NASA-TM-81364 19810022273

NASA Technical Memorandum 81364

USER'S MANUAL FOR FSLIP-3, FLEXSTAB LOADS INTEGRATION PROGRAM

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August 1981

NASA

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Space Administration

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1.0 INTRODUCTION

In the last decade, computer programs for theoretical aerodynamic analysis have evolved with increasing accuracy and sophistication. A most useful output from these panel method programs is the prediction of surface pressures on fairly arbitrary three dimensional configurations. These surface pressures can be integrated to obtain total forces and moments on complete configurations or airloads acting on individual vehicle components.

The FLEXSTAB computer program system (references 1-4) is being evaluated at NASA Dryden Flight Research Center for the prediction of airloads on rigid and aeroelastic configurations. Predicted airloads are being compared with wind tunnel and flight measured loads for a variety of vehicles including the B-1 and Space Shuttle Orbiter (reference 5). An existing FLEXSTAB module called ALOADS was written to integrate pressures to obtain airloads. However, certain restrictions in the ALOADS module make it ill-suited for predicting airloads which are comparable to many typical flight measured airloads. The most important restriction is that the pressures are summed at a user-specified point relative to the reference axis system which means the integration axis must be parallel to the model centerline with no sweep angle. The ALOADS model is also limited to symmetric flight conditions.

Because of these restrictions, a new follow-on integration program called FSLIP was written which has expanded capabilities and flexibility. FSLIP is generalized to work on any FLEXSTAB model with no restriction on the type of case or definition of the integration axis system. The effective area, bending arm, and torque arm for each panel can be individually defined. FSLIP also has a built-in interface with the FLEXSTAB GDTAPE data base to automatically generate the geometric integration data. Included in the program is an option for computing airloads derived from linearized wind tunnel coefficients for comparison to FLEXSTAB predicted loads.

This report consitutes the FSLIP program documentation and user's manual. An outline of the computational tasks is followed by sections describing the program's organization, execution, detailed data input, and output. Examples are included which illustrate the main program options. A microfiche supplement contains a listing of the source code and reference map.

2.0 SYMBOLS AND ABBREVIATIONS

The program assumes all varibles are input in U.S. Customary Units as specified below.

B	bending moment airload, in-lbs
BP	butt plane, in.
b/2	reference semispan of a load station, in.
C_{i1}, C_{i2}, C_{i3}	shear, bending, and torque constants, respectively (eq. 7)
C_V, C_B, C_T	shear, bending, and torque airload coefficients (eq. 4, 5, and 6, respectively)
C_{VBT}	generalized airload coefficient (eq. 8-14)
c	reference chord of a load station, in.
FS	fuselage station, in.
L_i	generalized airload (eq. 7)
P	rolling velocity, deg/sec, positive left wing up
Q	pitching velocity, deg/sec, positive nose up
$\bar{q}$	free stream dynamic pressure, psf
R	yawing velocity, deg/sec, positive nose right
R_i	radius at a slender body aerocentroid, in.
S	reference area of a load station, ft^2
s_i	effective area of a panel, in^2
T	torque airload, in-lbs
V	shear airload, lbs
V_t	true velocity, ft/sec
WL	waterline, in.
X_A, Y_A	integration axis coordinate system

X_{A_0}, Y_{A_0}	coordinates defining the origin of a thin body integration axis system, in. (fig. 6)
X_{C_i}	effective centroid of a slender body panel, in.
X_{FWD}, X_{AFT}, X_{MR}	coordinates defining a slender body integration, in. (fig. 8)
X_M, Y_M, Z_M	slender body local coordinate system
X_N, Y_N, Z_N	thin body local coordinate system
x_i	effective torque arm of a panel, in.
y_i	effective bending arm of a panel, in.
α	angle of attack, deg, positive nose up
$\dot{\alpha}$	angle of attack derivative, deg/sec, positive nose up
β	angle of sideslip, deg, positive nose left
δ_H	symmetric horizontal tail deflection $(\delta_{H_L}+\delta_{H_R})/2$, deg, positive trailing edge down
$\delta_{H'}$	asymmetric horizontal tail deflection $(\delta_{H_L}-\delta_{H_R})/2$, deg, positive produces right roll
δ_{RL}	lower rudder deflection, deg, positive trailing edge left
δ_{RU}	upper rudder deflection, deg, positive trailing edge left
δ_{SP_L}	left spoiler deflection, deg, negative trailing edge up
δ_{SP_R}	right spoiler deflection, deg, positive trailing edge up
ΔCP_i	differential pressure coefficient of a panel
Δx_{HT}	horizontal tail moment transfer arm, longitudinal, in., (eq. 16)
Δx_i	effective longitudinal width of a slender body panel, in.
Δx_{VTR}	vertical tail root moment transfer arm, longitudinal, in., (eq. 18)

