<td>8 + 14</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>etc.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>73 + 80</td>
<td>XPODjk</td>
<td></td>
<td>Card identifier, j is the pod segment, k is the card repetition number</td>
</tr>
</tbody>
</table>

---
INITIAL CONFIGURATION GEOMETRY INPUT
FIRST POD SEGMENT DEFINITION CARDS (cont.)
Y and Z-ORDINATES
(omit if NPOD = 0 or if J3TEST = 0)

<table>
<thead>
<tr>
<th>COLUMNS</th>
<th>VARIABLE</th>
<th>VALUE</th>
<th>DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 + 7</td>
<td>SPOD</td>
<td>real</td>
<td>NPRADX values of the Y-ordinates (referenced to the pod origin)</td>
</tr>
<tr>
<td>8 + 14</td>
<td>(card 1)</td>
<td></td>
<td>X-ordinate pod station. Each card contains up to 10 values, each value input in a 7-column field width as a real number. Order of input is bottom of pod to top.</td>
</tr>
<tr>
<td>etc.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>73 + 80</td>
<td>-----</td>
<td>YPjkl</td>
<td>Card identifier, j is the pod segment number, k is the pod station number, l is the card repetition number</td>
</tr>
<tr>
<td>1 + 7</td>
<td>SPOD</td>
<td>real</td>
<td>NPRADX values of the Z-ordinates (referenced to the pod origin) of the first X-ordinate station.</td>
</tr>
<tr>
<td>8 + 14</td>
<td>(card 2)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>73 + 80</td>
<td>-----</td>
<td>ZPjkl</td>
<td>Card identifier, j is the pod segment number, k is the pod station number, l is the card repetition number</td>
</tr>
</tbody>
</table>

NOTE: Repeat this Y and Z-ORDINATES pairing process NPORX times
### Cross-Sectional Areas

(omit if NPOD = 0 or if J3TEST = 1 or -1)

<table>
<thead>
<tr>
<th>COLUMNs</th>
<th>VARIABLE</th>
<th>VALUE</th>
<th>DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 + 7</td>
<td>PODARD</td>
<td>real</td>
<td>NPORX values of cross-sectional area, each value corresponding to a X-ordinate pod station. Each card contains up to 10 values, each value input in a 7-column field width as a real number.</td>
</tr>
<tr>
<td>8 + 14</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>etc.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>73 + 80</td>
<td>PODARjk</td>
<td></td>
<td>Card identifier, j is the pod segment number, k is the card repetition number</td>
</tr>
</tbody>
</table>

**Note:** Repeat this POD SEGMENT DEFINITION CARDS process NPOD times.
### INITIAL CONFIGURATION GEOMETRY INPUT

**FIRST FIN SEGMENT DEFINITION CARDS**

**AIRFOILS' ORIGIN/CHORD LENGTH**

(omit if NF = 0)

<table>
<thead>
<tr>
<th>COLUMN</th>
<th>VARIABLE</th>
<th>VALUE</th>
<th>DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 + 7</td>
<td>FINIX</td>
<td>real</td>
<td>X-ordinate of inboard airfoil leading-edge</td>
</tr>
<tr>
<td>8 + 14</td>
<td>FINY</td>
<td>real</td>
<td>Y-ordinate of inboard airfoil leading-edge</td>
</tr>
<tr>
<td>15 + 21</td>
<td>FINIZ</td>
<td>real</td>
<td>Z-ordinate of inboard airfoil leading-edge</td>
</tr>
<tr>
<td>22 + 28</td>
<td>FINIC</td>
<td>real</td>
<td>Chord length of inboard airfoil</td>
</tr>
<tr>
<td>29 + 35</td>
<td>FINOX</td>
<td>real</td>
<td>X-ordinate of outboard airfoil leading-edge</td>
</tr>
<tr>
<td>36 + 42</td>
<td>FINOY</td>
<td>real</td>
<td>Y-ordinate of outboard airfoil leading-edge</td>
</tr>
<tr>
<td>43 + 49</td>
<td>FINOZ</td>
<td>real</td>
<td>Z-ordinate of outboard airfoil leading-edge</td>
</tr>
<tr>
<td>50 + 56</td>
<td>FINOC</td>
<td>real</td>
<td>Chord length of outboard airfoil</td>
</tr>
<tr>
<td>73 + 80</td>
<td>FINORGj</td>
<td></td>
<td>Card identifier, j is the fin segment number</td>
</tr>
</tbody>
</table>
INITIAL CONFIGURATION GEOMETRY INPUT
FIRST FIN SEGMENT DEFINITION CARDS (cont.)
AIRFOIL ORDINATES' CHORD LOCATIONS
(omit if NF = 0)

<table>
<thead>
<tr>
<th>COLUMNS</th>
<th>VARIABLE</th>
<th>VALUE</th>
<th>DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 + 7</td>
<td>XFIN</td>
<td>0.0 → 100.0</td>
<td>NFINOR values describing the locations in percent chord at which the fin airfoil ordinates are to be specified. Each card contains up to 10 values, each value input in a 7-column field width as a real number. The order of input is fin leading-edge to trailing-edge.</td>
</tr>
<tr>
<td>8 + 14</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>etc.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>73 + 80</td>
<td>______</td>
<td>XFINjk</td>
<td>Card identifier, j is the fin segment number, k is the card repetition number</td>
</tr>
</tbody>
</table>


INITIAL CONFIGURATION GEOMETRY INPUT
FIRST FIN SEGMENT DEFINITION CARDS (cont.)
ORDINATES
(omit if NF = 0)

<table>
<thead>
<tr>
<th>COLUMNS</th>
<th>VARIABLE</th>
<th>VALUE</th>
<th>DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 + 7</td>
<td>FINORD</td>
<td>0.0 + 100.0</td>
<td>NFINOR values of airfoil half-thickness expressed as percent chord, each value corresponding to a specific percent chord location on the airfoil. Each card contains up to 10 values, each value input in a 7-column field width as a real number. The order of input is fin leading-edge to trailing-edge.</td>
</tr>
<tr>
<td>8 + 14</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>etc.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>73 + 80</td>
<td>----</td>
<td>FINORDjk</td>
<td>Card identifier, j is the fin segment number, k is the card repetition number</td>
</tr>
</tbody>
</table>

NOTE: Repeat this FIN SEGMENT DEFINITION CARDS process NF times
### INITIAL CONFIGURATION GEOMETRY INPUT

**FIRST CANARD SEGMENT DEFINITION CARDS**

**AIRFOILS' ORIGIN/CHORD LENGTH**

(omit if NCAN = 0)

<table>
<thead>
<tr>
<th>COLUMNS</th>
<th>VARIABLE</th>
<th>VALUE</th>
<th>DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 + 7</td>
<td>CANIX</td>
<td>real</td>
<td>X-ordinate of inboard airfoil leading-edge</td>
</tr>
<tr>
<td>8 + 14</td>
<td>CANIY</td>
<td>real</td>
<td>Y-ordinate of inboard airfoil leading-edge</td>
</tr>
<tr>
<td>15 + 21</td>
<td>CANIZ</td>
<td>real</td>
<td>Z-ordinate of inboard airfoil leading-edge</td>
</tr>
<tr>
<td>22 + 28</td>
<td>CANIC</td>
<td>real</td>
<td>Chord length of inboard airfoil</td>
</tr>
<tr>
<td>29 + 35</td>
<td>CANOX</td>
<td>real</td>
<td>X-ordinate of outboard airfoil leading-edge</td>
</tr>
<tr>
<td>36 + 42</td>
<td>CANOY</td>
<td>real</td>
<td>Y-ordinate of outboard airfoil leading-edge</td>
</tr>
<tr>
<td>43 + 49</td>
<td>CANOZ</td>
<td>real</td>
<td>Z-ordinate of outboard airfoil leading-edge</td>
</tr>
<tr>
<td>50 + 56</td>
<td>CANOC</td>
<td>real</td>
<td>Chord length of outboard airfoil</td>
</tr>
<tr>
<td>73 + 80</td>
<td>---</td>
<td>CANORGj</td>
<td>Card identifier, j is the canard segment number</td>
</tr>
</tbody>
</table>
INITIAL CONFIGURATION GEOMETRY INPUT
FIRST CANARD SEGMENT DEFINITION CARDS (cont.)
AIRFOIL ORDINATES' CHORD LOCATIONS
(omit if NCAN = 0)

<table>
<thead>
<tr>
<th>COLUMNS</th>
<th>VARIABLE</th>
<th>VALUE</th>
<th>DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 + 7</td>
<td>XCAN</td>
<td>0.0 - 100.0</td>
<td>NCANOR values describing the locations in percent chord at which the canard airfoil ordinates are to be specified. Each card contains up to 10 values, each input in a 7-column field width as a real number. The order of input is canard leading-edge to trailing-edge.</td>
</tr>
<tr>
<td>8 + 14</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>etc.</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

| 73 + 80 | ---     | XCANjk  | Card identifier, j is the canard segment number, k is the card repetition number |
|         |         |         |             |
**INITIAL CONFIGURATION GEOMETRY INPUT**

**FIRST CANARD SEGMENT DEFINITION CARDS (cont.)**

**ORDINATES**

(omit if NCAN = 0)

<table>
<thead>
<tr>
<th>COLUMNS</th>
<th>VARIABLE</th>
<th>VALUE</th>
<th>DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 + 7</td>
<td>CANORD</td>
<td>0.0 + 100.0</td>
<td>NCANOR values of airfoil half-thickness expressed as percent chord, each value corresponding to a specific percent chord location on the airfoil. Each card up to 10 values, each value input in a 7-column field width as a real number. The order of input is canard leading-edge to trailing-edge.</td>
</tr>
<tr>
<td>8 + 14</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>etc.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>73 + 80</td>
<td>---</td>
<td>CANORDjk</td>
<td>Card identifier, j is the canard segment number, k is the card repetition number</td>
</tr>
</tbody>
</table>

**NOTE:** If NCANOR < 0, repeat this ORDINATES process for the lower part of the canard

**NOTE:** Repeat this CANARD SEGMENT DEFINITION CARDS process NCAN times
<table>
<thead>
<tr>
<th>COLUMNS</th>
<th>VARIABLE</th>
<th>VALUE</th>
<th>DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>HORZ</td>
<td>X,Y, or Z</td>
<td>Horizontal axis identification</td>
</tr>
<tr>
<td>3</td>
<td>VERT</td>
<td>X,Y, or Z</td>
<td>Vertical axis identification</td>
</tr>
<tr>
<td>5 + 7</td>
<td>TEST1</td>
<td>OUT or leave blank</td>
<td>If word OUT appears, then hidden lines will be deleted. If this option is not wanted, leave columns 5 thru 7 blank</td>
</tr>
<tr>
<td>8 + 12</td>
<td>PH1</td>
<td>real</td>
<td>Roll angle, degrees</td>
</tr>
<tr>
<td>13 + 17</td>
<td>THETA</td>
<td>real</td>
<td>Pitch angle, degrees</td>
</tr>
<tr>
<td>18 + 22</td>
<td>PSI</td>
<td>real</td>
<td>Yaw angle, degrees</td>
</tr>
<tr>
<td>48 + 52</td>
<td>PLOTSZ</td>
<td>real</td>
<td>Desired size of plot, inches</td>
</tr>
<tr>
<td>53 + 55</td>
<td>TYPE</td>
<td>ORT</td>
<td>Identifies this as an orthographic plot</td>
</tr>
<tr>
<td>72</td>
<td>KODE</td>
<td>0</td>
<td>More plot cards follow</td>
</tr>
<tr>
<td>73 + 80</td>
<td>GOPLTj</td>
<td>Card identifier, j is the card repetition number</td>
<td></td>
</tr>
</tbody>
</table>
### INITIAL CONFIGURATION GEOMETRY INPUT

**PLOT CARD (cont.)**

**THREE-VIEW ORTHOGRAPHIC TYPE**

<table>
<thead>
<tr>
<th>COLUMNS</th>
<th>VARIABLE</th>
<th>VALUE</th>
<th>DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>8 + 12</td>
<td>PHI</td>
<td>real</td>
<td>Y-origin on paper of plan view, inches</td>
</tr>
<tr>
<td>13 + 17</td>
<td>THETA</td>
<td>real</td>
<td>Y-origin on paper of side view, inches</td>
</tr>
<tr>
<td>18 + 22</td>
<td>PSI</td>
<td>real</td>
<td>Y-origin on paper of front view, inches</td>
</tr>
<tr>
<td>48 + 52</td>
<td>PLOTSZ</td>
<td>real</td>
<td>Desired size of the plot, inches</td>
</tr>
<tr>
<td>53 + 55</td>
<td>TYPE</td>
<td>VU3</td>
<td>Identifies this as a three-way orthographic plot</td>
</tr>
<tr>
<td>72</td>
<td>KODE</td>
<td>0</td>
<td>More plot cards follow</td>
</tr>
<tr>
<td></td>
<td></td>
<td>1</td>
<td>Last plot card</td>
</tr>
<tr>
<td>73 + 80</td>
<td>---------</td>
<td>G3PLTj</td>
<td>Card identifier, j is the card repetition number</td>
</tr>
</tbody>
</table>
## INITIAL CONFIGURATION GEOMETRY INPUT

### PLOT CARD (cont.)

<table>
<thead>
<tr>
<th>COLUMNS</th>
<th>VARIABLE</th>
<th>VALUE</th>
<th>DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>8 + 12</td>
<td>PHI</td>
<td>real</td>
<td>X-coordinate of view point in data coordinate system</td>
</tr>
<tr>
<td>13 + 17</td>
<td>THETA</td>
<td>real</td>
<td>Y-coordinate of view point in data coordinate system</td>
</tr>
<tr>
<td>18 + 22</td>
<td>PSI</td>
<td>real</td>
<td>Z-coordinate of view point in data coordinate system</td>
</tr>
<tr>
<td>23 + 27</td>
<td>XF</td>
<td>real</td>
<td>X-coordinate of focal point in data coordinate system</td>
</tr>
<tr>
<td>28 + 32</td>
<td>YF</td>
<td>real</td>
<td>Y-coordinate of focal point in data coordinate system</td>
</tr>
<tr>
<td>33 + 37</td>
<td>ZF</td>
<td>real</td>
<td>Z-coordinate of focal point in data coordinate system</td>
</tr>
<tr>
<td>38 + 42</td>
<td>DIST</td>
<td>real</td>
<td>Distance from eye to viewing-plane, inches</td>
</tr>
<tr>
<td>43 + 47</td>
<td>FMAG</td>
<td>real</td>
<td>Viewing-plane magnification factor</td>
</tr>
<tr>
<td>48 + 52</td>
<td>PLOTSZ</td>
<td>real</td>
<td>Diameter of viewing-plane, inches</td>
</tr>
<tr>
<td>53 + 55</td>
<td>TYPE</td>
<td>PER</td>
<td>Identifies this as a perspective plot</td>
</tr>
<tr>
<td></td>
<td></td>
<td>STE</td>
<td>Identifies this as a stereo plot</td>
</tr>
<tr>
<td>72</td>
<td>KODE</td>
<td>0</td>
<td>More plot cards follow</td>
</tr>
<tr>
<td></td>
<td></td>
<td>1</td>
<td>Last plot card</td>
</tr>
<tr>
<td>73 + 80</td>
<td>GPSPLTj</td>
<td>Card identifier, j is the card repetition number</td>
<td></td>
</tr>
<tr>
<td>COLUMNS</td>
<td>VARIABLE</td>
<td>VALUE</td>
<td>DESCRIPTION</td>
</tr>
<tr>
<td>---------</td>
<td>----------</td>
<td>------------</td>
<td>-----------------------------------------------------------------------------</td>
</tr>
<tr>
<td>1 + 70</td>
<td>TITLE2</td>
<td>Alphanumeric</td>
<td>Identifying information: If the only information is the word HALT in columns 1 thru 5, then program execution will terminate.</td>
</tr>
<tr>
<td>73 + 80</td>
<td>TITLEB</td>
<td>Card identifier</td>
<td></td>
</tr>
</tbody>
</table>
## AUXILIARY INPUT

### BOUNDARY CONDITION / CONTROL POINT DEFINITION CARD

<table>
<thead>
<tr>
<th>COLUMNS</th>
<th>VARIABLE</th>
<th>VALUE</th>
<th>DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 + 3</td>
<td>LINBC</td>
<td>0</td>
<td>Non-planar boundary condition option, control points on surface of wing, fins, and canards</td>
</tr>
<tr>
<td>1</td>
<td></td>
<td></td>
<td>Planar boundary condition, control points in plane of wing, fins and canards</td>
</tr>
<tr>
<td>4 + 6</td>
<td>THICK</td>
<td>0</td>
<td>Wing thickness matrix not calculated if LINBC = 1</td>
</tr>
<tr>
<td>1</td>
<td></td>
<td></td>
<td>Calculate wing thickness matrix if LINBC = 1</td>
</tr>
<tr>
<td>7 + 9</td>
<td>PRINT</td>
<td>0</td>
<td>Print out the pressures, forces, moments and panel geometry</td>
</tr>
<tr>
<td>1</td>
<td></td>
<td></td>
<td>Print out option 0 and the spanwise loads on the wing, fins and canards</td>
</tr>
<tr>
<td>2</td>
<td></td>
<td></td>
<td>Print out option 1, the velocity components and source and vortex strengths</td>
</tr>
<tr>
<td>3</td>
<td></td>
<td></td>
<td>Print out option 2 and the steps in the iterative solution</td>
</tr>
<tr>
<td>4</td>
<td></td>
<td></td>
<td>Print out option 3 and the axial and normal velocity matrices</td>
</tr>
</tbody>
</table>