Δy_{HT}	horizontal tail moment transfer arm, lateral, in., (eq. 19)
Δz_{VTR}	vertical tail root moment transfer arm, vertical, in., (eq. 19)
Λ_A	sweep angle of a thin body integration axis system, deg

Subscripts:

AF	aft fuselage
A/S	asymmetric
c/o	carryover effect
FF	forward fuselage
LHT, RHT	left and right horizontal tail
LW, RW	left and right wing
SYM	symmetric
UVT	upper vertical tail
VT	vertical tail
VTR	vertical tail root

3.0 COMPUTATIONAL TASK DESCRIPTION

Sections 3.1, 3.2, and 3.3 outline the major computational tasks performed by the program. Section 3.4 discusses the sign convention for the loads.

3.1 Pressure Integrated Loads

The primary program task is to integrate pressures on a finite number of panels making up a single thin or slender body. The pressures are summed relative to an integration axis system to produce shear, bending, and torque loads as follows:

$$V = \bar{q} \sum_i \Delta CP_i \cdot s_i \tag{1}$$

$$B = \bar{q} \sum_i \Delta CP_i \cdot s_i \cdot y_i \tag{2}$$

$$T = \bar{q} \sum_i \Delta CP_i \cdot s_i \cdot x_i \tag{3}$$

The integration geometry for each load station is stored on a data base for repeated use. The pressure coefficients are stored on a separate data base for each case to be processed. Each body may have a left and right hand side or be a single body on the vehicle centerline. Thin bodies have a single ΔCP acting normal to each panel. Slender bodies may have both a vertical and lateral ΔCP.

The total integrated loads at each station are reduced to standard non-dimensional form as follows:

$$C_V = V / (\bar{q} \cdot S) \tag{4}$$

$$C_B = B / (\bar{q} \cdot S \cdot b/2) \tag{5}$$

$$C_T = T / (\bar{q} \cdot S \cdot c) \tag{6}$$

3.2 Additional Loads Option

Once the pressure integrated loads have been computed, a program option allows a new load station to be defined which is a linear combination of previously defined loads. An additional load definition takes the generalized form of a matrix equation:

$$\begin{bmatrix} V & B & T \end{bmatrix} = \begin{bmatrix} C_{01} & C_{02} & C_{03} \end{bmatrix} + \begin{bmatrix} L_1 & L_2 & \cdots & L_i \end{bmatrix} \begin{bmatrix} C_{11} & C_{12} & C_{13} \\ C_{21} & C_{22} & C_{23} \\ \vdots & \vdots & \vdots \\ C_{i1} & C_{i2} & C_{i3} \end{bmatrix} \tag{7}$$

3.3 Wind Tunnel Loads Option

This program option computes airloads based on linearized coefficients derived from wind tunnel or other load surveys. Table 1 lists the aerodynamic effects applicable to 5 types of load stations. The overall format is based on the airload coefficients derived for the B-1 aircraft in reference 6. The total load coefficients at each station are built up from the components as listed in the generalized equations below. Particular attention should be paid to the units and sign conventions for each component.

3.3.1 Wing station.-

Left side:

$$C_{VBT_{LW}} = C_{VBT_{\alpha=0}} + C_{VBT_{\alpha}}\alpha + C_{VBT_{\dot{\alpha}}}\left(\frac{\dot{\alpha}\, C_W}{2V_t}\right) - C_{VBT_{\delta_{SP}}}\delta_{SP_{LW}}$$

$$+ C_{VBT_P}\left(\frac{Pb_W}{2V_t}\right) + C_{VBT_Q}\left(\frac{QC_W}{2V_t}\right) \qquad (8L)$$

$$+ \left[C_{VBT_{\beta\alpha=0_{SYM}}} + C_{VBT_{\beta\alpha=0_{A/S}}} + \left(C_{VBT_{\beta\alpha_{SYM}}} + C_{VBT_{\beta\alpha_{A/S}}}\right)\alpha\right]\beta$$

Right side:

$$C_{VBT_{RW}} = C_{VBT_{\alpha=0}} + C_{BVT_{\alpha}}\alpha + C_{VBT_{\dot{\alpha}}}\left(\frac{\dot{\alpha}\, C_W}{2V_t}\right) + C_{VBT_{\delta_{SP}}}\delta_{SP_{RW}}$$

$$- C_{VBT_P}\left(\frac{Pb_W}{2V_t}\right) + C_{VBT_Q}\left(\frac{QC_W}{2V_t}\right) \qquad (8R)$$

$$+ \left[C_{VBT_{\beta\alpha=0_{SYM}}} - C_{VBT_{\beta\alpha=0_{A/S}}} + \left(C_{VBT_{\beta\alpha_{SYM}}} - C_{VBT_{\beta\alpha_{A/S}}}\right)\alpha\right]\beta$$

TABLE I.- AERODYNAMIC EFFECTS APPLICABLE TO COMPONENT LOADS

Effect	Wing	Horiz tail	Vert tail	Fwd fus	Aft fus
$\alpha = 0$	X	X		X	X
α	X	X		X	X
$\dot{\alpha}$	X	X			
β		X		X	X
δ_H (sym horiz tail defl)		X			
$\delta_{H'}$ (anti sym horiz tail defl)		X	X		X
δ_{SP} (spoiler defl)	X	X	X		
δ_{SP} c/o (horiz tail carryover)		X			
δ_{RU} (upper rudder defl)			X		
δ_{RL} (lower rudder defl)			X		X
P (damping in roll)	X	X	X	X	X
Q (damping in pitch)	X	X			
R (damping in yaw)			X		
β $\alpha = 0$ A/S (wing)	X				
β $\alpha = 0$ Sym (wing)	X				
$\beta\alpha$A/S (wing)	X				
$\beta\alpha$Sym (wing)	X				
β $\alpha = 0$ (vert tail)			X		
$\beta\alpha$ (vert tail)			X		
β $\alpha = 0$ c/o (aft fus carryover)					X
$\beta\alpha$ c/o (aft fus carryover)					X

X = Applicable aerodynamic effect

3.3.2 Horizontal tail station.-

Left side:

$$C_{VBT_{LHT}} = C_{VBT_{\alpha=0}} + C_{VBT_{\alpha}}\alpha + C_{VBT_{\delta_H}}\delta_H + C_{VBT_{\dot{\alpha}}}\left(\frac{\dot{\alpha}\, C_{HT}}{2V_t}\right)$$

$$+ C_{VBT_{\delta_{H'}}}\delta_{H'} + C_{VBT_{\beta}}\beta - C_{VBT_{\delta_{SP}}}\delta_{SP_L} + C_{VBT_{\delta_{SP_{c/o}}}}\delta_{SP_R}$$

$$+ C_{VBT_P}\left(\frac{Pb_{HT}}{2V_t}\right) + C_{BVT_Q}\left(\frac{QC_{HT}}{2V_t}\right) \qquad (9L)$$

Right side:

$$C_{VBT_{RHT}} = C_{VBT_{\alpha=0}} + C_{VBT_{\alpha}}\alpha + C_{BVT_{\delta_H}}\delta_H + C_{BVT_{\dot{\alpha}}}\left(\frac{\dot{\alpha}\, C_{HT}}{2V_t}\right)$$

$$- C_{VBT_{\delta_{H'}}}\delta_{H'} - C_{VBT_{\beta}}\beta + C_{VBT_{\delta_{SP}}}\delta_{SP_R} - C_{VBT_{\delta_{SP_{c/o}}}}\delta_{SP_L}$$

$$- C_{VBT_P}\left(\frac{Pb_{HT}}{2V_t}\right) + C_{VBT_Q}\left(\frac{QC_{HT}}{2V_t}\right) \qquad (9R)$$

3.3.3 Vertical tail station.-

$$C_{VBT_{VT}} = \left[C_{VBT_{\beta\alpha=0}} + C_{VBT_{\beta\alpha}}\alpha\right]\beta + C_{VBT_{\delta_{H'}}}\delta_{H'}$$

$$+ C_{VBT_{\delta_{SP}}}\left(\delta_{SP_R} + \delta_{SP_L}\right) + C_{VBT_{\delta_{RU}}}\delta_{RU} \qquad (10)$$

$$+ C_{VBT_{\delta_{RL}}}\delta_{RL} + C_{VBT_P}\left(\frac{Pb_{VT}}{2V_t}\right) + C_{VBT_R}\left(\frac{Rb_{VT}}{2V_t}\right)$$