**NOTE:** Print options 3 and 4 will generate a large quantity of output
<table>
<thead>
<tr>
<th>COLUMNS</th>
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<th>VALUE</th>
<th>DESCRIPTION</th>
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</thead>
<tbody>
<tr>
<td>10 + 12</td>
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<td>0</td>
<td>Blocked JACOBI iterative solution procedure</td>
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</tr>
<tr>
<td>2</td>
<td></td>
<td></td>
<td>Blocked controlled successive over-relaxation iterative solution procedure</td>
</tr>
<tr>
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<tr>
<td>3</td>
<td></td>
<td></td>
<td>Blocked successive over-relaxation iterative solution procedure</td>
</tr>
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<td>Maximum number of iterations set at 50 integer</td>
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<td></td>
<td></td>
<td>Specified maximum number of iterations</td>
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</tr>
<tr>
<td>16 + 22</td>
<td>CCTEST</td>
<td>0.0</td>
<td>Convergence criterion set at 0.001 real</td>
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<td></td>
<td></td>
<td>Specified convergence criterion</td>
</tr>
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</tr>
<tr>
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<td>DCTEST</td>
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<td>Divergence criterion set at 1000.0 real</td>
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<td></td>
<td></td>
<td>Specified divergence criterion</td>
</tr>
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<td>VALUE</td>
<td>DESCRIPTION</td>
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<td>----------</td>
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<td>-------------------------------</td>
</tr>
<tr>
<td>30 + 36</td>
<td>ALF1</td>
<td>&gt;0.0 and &lt; 1.0</td>
<td>Relaxation factor, set only if ITMETH = 3</td>
</tr>
<tr>
<td>73 + 80</td>
<td>BCP</td>
<td></td>
<td>Card identifier</td>
</tr>
<tr>
<td>COLUMNS</td>
<td>VARIABLE</td>
<td>VALUE</td>
<td>DESCRIPTION</td>
</tr>
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<td>----------</td>
<td>-------</td>
<td>-------------</td>
</tr>
<tr>
<td>7 + 9</td>
<td>K2</td>
<td>-1</td>
<td>Fuselage data to be read</td>
</tr>
<tr>
<td></td>
<td></td>
<td>0</td>
<td>Omit all fuselages</td>
</tr>
<tr>
<td></td>
<td></td>
<td>1</td>
<td>Default all fuselage values to initial configuration input</td>
</tr>
<tr>
<td>10 + 12</td>
<td>K3</td>
<td>-1</td>
<td>Pod data to be read</td>
</tr>
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<td></td>
<td>0</td>
<td>Omit all pods</td>
</tr>
<tr>
<td></td>
<td></td>
<td>1</td>
<td>Default all pod values to initial configuration input</td>
</tr>
<tr>
<td>13 + 15</td>
<td>K4</td>
<td>-1</td>
<td>Fin data to be read</td>
</tr>
<tr>
<td></td>
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<td>0</td>
<td>Omit all fins</td>
</tr>
<tr>
<td></td>
<td></td>
<td>1</td>
<td>Default all fin values to initial configuration input</td>
</tr>
<tr>
<td>VARIABLE</td>
<td>VALUE</td>
<td>COLUMN 16 + 18</td>
<td>COLUMN 19 + 21</td>
</tr>
<tr>
<td>----------</td>
<td>-------</td>
<td>----------------</td>
<td>----------------</td>
</tr>
<tr>
<td>K5</td>
<td>-1</td>
<td>Canard data to be read</td>
<td>Omit all canards</td>
</tr>
<tr>
<td>PLOT</td>
<td>0</td>
<td>No plot cards for auxiliary input</td>
<td>No plot cards for auxiliary input</td>
</tr>
<tr>
<td>ACNTL</td>
<td></td>
<td>Card identifier</td>
<td>Card identifier</td>
</tr>
</tbody>
</table>

Description:
- **K5**: Canard data to be read.
- **PLOT**: No plot cards for auxiliary input.
- **ACNTL**: Card identifier.
<table>
<thead>
<tr>
<th>WING CONTROL CARD (omit if WING = 0 or if KL &gt; 0)</th>
</tr>
</thead>
<tbody>
<tr>
<td>COLUMN</td>
</tr>
<tr>
<td>--------</td>
</tr>
<tr>
<td>1 + 3</td>
</tr>
<tr>
<td>4 + 6</td>
</tr>
<tr>
<td>73 + 80</td>
</tr>
</tbody>
</table>
### AUXILIARY INPUT

**FUSELAGE CONTROL CARD**

(omit if NFUS = 0, or if K2 > or = 0)

<table>
<thead>
<tr>
<th>COLUMNS</th>
<th>VARIABLE</th>
<th>VALUE</th>
<th>DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 + 3</td>
<td>KRADX (1)</td>
<td>0, ±3 ±20</td>
<td>Number of meridian lines used to define panel edges of first fuselage. If 0, then will default to NRADX. If negative, then user must input KRADX meridian angles</td>
</tr>
<tr>
<td>4 + 6</td>
<td>KFORX (1)</td>
<td>0, 2 ±30</td>
<td>Number of axial stations for first fuselage. If 0, then will default to NFORX</td>
</tr>
<tr>
<td>7 + 9</td>
<td>KRADX (2)</td>
<td>0, ±3 ±20</td>
<td>Second fuselage</td>
</tr>
<tr>
<td>10 + 12</td>
<td>KFORX (2)</td>
<td>0, 2 ±30</td>
<td>Second fuselage</td>
</tr>
<tr>
<td>13 + 15</td>
<td>KRADX (3)</td>
<td>0, ±3 ±20</td>
<td>Third fuselage</td>
</tr>
<tr>
<td>16 + 18</td>
<td>KFORX (3)</td>
<td>0, 2 ±30</td>
<td>Third fuselage</td>
</tr>
<tr>
<td>19 + 21</td>
<td>KRADX (4)</td>
<td>0, ±3 ±20</td>
<td>Fourth fuselage</td>
</tr>
<tr>
<td>22 + 24</td>
<td>KFORX (4)</td>
<td>0, 2 ±30</td>
<td>Fourth fuselage</td>
</tr>
<tr>
<td>25 + 27</td>
<td>KRADX (5)</td>
<td>0, ±3 ±20</td>
<td>Fifth fuselage</td>
</tr>
<tr>
<td>28 + 30</td>
<td>KFORX (5)</td>
<td>0, 2 ±30</td>
<td>Fifth fuselage</td>
</tr>
<tr>
<td>31 + 33</td>
<td>KRADX (6)</td>
<td>0, ±3 ±20</td>
<td>Sixth fuselage</td>
</tr>
<tr>
<td>34 + 36</td>
<td>KFORX (6)</td>
<td>0, 2 ±30</td>
<td>Sixth fuselage</td>
</tr>
<tr>
<td>73 + 80</td>
<td>AFCTRL</td>
<td>---</td>
<td>Card identifier</td>
</tr>
</tbody>
</table>
**AUXILIARY INPUT**

**POD CONTROL CARD**
(omit if NPOD = 0, or if K3 > or = 0)

<table>
<thead>
<tr>
<th>COLUMNS</th>
<th>VARIABLE</th>
<th>VALUE</th>
<th>DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 + 3</td>
<td>KPRADX (1)</td>
<td>0, ± 3 ± 10</td>
<td>Number of meridian lines used to define panel edges of first pod</td>
</tr>
<tr>
<td></td>
<td></td>
<td>0, ± 3 ± 20</td>
<td>If J3TEST = 1</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>If J3TEST = 0 or -1</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Note: if 0, then will default to NPRADX; if negative, then user must input KPRADX</td>
</tr>
<tr>
<td>4 + 6</td>
<td>KPORX (1)</td>
<td>0, 2 + 30</td>
<td>Number of axial stations for first pod</td>
</tr>
<tr>
<td>7 + 9</td>
<td>KPRADX (2)</td>
<td>0, ± 3 ± 20</td>
<td>Second pod</td>
</tr>
<tr>
<td>10 + 12</td>
<td>KPORX (2)</td>
<td>0, 2 + 30</td>
<td>Second pod</td>
</tr>
<tr>
<td>13 + 15</td>
<td>KPRADX (3)</td>
<td>0, ± 3 ± 20</td>
<td>Third pod</td>
</tr>
<tr>
<td>16 + 18</td>
<td>KPORX (3)</td>
<td>0, 2 + 30</td>
<td>Third pod</td>
</tr>
<tr>
<td>19 + 21</td>
<td>KPRADX (4)</td>
<td>0, ± 3 ± 20</td>
<td>Fourth pod</td>
</tr>
<tr>
<td>22 + 24</td>
<td>KPORX (4)</td>
<td>0, 2 + 30</td>
<td>Fourth pod</td>
</tr>
<tr>
<td>25 + 27</td>
<td>KPRADX (5)</td>
<td>0, ± 3 ± 20</td>
<td>Fifth pod</td>
</tr>
<tr>
<td>28 + 30</td>
<td>KPORX (5)</td>
<td>0, 2 + 30</td>
<td>Fifth pod</td>
</tr>
<tr>
<td>31 + 33</td>
<td>KPRADX (6)</td>
<td>0, ± 3 ± 20</td>
<td>Sixth pod</td>
</tr>
<tr>
<td>34 + 36</td>
<td>KPORX (6)</td>
<td>0, 2 + 30</td>
<td>Sixth pod</td>
</tr>
<tr>
<td>73 + 80</td>
<td>---</td>
<td>APCTRL</td>
<td>Card identifier</td>
</tr>
</tbody>
</table>
### AUXILIARY INPUT

**FIN LEADING-EDGE CONTROL CARD**  
(omit if NF = 0, or if K4 > or = 0)

<table>
<thead>
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<th>COLUMNS</th>
<th>VARIABLE</th>
<th>VALUE</th>
<th>DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 + 3</td>
<td>K4TEST (1)</td>
<td>1</td>
<td>First fin has sharp leading-edge</td>
</tr>
<tr>
<td></td>
<td></td>
<td>3</td>
<td>First fin has round leading-edge radii input is required</td>
</tr>
<tr>
<td>4 + 6</td>
<td>K4TEST (2)</td>
<td>0,1,3</td>
<td>Second fin</td>
</tr>
<tr>
<td>7 + 9</td>
<td>K4TEST (3)</td>
<td>0,1,3</td>
<td>Third fin</td>
</tr>
<tr>
<td>10 + 12</td>
<td>K4TEST (4)</td>
<td>0,1,3</td>
<td>Fourth fin</td>
</tr>
<tr>
<td>13 + 15</td>
<td>K4TEST (5)</td>
<td>0,1,3</td>
<td>Fifth fin</td>
</tr>
<tr>
<td>16 + 18</td>
<td>K4TEST (6)</td>
<td>0,1,3</td>
<td>Sixth fin</td>
</tr>
<tr>
<td>19 + 21</td>
<td>K4TEST (7)</td>
<td>0,1,3</td>
<td>Seventh fin</td>
</tr>
<tr>
<td>22 + 24</td>
<td>K4TEST (8)</td>
<td>0,1,3</td>
<td>Eighth fin</td>
</tr>
<tr>
<td>25 + 27</td>
<td>K4TEST (9)</td>
<td>0,1,3</td>
<td>Ninth fin</td>
</tr>
<tr>
<td>28 + 30</td>
<td>K4TEST (10)</td>
<td>0,1,3</td>
<td>Tenth fin</td>
</tr>
<tr>
<td>73 + 80</td>
<td>AFINLE</td>
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<td>Card identifier</td>
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### AUXILIARY INPUT
### FIN CONTROL CARD
(omit if NF = 0, or if K4 > or = 0)

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<th>VALUE</th>
<th>DESCRIPTION</th>
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</thead>
<tbody>
<tr>
<td>1 * 3</td>
<td>KF (1)</td>
<td>0,2 + 20</td>
<td>Number of airfoil sections for the first fin. If 0, then the inboard and outboard airfoils define the fin.</td>
</tr>
<tr>
<td>4 * 6</td>
<td>KFINOR (1)</td>
<td>0,3 + 30</td>
<td>Number of ordinates used to define each airfoil section for first fin. If 0, then will default to NFINOR.</td>
</tr>
<tr>
<td>7 * 9</td>
<td>KF (2)</td>
<td>0,2 + 20</td>
<td>Second fin</td>
</tr>
<tr>
<td>10 * 12</td>
<td>KFINOR (2)</td>
<td>0,3 + 30</td>
<td>Second fin</td>
</tr>
<tr>
<td>13 * 15</td>
<td>KF (3)</td>
<td>0,2 + 20</td>
<td>Third fin</td>
</tr>
<tr>
<td>16 * 18</td>
<td>KFINOR (3)</td>
<td>0,3 + 30</td>
<td>Third fin</td>
</tr>
<tr>
<td>19 * 21</td>
<td>KF (4)</td>
<td>0,2 + 20</td>
<td>Fourth fin</td>
</tr>
<tr>
<td>22 * 24</td>
<td>KFINOR (4)</td>
<td>0,3 + 30</td>
<td>Fourth fin</td>
</tr>
<tr>
<td>25 * 27</td>
<td>KF (5)</td>
<td>0,2 + 20</td>
<td>Fifth fin</td>
</tr>
<tr>
<td>28 * 30</td>
<td>KFINOR (5)</td>
<td>0,3 + 30</td>
<td>Fifth fin</td>
</tr>
<tr>
<td>31 * 33</td>
<td>KF (6)</td>
<td>0,2 + 20</td>
<td>Sixth fin</td>
</tr>
<tr>
<td>34 * 36</td>
<td>KFINOR (6)</td>
<td>0,3 + 30</td>
<td>Sixth fin</td>
</tr>
<tr>
<td>37 * 39</td>
<td>KF (7)</td>
<td>0,2 + 20</td>
<td>Seventh fin</td>
</tr>
<tr>
<td>40 * 42</td>
<td>KFINOR (7)</td>
<td>0,3 + 30</td>
<td>Seventh fin</td>
</tr>
<tr>
<td>43 * 45</td>
<td>KF (8)</td>
<td>0,2 + 20</td>
<td>Eighth fin</td>
</tr>
<tr>
<td>Columns</td>
<td>Variable</td>
<td>Value</td>
<td>Description</td>
</tr>
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<td>-----------</td>
<td>-----------</td>
<td>----------------------</td>
</tr>
<tr>
<td>46 + 48</td>
<td>KF/NOR (8)</td>
<td>0,3 + 30</td>
<td>Eighth fin</td>
</tr>
<tr>
<td>49 + 51</td>
<td>KF (9)</td>
<td>0,2 + 20</td>
<td>Ninth fin</td>
</tr>
<tr>
<td>52 + 54</td>
<td>KF/NOR (10)</td>
<td>0,3 + 30</td>
<td>Tenth fin</td>
</tr>
<tr>
<td>55 + 57</td>
<td>KF (10)</td>
<td>0,2 + 20</td>
<td>Tenth fin</td>
</tr>
<tr>
<td>58 + 60</td>
<td>KF/NOR (10)</td>
<td>0,3 + 30</td>
<td>Tenth fin</td>
</tr>
<tr>
<td>73 + 80</td>
<td>AFINERL</td>
<td></td>
<td>Card identifier</td>
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<td>COLUMNS</td>
<td>VARIABLE</td>
<td>VALUE</td>
<td>DESCRIPTION</td>
</tr>
<tr>
<td>---------</td>
<td>----------</td>
<td>-------</td>
<td>-------------</td>
</tr>
<tr>
<td>1 + 3</td>
<td>K5TEST (1)</td>
<td>1,3</td>
<td>First canard has sharp leading-edge</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>First canard has round leading-edge and radii input is required</td>
</tr>
<tr>
<td>4 + 6</td>
<td>K5TEST (2)</td>
<td>0,1,3</td>
<td>Second canard</td>
</tr>
<tr>
<td>7 + 9</td>
<td>K5TEST (3)</td>
<td>0,1,3</td>
<td>Third canard</td>
</tr>
<tr>
<td>10 + 12</td>
<td>K5TEST (4)</td>
<td>0,1,3</td>
<td>Fourth canard</td>
</tr>
<tr>
<td>13 + 15</td>
<td>K5TEST (5)</td>
<td>0,1,3</td>
<td>Fifth canard</td>
</tr>
<tr>
<td>16 + 18</td>
<td>K5TEST (6)</td>
<td>0,1,3</td>
<td>Sixth canard</td>
</tr>
<tr>
<td>19 + 21</td>
<td>K5TEST (7)</td>
<td>0,1,3</td>
<td>Seventh canard</td>
</tr>
<tr>
<td>22 + 24</td>
<td>K5TEST (8)</td>
<td>0,1,3</td>
<td>Eighth canard</td>
</tr>
<tr>
<td>25 + 27</td>
<td>K5TEST (9)</td>
<td>0,1,3</td>
<td>Ninth canard</td>
</tr>
<tr>
<td>28 + 30</td>
<td>K5TEST (10)</td>
<td>0,1,3</td>
<td>Tenth canard</td>
</tr>
<tr>
<td>73 + 80</td>
<td>---</td>
<td>ACANLE</td>
<td>Card identifier</td>
</tr>
</tbody>
</table>
**AUXILIARY INPUT**

**CANARD CONTROL CARD**

(omit if NCAN = 0, or if K5 > or = 0)

<table>
<thead>
<tr>
<th>COLUMNS</th>
<th>VARIABLE</th>
<th>VALUE</th>
<th>DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 + 3</td>
<td>KAN (1)</td>
<td>0,±2 + ±20</td>
<td>Number of airfoil sections for the first canard. If 0, then the inboard and outboard airfoils define the canard. If negative, then no vortex sheets carry through the body and concentrated vortices are shed from the inboard edge of the canard.</td>
</tr>
<tr>
<td>4 + 6</td>
<td>KANOR (1)</td>
<td>0,3 + 30</td>
<td>Number of ordinates used to define each airfoil section for first canard. If 0, then will default to NCANOR</td>
</tr>
<tr>
<td>7 + 9</td>
<td>KAN (2)</td>
<td>0,±2 + ±20</td>
<td>Second canard</td>
</tr>
<tr>
<td>10 + 12</td>
<td>KANOR (2)</td>
<td>0,3 + 30</td>
<td>Second canard</td>
</tr>
<tr>
<td>13 + 15</td>
<td>KAN (3)</td>
<td>0,±2 + ±20</td>
<td>Third canard</td>
</tr>
<tr>
<td>16 + 18</td>
<td>KANOR (3)</td>
<td>0,3 + 30</td>
<td>Third canard</td>
</tr>
<tr>
<td>19 + 21</td>
<td>KAN (4)</td>
<td>0,±2 + ±20</td>
<td>Fourth canard</td>
</tr>
<tr>
<td>22 + 24</td>
<td>KANOR (4)</td>
<td>0,3 + 30</td>
<td>Fourth canard</td>
</tr>
<tr>
<td>25 + 27</td>
<td>KAN (5)</td>
<td>0,±2 + ±20</td>
<td>Fifth canard</td>
</tr>
<tr>
<td>28 + 30</td>
<td>KANOR (5)</td>
<td>0,3 + 30</td>
<td>Fifth canard</td>
</tr>
<tr>
<td>31 + 33</td>
<td>KAN (6)</td>
<td>0,2± + ±20</td>
<td>Sixth canard</td>
</tr>
<tr>
<td>34 + 36</td>
<td>KANOR (6)</td>
<td>0,3 + 30</td>
<td>Sixth canard</td>
</tr>
</tbody>
</table>
### AUXILIARY INPUT