3.3.4 Forward fuselage station.-

Vertical :

$$C_{VBT_{FF}} = C_{VBT_{\alpha=0}} + C_{VBT_{\alpha}} \alpha \tag{11}$$

Lateral :

$$C_{VBT_{FF}} = C_{VBT_{\beta}} \beta + C_{VBT_{P}} \left(\frac{Pb_{FF}}{2V_t} \right) \tag{12}$$

3.3.5 Aft fuselage station.-

Vertical :

$$C_{VBT_{AF}} = C_{VBT_{\alpha=0}} + C_{VBT_{\alpha}} \alpha \tag{13}$$

Lateral :

$$C_{VBT_{AF}} = \left(C_{VBT_{\beta\alpha=0_{c/o}}} + C_{VBT_{\beta\alpha_{c/o}}} \alpha \right) \beta + C_{VBT_{\delta_{H'}}} \delta_{H'} + C_{VBT_{\delta_{RL}}} \delta_{RL}$$

$$+ C_{VBT_{P}} \left(\frac{Pb_{AF}}{2V_t} \right) + C_{VBT_{\beta}} \beta \tag{14}$$

The TOTAL vertical and lateral airloads at the aft fuselage station can be computed by adding the tail induced components to the airloads on the aft fuselage itself :

Vertical :

$$V_{AF} = (C_{V_{AF}} \bar{q} S_{AF}) + (V_{LHT} + V_{RHT}) \tag{15}$$

$$B_{AF} = (C_{B_{AF}} \bar{q} S_{AF} b_{AF}/2) + (V_{LHT} + V_{RHT}) \Delta x_{HT} - (T_{LHT} + T_{RHT}) \tag{16}$$

Lateral :

$$V_{AF} = (C_{V_{AF}} \bar{q} S_{AF}) + V_{VTR} \tag{17}$$

$$B_{AF} = (C_{B_{AF}} \bar{q} S_{AF} b_{AF}/2) + V_{VTR} \Delta x_{VTR} - T_{VTR} \tag{18}$$

$$T_{AF} = (C_{T_{AF}} \bar{q} S_{AF} c_{AF}) + V_{VTR} \Delta z_{VTR} + B_{VTR} + (V_{LHT} - V_{RHT}) \Delta y_{HT} + (B_{LHT} - B_{RHT}) \quad (19)$$

3.4 Sign Convention for Loads

Figure 1 shows the sign convention for positive shear loads. Note that for thin bodies off the centerline, positive shear load is always in the direction of the LOCAL Z_N axis normal to the surface. For slender bodies off the centerline, positive shears are always in the direction of the LOCAL Y_M and Z_M axes. For all bodies on the centerline, positive shear is always to the right.

Positive bending and torque loads for the right side thin bodies obey the right hand rule about the local X and Y axes respectively (positive tip and leading edge up). The left side axes are a mirror image of the right side. For slender bodies, a program option allows the user to define the convention for positive bending moments (either nose up, nose right, tail up, or tail right).