**CANARD CONTROL CARD (cont.)**
*(omit if NCAN = 0, or if K5 > or = 0)*

<table>
<thead>
<tr>
<th>COLUMNS</th>
<th>VARIABLE</th>
<th>VALUE</th>
<th>DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>37 - 39</td>
<td>KAN (7)</td>
<td>0.2 + 20</td>
<td>Seventh canard</td>
</tr>
<tr>
<td>40 - 42</td>
<td>KANOR (7)</td>
<td>0.3 + 30</td>
<td>Seventh canard</td>
</tr>
<tr>
<td>43 - 45</td>
<td>KAN (8)</td>
<td>0.2 + 20</td>
<td>Eighth canard</td>
</tr>
<tr>
<td>46 - 48</td>
<td>KANOR (8)</td>
<td>0.3 + 30</td>
<td>Eighth canard</td>
</tr>
<tr>
<td>49 - 51</td>
<td>KAN (9)</td>
<td>0.2 + 20</td>
<td>Ninth canard</td>
</tr>
<tr>
<td>52 - 54</td>
<td>KANOR (9)</td>
<td>0.3 + 30</td>
<td>Ninth canard</td>
</tr>
<tr>
<td>55 - 57</td>
<td>KAN (10)</td>
<td>0.2 + 20</td>
<td>Tenth canard</td>
</tr>
<tr>
<td>58 - 60</td>
<td>KANOR (10)</td>
<td>0.3 + 30</td>
<td>Tenth canard</td>
</tr>
</tbody>
</table>
| 73 - 80 | ---      | ---     | ACANCRU        | Card identifier
<table>
<thead>
<tr>
<th>COLUMNS</th>
<th>VARIABLE</th>
<th>VALUE</th>
<th>DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 + 7</td>
<td>REFAR</td>
<td>0.0, real</td>
<td>Wing reference area. If 0.0, then will default to REFA</td>
</tr>
<tr>
<td>8 + 14</td>
<td>REFB</td>
<td>0.0, real</td>
<td>Wing semispan. If 0.0, then will default to 1.0</td>
</tr>
<tr>
<td>15 + 21</td>
<td>REFC</td>
<td>0.0, real</td>
<td>Wing reference chord. If 0.0, then will default to 1.0</td>
</tr>
<tr>
<td>22 + 28</td>
<td>REFD</td>
<td>0.0, real</td>
<td>Fuselage reference diameter. If 0.0, then will default to 1.0</td>
</tr>
<tr>
<td>29 + 35</td>
<td>REFL</td>
<td>0.0, real</td>
<td>Fuselage reference length. If 0.0, then will default to 1.0</td>
</tr>
<tr>
<td>36 + 42</td>
<td>REFX</td>
<td>real</td>
<td>X-coordinate of moment center</td>
</tr>
<tr>
<td>43 + 49</td>
<td>REFZ</td>
<td>real</td>
<td>Z-coordinate of moment center</td>
</tr>
<tr>
<td>73 + 80</td>
<td>------</td>
<td>AREF</td>
<td>Card identifier</td>
</tr>
</tbody>
</table>
**AUXILIARY INPUT**
**WING REDEFINITION CARDS**
**RADII**
(omit if JWNG = 0, or if K1 = 0, ±1)

<table>
<thead>
<tr>
<th>COLUMNS</th>
<th>VARIABLE</th>
<th>VALUE</th>
<th>DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 + 7</td>
<td>RHO</td>
<td>0.0</td>
<td>NWAF values of leading-edge radius expressed in percent chord. Each card contains up to 10 values, each value input in a 7-column field width as a real number. Order of input is inboard airfoil to outboard airfoil.</td>
</tr>
<tr>
<td>8 + 14</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>etc.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>73 + 80</td>
<td></td>
<td>AWRADj</td>
<td>Card identifier, j is the card repetition number</td>
</tr>
</tbody>
</table>
**AUXILIARY INPUT**

**WING REDEFINITION CARDS (cont.)**

**AIRFOIL ORDINATES' CHORD LOCATIONS**

(omit if JWNG = 0, K1 > or = 0, KWAFOR = 0)

<table>
<thead>
<tr>
<th>COLUMNS</th>
<th>VARIABLE</th>
<th>VALUE</th>
<th>DEFINITION</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 + 7</td>
<td>XAFK</td>
<td>0.0 - 100.0</td>
<td>KWAFOR values describing the new locations in percent chord at which the ordinates of all wing airfoils are to be specified. Each card contains up to 10 values, each value input in a 7-column field width as a real number. The order of input is wing leading-edge to trailing-edge.</td>
</tr>
<tr>
<td>8 + 14</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>etc.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>73 + 80</td>
<td>----</td>
<td>AXAFj</td>
<td>Card identifier, j is the card repetition number</td>
</tr>
</tbody>
</table>
## AUXILIARY INPUT

### WING REDEFINITION CARDS (cont.)

#### Y-ORDINATES

(omit if JWNG = 0, Kl > or = 0, KWAF = 0)

<table>
<thead>
<tr>
<th>COLUMNS</th>
<th>VARIABLE</th>
<th>VALUE</th>
<th>DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 + 7</td>
<td>YK</td>
<td>real</td>
<td>KWAF values of the new Y-ordinate of each airfoil's leading-edge. Each card contains up to 10 values, each value input in a 7-column field width as a real number. The order of input is inboard airfoil to outboard airfoil.</td>
</tr>
<tr>
<td>8 + 14</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>etc.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>73 + 80</td>
<td>_______</td>
<td>AWYKj</td>
<td>Card identifier, j is the card repetition number</td>
</tr>
</tbody>
</table>
## AUXILIARY INPUT
FUZEKLAGE REDEFINITION CARDS
MERIDIAN ANGLES
(omit if NFUS = 0, K2 > or = 0, KRADX > or = 0)

<table>
<thead>
<tr>
<th>COLUMNS</th>
<th>VARIABLE</th>
<th>VALUE</th>
<th>DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 + 7</td>
<td>PHIK</td>
<td>real</td>
<td>KRADX values of the new fuselage meridian angles expressed in degrees. Each card contains up to 10 values, each value input in a 7-column field width as a real number. Order of input is bottom of fuselage to top with PHIK = 0.0 at the bottom and 180.0 at the top.</td>
</tr>
<tr>
<td>8 + 14</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>etc.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>73 + 80</td>
<td>APMAjk</td>
<td></td>
<td>Card identifier, j is fuselage segment number, k is the card repetition number</td>
</tr>
</tbody>
</table>

NOTE: Repeat this MERIDIAN ANGLES process NFUS times.
### AUXILIARY INPUT

**FUSELAGE REDEFINITION CARDS (cont.)**

**X-ORDINATES**

(omit if NFUS = 0, K2 > or = 0, KFORX = 0)

<table>
<thead>
<tr>
<th>COLUMN</th>
<th>VARIABLE</th>
<th>VALUE</th>
<th>DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 + 7</td>
<td>XJ</td>
<td>real</td>
<td>KFORX values of the new X-ordinates of the fuselage stations. Each card contains up to 10 values, each value input in a 7-column field width as a real number. The order of input is minimum X-ordinate to maximum.</td>
</tr>
<tr>
<td>8 + 14</td>
<td>etc.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

| 73 + 80 | AXFUSjk | Card identifier, j is the fuselage segment number, k is the card repetition number |

**NOTE:** Repeat this X-ORDINATES process NFUS times.
# AUXILIARY INPUT
POD REDEFINITION CARDS
MERIDIAN ANGLES
(omit if NPOD = 0, K3 > or = 0, KPRADX > or = 0)

<table>
<thead>
<tr>
<th>COLUMNS</th>
<th>VARIABLE</th>
<th>VALUE</th>
<th>DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 + 7</td>
<td>GAMK</td>
<td>real</td>
<td>KPRADX values of the new pod meridian angles expressed in degrees. Each card contains up to 10 values, each value input in a 7-column field width as a real number. If J3TEST = 0 or 1, the order of input is bottom of pod to top with GAMK=0.0 at the bottom and 180.0 at the top. If J3TEST=-1, the order of input is bottom of pod to top and then back to bottom (i.e. full 360.0 degrees traversed in a counter clockwise direction)</td>
</tr>
<tr>
<td>8 + 14</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>etc.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>73 + 80</td>
<td>APMAjk</td>
<td></td>
<td>Card identifier, j is the pod segment number, K is the card repetition number</td>
</tr>
</tbody>
</table>

NOTE: Repeat this MERIDIAN ANGLES process NPOD times.
# Auxiliary Input

## POD Redefinition Cards (cont.)

### X-Ordinates

(omit if NP0D = 0, K3 > or = 0, KP0RX = 0)

<table>
<thead>
<tr>
<th>Columns</th>
<th>Variable</th>
<th>Value</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 + 7</td>
<td>XJP</td>
<td>real</td>
<td>KP0RX values of the new X-ordinates of the pod stations (referenced to the pod origin). Each card contains up to 10 values, each value input in a 7-column field width as a real number. The order of input is minimum x-ordinate to maximum.</td>
</tr>
<tr>
<td>8 + 14</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>etc.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>73 + 80</td>
<td>AXPODjk</td>
<td></td>
<td>Card identifier, j is the pod segment number, k is the card repetition number</td>
</tr>
</tbody>
</table>

NOTE: Repeat this X-ORDINATES process NP0D times.
## AUXILIARY INPUT
FIN REDEFINITION CARDS
RADII

*(omit if NF = 0, K4 > or = 0, K4TEST = 1)*

<table>
<thead>
<tr>
<th>COLUMNS</th>
<th>VARIABLE</th>
<th>VALUE</th>
<th>DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 + 7</td>
<td>RHO</td>
<td>0.0 + 100.0</td>
<td>Leading-edge radius expressed in percent chord</td>
</tr>
<tr>
<td>73 + 80</td>
<td>AFRADJ</td>
<td></td>
<td>Card identifier, j is the fin segment number</td>
</tr>
</tbody>
</table>

---

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AUXILIARY INPUT
FIN REDEFINITION CARDS (cont.)
AIRFOIL ORDINATES' CHORD LOCATIONS
(omit if NF=0, K4 > or = 0, KFINOR = 0)

<table>
<thead>
<tr>
<th>COLUMNS</th>
<th>VARIABLE</th>
<th>VALUE</th>
<th>DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 + 7</td>
<td>XAFK</td>
<td>0.0 to 100.0</td>
<td>KFINOR values describing the new locations in percent chord at which the ordinates of the fin airfoils are to be specified. Each card contains up to 10 values, each value input in a 7-column field width as a real number. The order of input is fin leading-edge to trailing-edge.</td>
</tr>
<tr>
<td>8 + 14</td>
<td>etc.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>73 + 80</td>
<td>AXFINjk</td>
<td></td>
<td>Card identifier, j is the fin segment number, k is the card repetition number</td>
</tr>
</tbody>
</table>
### AUXILIARY INPUT

**FIN REDEFINITION CARDS (cont.)**

**Z-ORDINATES**

*(omit if NF = 0, K4 > or = 0, KF = 0)*

<table>
<thead>
<tr>
<th>COLUMNS</th>
<th>VARIABLE</th>
<th>VALUE</th>
<th>DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 + 7</td>
<td>YK</td>
<td>real</td>
<td>KF values of the new Z-ordinate of each airfoil's leading-edge. Each card contains up to 10 values, each value input in a 7-column field width as a real number. The order of input is inboard airfoil to outboard airfoil.</td>
</tr>
<tr>
<td>8 + 14</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>etc.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>73 + 80</td>
<td>----</td>
<td>AFZKjk</td>
<td>Card identifier, j is the fin segment number, k is the card repetition number</td>
</tr>
</tbody>
</table>

**NOTE:** Repeat this FIN REDEFINITION CARDS process NF times.
## AUXILIARY INPUT

### CANARD REDEFINITION CARDS

#### RADII

*omit if NCAN = 0, K5 > or = 0, K5TEST = 1*

<table>
<thead>
<tr>
<th>COLUMNS</th>
<th>VARIABLE</th>
<th>VALUE</th>
<th>DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 * 7</td>
<td>RHO</td>
<td>0.0 - 100.0</td>
<td>Leading-edge radius expressed in percent chord</td>
</tr>
<tr>
<td>73 * 80</td>
<td>ACRADj</td>
<td></td>
<td>Card identifier, j is the canard segment number</td>
</tr>
</tbody>
</table>
AUXILIARY INPUT
CANARD REDEFINITION CARDS (cont.)
AIRFOIL ORDINATES' CHORD LOCATIONS
(omit if NCAN = 0, K5 > or = 0, KANOR = 0)

<table>
<thead>
<tr>
<th>COLUMNS</th>
<th>VARIABLE</th>
<th>VALUE</th>
<th>DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 + 7</td>
<td>XAFK</td>
<td>0.0 + 100.0</td>
<td>KANOR values describing the new locations in percent chord at which the ordinates of the canard airfoils are to be specified. Each card contains up to 10 values, each value input in a 7-column field width as a real number. The order of input is canard leading-edge to trailing-edge.</td>
</tr>
<tr>
<td>8 + 14</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>etc.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>73 + 80</td>
<td>---</td>
<td>AXCANjk</td>
<td>Card identifier, j is the canard segment number, k is the card repetition number</td>
</tr>
</tbody>
</table>
**AUXILIARY INPUT**

**CANARD REDEFINITION CARDS (cont.)**

**Y-ORDINATES**

(omit if NCAN = 0, K5 > or = 0, KAN = 0)

<table>
<thead>
<tr>
<th>COLUMNS</th>
<th>VARIABLE</th>
<th>VALUE</th>
<th>DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 + 7</td>
<td>YK</td>
<td>real</td>
<td>KAN values of the new Y-ordinate of each airfoil's leading-edge. Each card contains up to 10 values, each value input in a 7-column field width as a real number. The order of input is inboard airfoil to outboard airfoil.</td>
</tr>
<tr>
<td>8 + 14</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>etc.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>73 + 80</td>
<td>--------</td>
<td>ACYKjk</td>
<td>Card identifier, j is the canard segment number, k is the card repetition number</td>
</tr>
</tbody>
</table>

**NOTE:** Repeat this CANARD REDEFINITION CARDS process NCAN times.
<table>
<thead>
<tr>
<th>COLUMNS</th>
<th>VARIABLE</th>
<th>VALUE</th>
<th>DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>HORZ</td>
<td>X,Y, or Z</td>
<td>Horizontal axis identification</td>
</tr>
<tr>
<td>3</td>
<td>VERT</td>
<td>X,Y, or Z</td>
<td>Vertical axis identification</td>
</tr>
<tr>
<td>5 + 7</td>
<td>TEST1</td>
<td>OUT or leave blank</td>
<td>If word OUT appears, then hidden lines will be deleted. If this option is not wanted leave columns 5 thru 7 blank</td>
</tr>
<tr>
<td>8 + 12</td>
<td>PHI</td>
<td>real</td>
<td>Roll angle, degrees</td>
</tr>
<tr>
<td>13 + 17</td>
<td>THETA</td>
<td>real</td>
<td>Pitch angle, degrees</td>
</tr>
<tr>
<td>18 + 22</td>
<td>PSI</td>
<td>real</td>
<td>Yaw angle, degrees</td>
</tr>
<tr>
<td>48 + 52</td>
<td>PLOTSZ</td>
<td>real</td>
<td>Desired size of plot, inches</td>
</tr>
<tr>
<td>53 + 55</td>
<td>TYPE</td>
<td>ORT</td>
<td>Identifies this as an orthographic plot</td>
</tr>
<tr>
<td>72</td>
<td>KODE</td>
<td>0</td>
<td>More plot cards follow</td>
</tr>
<tr>
<td></td>
<td></td>
<td>1</td>
<td>Last plot card</td>
</tr>
<tr>
<td>73 + 80</td>
<td>--------</td>
<td>AOPLTj</td>
<td>Card identifier, j is the card repetition number</td>
</tr>
</tbody>
</table>
## AUXILIARY INPUT

### PLOT CARD (cont.)

#### THREE-VIEW ORTHOGRAPHIC TYPE

<table>
<thead>
<tr>
<th>COLUMNS</th>
<th>VARIABLE</th>
<th>VALUE</th>
<th>DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>8 + 12</td>
<td>PHI</td>
<td>real</td>
<td>Y-origin on paper of plan view, inches</td>
</tr>
<tr>
<td>13 + 17</td>
<td>THETA</td>
<td>real</td>
<td>Y-origin on paper of side view, inches</td>
</tr>
<tr>
<td>18 + 22</td>
<td>PSI</td>
<td>real</td>
<td>Y-origin on paper of front view, inches</td>
</tr>
<tr>
<td>48 + 52</td>
<td>PLOTSZ</td>
<td>real</td>
<td>Desired size of the plot, inches</td>
</tr>
<tr>
<td>53 + 55</td>
<td>TYPE</td>
<td>VU3</td>
<td>Identifies this as a three-way orthographic plot</td>
</tr>
<tr>
<td>72</td>
<td>KODE</td>
<td>0</td>
<td>More plot cards follow</td>
</tr>
<tr>
<td></td>
<td></td>
<td>1</td>
<td>Last plot card</td>
</tr>
<tr>
<td>73 + 80</td>
<td>A3PLTj</td>
<td>Card identifier, j is the card repetition number</td>
<td></td>
</tr>
<tr>
<td>COLUMNS</td>
<td>VARIABLE</td>
<td>VALUE</td>
<td>DESCRIPTION</td>
</tr>
<tr>
<td>---------</td>
<td>----------</td>
<td>-------</td>
<td>-------------</td>
</tr>
<tr>
<td>8 + 12</td>
<td>PHI</td>
<td>real</td>
<td>X-coordinate of view point in data coordinate system</td>
</tr>
<tr>
<td>13 + 17</td>
<td>THETA</td>
<td>real</td>
<td>Y-coordinate of view point in data coordinate system</td>
</tr>
<tr>
<td>18 + 22</td>
<td>PSI</td>
<td>real</td>
<td>Z-coordinate of view point in data coordinate system</td>
</tr>
<tr>
<td>23 + 27</td>
<td>XF</td>
<td>real</td>
<td>X-coordinate of focal point in data coordinate system</td>
</tr>
<tr>
<td>28 + 32</td>
<td>YF</td>
<td>real</td>
<td>Y-coordinate of focal point in data coordinate system</td>
</tr>
<tr>
<td>33 + 37</td>
<td>ZF</td>
<td>real</td>
<td>Z-coordinate of focal point in data coordinate system</td>
</tr>
<tr>
<td>38 + 42</td>
<td>DIST</td>
<td>real</td>
<td>Distance from eye to viewing-plane, inches</td>
</tr>
<tr>
<td>43 + 47</td>
<td>FMAG</td>
<td>real</td>
<td>Viewing-plane magnification factor</td>
</tr>
<tr>
<td>48 + 52</td>
<td>PLOTSZ</td>
<td>real</td>
<td>Diameter of viewing-plane, inches</td>
</tr>
<tr>
<td>53 + 55</td>
<td>TYPE</td>
<td>PER</td>
<td>Identifies this as a perspective plot</td>
</tr>
<tr>
<td></td>
<td></td>
<td>STE</td>
<td>Identifies this as a stereo plot</td>
</tr>
<tr>
<td>72</td>
<td>KODE</td>
<td>0</td>
<td>More plot cards follow</td>
</tr>
<tr>
<td></td>
<td></td>
<td>1</td>
<td>Last plot card</td>
</tr>
<tr>
<td>73 + 80</td>
<td>APSPLITj</td>
<td>Card identifier, j is the card repetition number</td>
<td></td>
</tr>
</tbody>
</table>
### AUXILIARY INPUT

#### AERODYNAMIC INPUT CARD

<table>
<thead>
<tr>
<th>COLUMNS</th>
<th>VARIABLE</th>
<th>VALUE</th>
<th>DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 + 7</td>
<td>MACH</td>
<td>real</td>
<td>The free stream subsonic or supersonic Mach number (including 0.0) at which aerodynamic output is desired</td>
</tr>
<tr>
<td></td>
<td></td>
<td>-1.0</td>
<td>Indicates the termination of the aerodynamic calculation for the given configuration</td>
</tr>
<tr>
<td>8 + 14</td>
<td>ALPHA</td>
<td>real</td>
<td>The angle of attack in degrees</td>
</tr>
<tr>
<td>15 + 21</td>
<td>NORVEL</td>
<td>0.0</td>
<td>The boundary condition of where zero normal velocity is applied at body panel control points</td>
</tr>
<tr>
<td></td>
<td></td>
<td>1.0</td>
<td>Modified boundary condition applied at body panel control points (input for non-zero normal velocities is required)</td>
</tr>
<tr>
<td>22 + 28</td>
<td>FLDPTS</td>
<td>real</td>
<td>The number of field points at which velocity and pressure calculations is desired (input is required for each field point location)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>0.0</td>
<td>No field point calculations</td>
</tr>
<tr>
<td>29 + 31</td>
<td>KOP</td>
<td>1</td>
<td>Given configuration has a coplanar wing</td>
</tr>
<tr>
<td></td>
<td></td>
<td>0</td>
<td>Not a coplanar wing</td>
</tr>
<tr>
<td>VARIABLE</td>
<td>DESCRIPTION</td>
<td>VALUE</td>
<td></td>
</tr>
<tr>
<td>----------</td>
<td>-------------</td>
<td>-------</td>
<td></td>
</tr>
</tbody>
</table>
| MFLOT    | User selects which configuration segments are to have pressure coefficient plots (control input is required) | 0
|          | Plot pressure coefficients for all configuration segments | 1 |