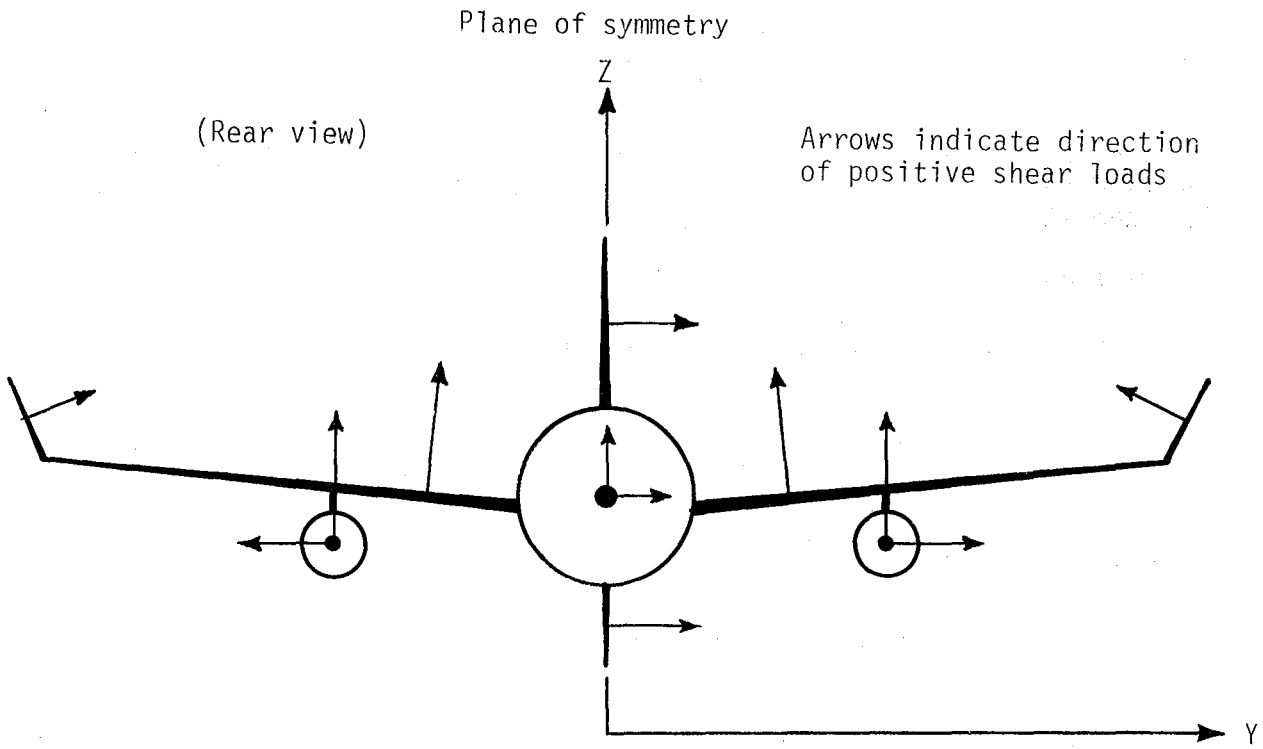

Figure 1. Sign convention for positive shear loads.

4.0 PROGRAM DESCRIPTION

The FSLIP-3 program is written in FORTRAN Extended Version 4 (reference 7). Current length is 1535 statements including comments. A complete listing of the source code with reference maps is included in a microfiche supplement attached to the inside back cover.

4.1 Main Program Organization

The primary function of the main program is to control the execution of subroutines which create or use various mini data bases. A simplified flowchart of the main program is shown in figure 2. The program first reads execution control information. If requested, an integration geometry data base is next created by a call to the geometry option subroutine (GOPSR). If no other options are requested, execution stops at this point. A call to the wind tunnel option subroutine (WOPSR) creates a data base containing wind tunnel load coefficients. Next, data describing each case (e.g. α, β, $\bar{q}$, δ_e, etc.) are read in. If the pressure data is input on cards, the pressure option subroutine (POPSR) is called to create this data base.

At this point (labeled A) all data input is complete and the program proceeds with the computational options. A call to the integration option subroutine (IOPSR) generates the pressure integrated loads. If specified on the geometry data base, this subroutine also computes any additional loads defined as a linear combination of previously computed loads. If wind tunnel derived loads are desired, the wind tunnel option subroutine (WOPSR) is called again. At this point, all loads have been computed and the only remaining task is an option to print a summary of specified results in a very concise format.

4.2 Input/Output Data Flow

As just discussed, a set of subroutines creates or uses a number of discrete disk files containing data required by the computational options. Table 2 describes the function of each disk file allocated for data input or output. The overall data flow between the subroutines is shown in figure 3 and is discussed below in terms of the primary program options. Specific details of the unformatted disk files are provided in the DATA INPUT DESCRIPTION (sections 6.2, 6.3, and 6.5).

4.2.1 Geometry Option.- The surface/axis data file (Tape 20) provides the foundation for the integration process. For each integration, this data base contains the effective area, bending arm, and torque arm for each panel on the specified body. The user has several means of creating the surface/axis data file via subroutine GOPSR which is controlled by the geometry option parameter (GOP). If GOP = 1, the file is assumed to exist and the subroutine is not called. GOP = 2 indicates that the file is copied from card input. GOP = 0 means the file is not input.