**AERODYNAMIC INPUT CARD (cont.)**

<table>
<thead>
<tr>
<th>COLUMNS</th>
<th>VALUE</th>
<th>VARIABLE</th>
<th>DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>32 + 34</td>
<td></td>
<td>AEROIN</td>
<td></td>
</tr>
<tr>
<td>73 + 80</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
### AUXILIARY INPUT
### PRESSURE PLOT CONTROL CARD
*(omit if MPLIT = 0 or 1)*

<table>
<thead>
<tr>
<th>COLUMNS</th>
<th>VARIABLE</th>
<th>VALUE</th>
<th>DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 + 3</td>
<td>KPLOTW</td>
<td>1</td>
<td>Plot wing pressure coefficients</td>
</tr>
<tr>
<td></td>
<td></td>
<td>0</td>
<td>No plots for wing</td>
</tr>
<tr>
<td>4 + 6</td>
<td>KPLOTB</td>
<td>-1</td>
<td>User selects which fuselage segments are to have pressure plots (input for segment control is required)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>0</td>
<td>No plots for fuselage segments</td>
</tr>
<tr>
<td></td>
<td></td>
<td>1</td>
<td>Plot pressure coefficients for all fuselage segments</td>
</tr>
<tr>
<td>7 + 9</td>
<td>KPLOTP</td>
<td>-1</td>
<td>User selects which pod segments are to have pressure plots (input for segment control is required)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>0</td>
<td>No plots for pod segments</td>
</tr>
<tr>
<td></td>
<td></td>
<td>1</td>
<td>Plot pressure coefficients for all pod segments</td>
</tr>
<tr>
<td>10 + 12</td>
<td>KPLOTF</td>
<td>-1</td>
<td>User selects which fin segments are to have pressure plots (input for segment control is required)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>0</td>
<td>No plots for fin segments</td>
</tr>
<tr>
<td></td>
<td></td>
<td>1</td>
<td>Plot pressure coefficients for all fin segments</td>
</tr>
<tr>
<td>VARIABLE</td>
<td>VALUE</td>
<td>DESCRIPTION</td>
<td></td>
</tr>
<tr>
<td>----------</td>
<td>-------</td>
<td>-------------</td>
<td></td>
</tr>
<tr>
<td>KPLOT C</td>
<td>-1</td>
<td>User selects which canard segments are to have pressure plots (input for segment control is required)</td>
<td></td>
</tr>
<tr>
<td>0</td>
<td>No plots for canard segments</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>Plot Pressure coefficients for all canard segments</td>
<td></td>
<td></td>
</tr>
<tr>
<td>73 + 80</td>
<td>PRPLOT</td>
<td>Card identifier</td>
<td></td>
</tr>
<tr>
<td>VARIABLES</td>
<td>VALUE</td>
<td>DESCRIPTION</td>
<td></td>
</tr>
<tr>
<td>-----------</td>
<td>-------</td>
<td>-------------</td>
<td></td>
</tr>
<tr>
<td>IBPLOT (1)</td>
<td>0</td>
<td>Omits pressure coefficients plot for first fuselage segment</td>
<td></td>
</tr>
<tr>
<td>IBPLOT (2)</td>
<td>0.1</td>
<td>First fuselage</td>
<td></td>
</tr>
<tr>
<td>IBPLOT (3)</td>
<td>0.1</td>
<td>Second fuselage</td>
<td></td>
</tr>
<tr>
<td>IBPLOT (4)</td>
<td>0.1</td>
<td>Third fuselage</td>
<td></td>
</tr>
<tr>
<td>IBPLOT (5)</td>
<td>0.1</td>
<td>Fourth fuselage</td>
<td></td>
</tr>
<tr>
<td>IBPLOT (6)</td>
<td>0.1</td>
<td>Fifth fuselage</td>
<td></td>
</tr>
<tr>
<td>IBPLOT (7)</td>
<td>0.1</td>
<td>Sixth fuselage</td>
<td></td>
</tr>
<tr>
<td>BPBPLT</td>
<td></td>
<td>Card identifier</td>
<td></td>
</tr>
</tbody>
</table>

 omits if IBPLOT = 0 or 1 |
<table>
<thead>
<tr>
<th>COLUMNS</th>
<th>VARIABLE</th>
<th>VALUE</th>
<th>DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 + 3</td>
<td>IPPLLOT (1)</td>
<td>0</td>
<td>Omit pressure coefficients plot for first pod segment</td>
</tr>
<tr>
<td></td>
<td>1</td>
<td></td>
<td>Plot pressure coefficients for first pod segment</td>
</tr>
<tr>
<td>4 + 6</td>
<td>IPPLLOT (2)</td>
<td>0,1</td>
<td>Second pod</td>
</tr>
<tr>
<td>7 + 9</td>
<td>IPPLLOT (3)</td>
<td>0,1</td>
<td>Third pod</td>
</tr>
<tr>
<td>10 + 12</td>
<td>IPPLLOT (4)</td>
<td>0,1</td>
<td>Fourth pod</td>
</tr>
<tr>
<td>13 + 15</td>
<td>IPPLLOT (5)</td>
<td>0,1</td>
<td>Fifth pod</td>
</tr>
<tr>
<td>16 + 18</td>
<td>IPPLLOT (6)</td>
<td>0,1</td>
<td>Sixth pod</td>
</tr>
<tr>
<td>73 + 80</td>
<td>PPRPLT</td>
<td></td>
<td>Card identifier</td>
</tr>
</tbody>
</table>
### AUXILIARY INPUT

**FIN PRESSURE CONTROL CARD**
(omit if KPLTFF = 0 or 1)

<table>
<thead>
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<th>VARIABLE</th>
<th>VALUE</th>
<th>DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 + 3</td>
<td>IFPLOT (1)</td>
<td>0</td>
<td>Omit pressure coefficients plot for first fin segment</td>
</tr>
<tr>
<td></td>
<td></td>
<td>1</td>
<td>Plot pressure coefficients for first fin segment</td>
</tr>
<tr>
<td>4 + 6</td>
<td>IFPLOT (2)</td>
<td>0,1</td>
<td>Second fin</td>
</tr>
<tr>
<td>7 + 9</td>
<td>IFPLOT (3)</td>
<td>0,1</td>
<td>Third fin</td>
</tr>
<tr>
<td>10 + 12</td>
<td>IFPLOT (4)</td>
<td>0,1</td>
<td>Fourth fin</td>
</tr>
<tr>
<td>13 + 15</td>
<td>IFPLOT (5)</td>
<td>0,1</td>
<td>Fifth fin</td>
</tr>
<tr>
<td>16 + 18</td>
<td>IFPLOT (6)</td>
<td>0,1</td>
<td>Sixth fin</td>
</tr>
<tr>
<td>19 + 21</td>
<td>IFPLOT (7)</td>
<td>0,1</td>
<td>Seventh fin</td>
</tr>
<tr>
<td>22 + 24</td>
<td>IFPLOT (8)</td>
<td>0,1</td>
<td>Eighth fin</td>
</tr>
<tr>
<td>25 + 27</td>
<td>IFPLOT (9)</td>
<td>0,1</td>
<td>Ninth fin</td>
</tr>
<tr>
<td>28 + 30</td>
<td>IFPLOT (10)</td>
<td>0,1</td>
<td>Tenth fin</td>
</tr>
<tr>
<td>73 + 80</td>
<td>----</td>
<td>FPRPLT</td>
<td>Card identifier</td>
</tr>
<tr>
<td>COLUMNS</td>
<td>VARIABLE</td>
<td>VALUE</td>
<td>DESCRIPTION</td>
</tr>
<tr>
<td>---------</td>
<td>----------</td>
<td>-------</td>
<td>-------------</td>
</tr>
<tr>
<td>1 + 3</td>
<td>ICPLLOT (1)</td>
<td>0</td>
<td>Omit pressure coefficients plot for first canard segment</td>
</tr>
<tr>
<td></td>
<td></td>
<td>1</td>
<td>Plot pressure coefficients for first segment</td>
</tr>
<tr>
<td>4 + 6</td>
<td>ICPLLOT (2)</td>
<td>0,1</td>
<td>Second canard</td>
</tr>
<tr>
<td>7 + 9</td>
<td>ICPLLOT (3)</td>
<td>0,1</td>
<td>Third canard</td>
</tr>
<tr>
<td>10 + 12</td>
<td>ICPLLOT (4)</td>
<td>0,1</td>
<td>Fourth canard</td>
</tr>
<tr>
<td>13 + 15</td>
<td>ICPLLOT (5)</td>
<td>0,1</td>
<td>Fifth canard</td>
</tr>
<tr>
<td>16 + 18</td>
<td>ICPLLOT (6)</td>
<td>0,1</td>
<td>Sixth canard</td>
</tr>
<tr>
<td>19 + 21</td>
<td>ICPLLOT (7)</td>
<td>0,1</td>
<td>Seventh canard</td>
</tr>
<tr>
<td>22 + 24</td>
<td>ICPLLOT (8)</td>
<td>0,1</td>
<td>Eighth canard</td>
</tr>
<tr>
<td>25 + 27</td>
<td>ICPLLOT (9)</td>
<td>0,1</td>
<td>Ninth canard</td>
</tr>
<tr>
<td>28 + 30</td>
<td>ICPLLOT (10)</td>
<td>0,1</td>
<td>Tenth canard</td>
</tr>
<tr>
<td>73 + 80</td>
<td>CPRPLT</td>
<td>-----</td>
<td>Card identifier</td>
</tr>
</tbody>
</table>
### AUXILIARY INPUT

**NORMAL VELOCITY INPUT CARD**

(omit if NORVEL = 0.0)

<table>
<thead>
<tr>
<th>COLUMNS</th>
<th>VARIABLE</th>
<th>VALUE</th>
<th>DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 + 7</td>
<td>QB</td>
<td>real</td>
<td>Normal velocities specified at the control point of each body panel. One value of normal velocity is input for each body panel, in order of the body panel numbers assigned by the program. Each card contains up to 10 values, each value input in a 7-column field width as a real number.</td>
</tr>
<tr>
<td>8 + 14</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>etc.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>73 + 80</td>
<td>---</td>
<td>NORVEL</td>
<td>Card identifier, j is the card repetition number</td>
</tr>
<tr>
<td></td>
<td></td>
<td>j</td>
<td></td>
</tr>
</tbody>
</table>
## AUXILIARY INPUT

**FIELD POINT CARD**

(omit if FLDPTS = 0.0)

<table>
<thead>
<tr>
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<th>VARIABLE</th>
<th>VALUE</th>
<th>DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 + 7</td>
<td>XPT</td>
<td>real</td>
<td>X-coordinate of the field point</td>
</tr>
<tr>
<td>8 + 14</td>
<td>YPT</td>
<td>real</td>
<td>Y-coordinate of the field point</td>
</tr>
<tr>
<td>15 + 21</td>
<td>ZPT</td>
<td>real</td>
<td>Z-coordinate of the field point</td>
</tr>
<tr>
<td>73 + 80</td>
<td>FLDPTj</td>
<td></td>
<td>Card identifier, j is the card repetition number</td>
</tr>
</tbody>
</table>

**NOTE:** Repeat this FIELD POINT process FLDPTS times.
<table>
<thead>
<tr>
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<th>VARIABLE</th>
<th>VALUE</th>
<th>DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 + 7</td>
<td>MACH</td>
<td>-1.0</td>
<td>Terminates the run</td>
</tr>
<tr>
<td>73 + 80</td>
<td></td>
<td></td>
<td>Card identifier</td>
</tr>
</tbody>
</table>
Section 5

REFERENCES


Appendix A

INPUT/OUTPUT FILES

The data input to USSAERO version D00 must reside on a file named DATIN. Numerical output is written to a file named DATOUT. If the plotting options are activated, the plot output resides on the DI-3000 output file named DIMETA. When run on the CDC CYBER 170/180 series computers at NASA Langley Research Center, the program plus the DI-3000 graphics library requires a minimum core length of 275K octal.
Appendix B

EXTERNAL ROUTINES

Due to its plotting capabilities, version D00 of USSAERO requires the use of an external graphics library. The plot routine call statements which reside in USSAERO refer to the DI-3000 graphics package. These plot routine calls may have to be replaced by the users' equivalent graphics package commands.

USSAERO also makes calls to system dependent time, date and termination routines. These calls may also have to be replaced by the users' equivalent system routines.

This appendix describes these external system/graphics routines and identifies where they are used in USSAERO. Appropriate comments have been placed in the USSAERO program code to further assist the user in locating the calls to these external routines.
### USSAERO REFERENCES TO EXTERNAL ROUTINES

<table>
<thead>
<tr>
<th>DI-3000 ROUTINE</th>
<th>called by</th>
<th>USSAERO ROUTINE</th>
</tr>
</thead>
<tbody>
<tr>
<td>JBASE</td>
<td></td>
<td>AXLES</td>
</tr>
<tr>
<td>JBEGIN</td>
<td></td>
<td>USAERO</td>
</tr>
<tr>
<td>JCLOSE</td>
<td></td>
<td>PLOTIT PLTORT PLTSTE</td>
</tr>
<tr>
<td></td>
<td></td>
<td>PRESBO PRSWNG STERPT</td>
</tr>
<tr>
<td>JDEVON</td>
<td></td>
<td>USAERO</td>
</tr>
<tr>
<td>JDFONT</td>
<td></td>
<td>USAERO</td>
</tr>
<tr>
<td>JDINIT</td>
<td></td>
<td>USAERO</td>
</tr>
<tr>
<td>JDRAW</td>
<td></td>
<td>AXLES PLOTIT PRESBO</td>
</tr>
<tr>
<td></td>
<td></td>
<td>PRSWNG STERPT</td>
</tr>
<tr>
<td>JDSIZE</td>
<td></td>
<td>USAERO</td>
</tr>
<tr>
<td>JEND</td>
<td></td>
<td>GEOM</td>
</tr>
<tr>
<td>JFRAME</td>
<td></td>
<td>LABEL PLTSTE</td>
</tr>
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<td>JLSTYL</td>
<td></td>
<td>PRSWNG</td>
</tr>
<tr>
<td>JMOVE</td>
<td></td>
<td>AXLES LABEL PLOTIT</td>
</tr>
<tr>
<td></td>
<td></td>
<td>PLTORT PLTSTE PRESBO</td>
</tr>
<tr>
<td></td>
<td></td>
<td>PRSWNG STERPT</td>
</tr>
<tr>
<td>JOPEN</td>
<td></td>
<td>PLOTIT PLTORT PLTSTE</td>
</tr>
<tr>
<td></td>
<td></td>
<td>PRESBO PRSWNG STERPT</td>
</tr>
<tr>
<td>JSIZE</td>
<td></td>
<td>AXLES LABEL</td>
</tr>
<tr>
<td>JVPORT</td>
<td></td>
<td>USAERO</td>
</tr>
<tr>
<td>JWINDO</td>
<td></td>
<td>AXLES PLTORT PLTSTE</td>
</tr>
<tr>
<td></td>
<td></td>
<td>STERPT USAERO</td>
</tr>
<tr>
<td>J3STRG</td>
<td></td>
<td>AXLES LABEL PLTORT</td>
</tr>
<tr>
<td></td>
<td></td>
<td>PLTSTE</td>
</tr>
</tbody>
</table>
**SYSTEM ROUTINES**

**DATE:** returns the current date as the value of the function in the form YY/MM/DD where MM is the number of the month, DD is the day within the month, and YY is the year. The value returned is type character with a length of 10.

**EXIT:** terminates program execution and returns control to the operating system.

**TIME:** returns the current reading of the system clock as the value of the function in the form HH.MM.SS where HH is hours from 0 to 23, MM is minutes, and SS is seconds. The value returned is type character with a length of 10.

**SYSTEM ROUTINE** called by **USSAERO ROUTINE**

- DATE
- EXIT
- TIME

- USAERO
- GEOM INVERT SUPPAN
- WNGVEL
- HDR

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APPENDIX C

INPUT ERROR ANALYSIS EXAMPLE

This appendix presents an example using the new input error analysis routine. The routine was developed as a user aid in identifying input card errors. Each control card variable is checked against permissable values and an error is written out when the check fails.

The following pages present the input and output of the error example.
ERROR EXAMPLE INPUT

ORIGINAL PAGE IS OF POOR QUALITY

NACA 64 A51631 SWEPT WING VERSION DOE

-1 0 0 0 0 0

2.51

0. 2.5 5. 10. 15. 20. 30. 40. 50. 60.

0. 0. 0. 0. 1.0

1.25 1.25 0. 0.

0. 1.26 1.741 2.383 2.841 3.186 3.634 3.811 3.693 3.252

2.583 1.768 .887 .451 .014

0. 1.268 1.741 2.383 2.841 3.186 3.634 3.811 3.693 3.252

2.583 .768 .887 .451 .014

SINGULARITY PANELING NACA 64 A51631 VERSION DOE

-1 -1 -1 -1 -1 -1 -1

0 0 0 0 0 0 0

1.69 1.125

.485 .485

0. 6.45 .7875 1.125

-1.
APPENDIX D

COMPARISON RUN BETWEEN VERSIONS BO1 AND D00

This appendix shows the input card differences between versions BO1 and D00. The configuration used is the transonic wing-body model which appears in reference 1. Differences between the two inputs are highlighted by asterisks.
### NACA RM LSIF07 TRANSONIC WING-BODY DEFINITION

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<th>0.0</th>
<th>7.1</th>
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<tbody>
<tr>
<td>25.3</td>
<td>0.0</td>
<td>4.5</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>WAFORD</th>
<th>0.0</th>
<th>0.464</th>
<th>0.563</th>
<th>0.718</th>
<th>0.981</th>
<th>1.313</th>
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**ORIGINAL PAGE IS OF POOR QUALITY**
**Title and Subtitle**

USSAERO Version D
Computer Program Development
Using ANSI Standard FORTRAN 77 and DI-3000 Graphics

**Author(s)**

Michael R. Wiese

**Performing Organization Name and Address**

Computer Sciences Corporation
Hampton, Virginia 23666

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National Aeronautics and Space Administration
Washington, DC 20546

**Abstract**

The D version of the Unified Subsonic Supersonic Aerodynamic Analysis (USSAERO) program is the result of numerous modifications and enhancements to the BO1 version.

These changes include conversion to ANSI standard FORTRAN 77; use of the DI-3000 graphics package; removal of the overlay structure; a revised input format; the addition of an input data analysis routine; and increasing the number of aeronautical components allowed.

**Key Words (Suggested by Author(s))**

- Potential flow
- Pressure distribution theory
- Aerodynamic characteristics
- Subsonic aerodynamics
- Supersonic aerodynamics
- Panel methods
- Lifting surface
- Computer program

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