An initial run is usually made with GOP = 3 or 4 which uses the FLEXSTAB GDTAPE. The user simply specifies the FLEXSTAB body along with the integration

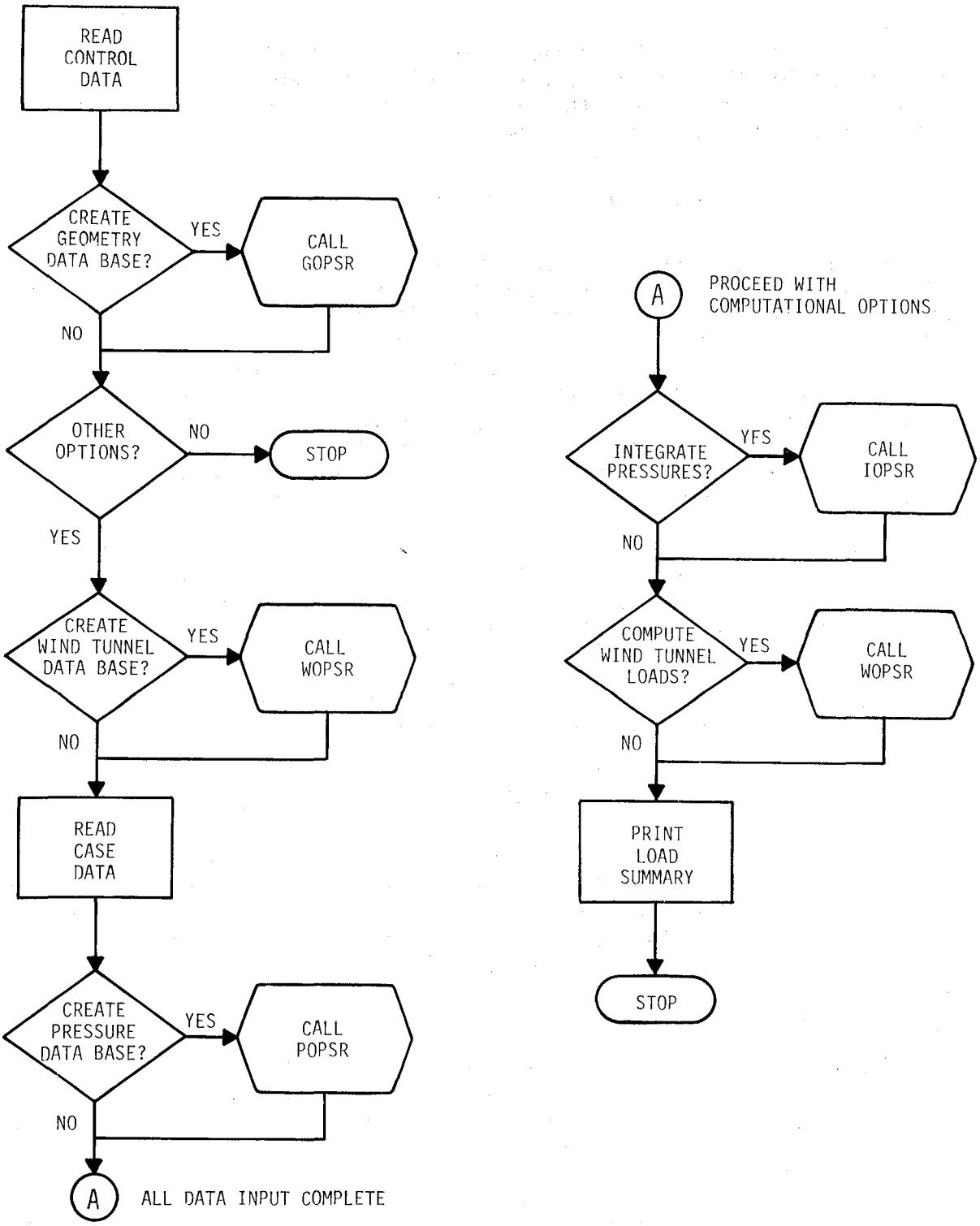

Figure 2. Main program simplified flowchart.

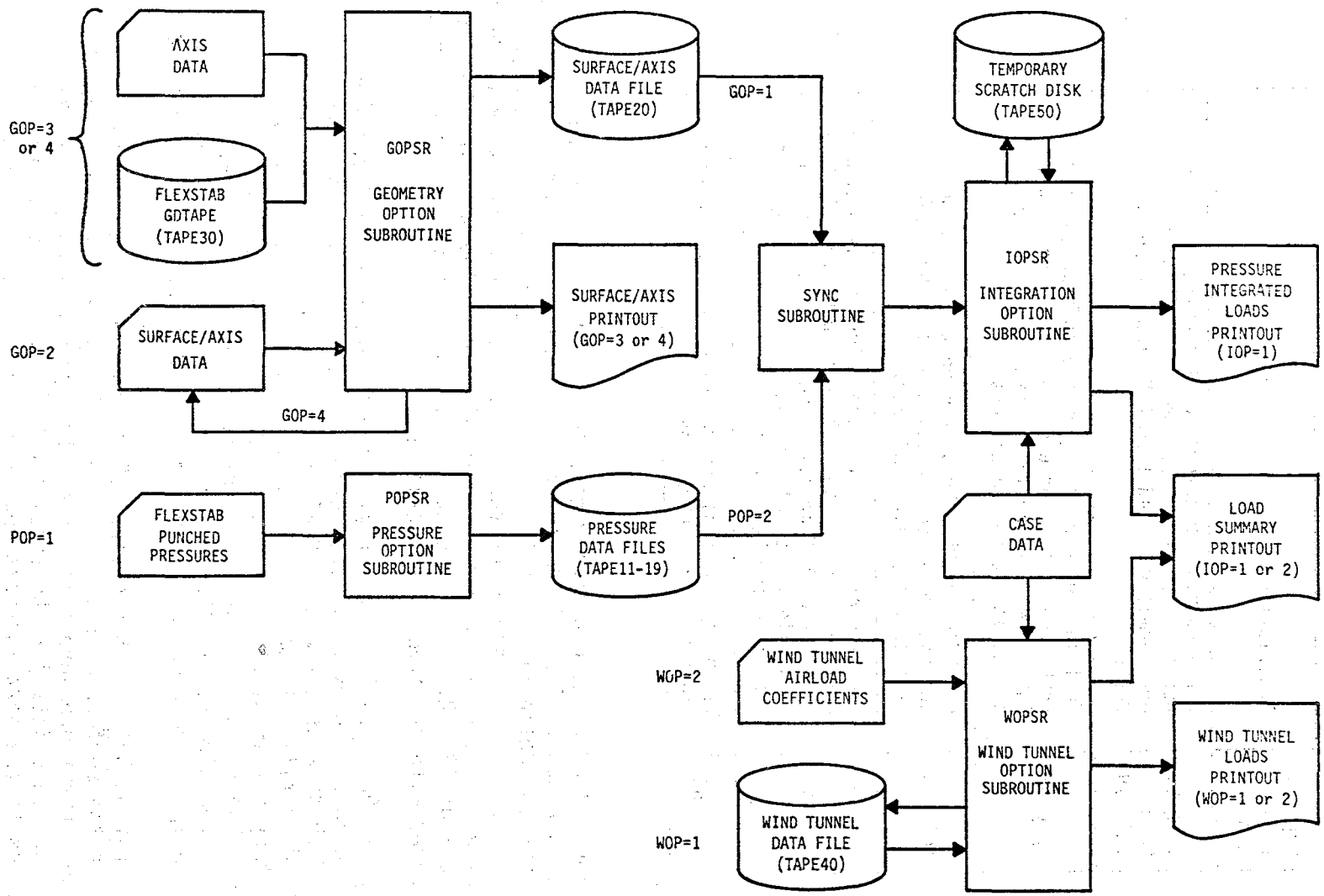

Figure 3. Input/output data flow.

TABLE 2. INPUT/OUTPUT DISK FILES

Logical File Name	Description
TAPE 11 thru TAPE 19	Contains panel pressure coefficients, one file per case, up to 9 cases per job. These files are normally copied from FLEXSTAB punched card decks.
TAPE 20	Contains surface/axis geometry information for each load station on each thin or slender body. This file is normally created from card input and cataloged for later runs.
TAPE 30	FLEXSTAB GDTAPE - This permanent file can be accessed to automatically generate the surface/ axis geometry file (TAPE 20).
TAPE 40	Contains airload coefficients for the wind tunnel derived loads option. There is usually a different file for each Mach number/vehicle configuration. This file is normally created from card input and cataloged for later runs.
TAPE 50	Temporary internal scratch disk used by the integration option subroutine.

axis location and GOPSR automatically computes the data for each panel and creates the data base. A printout is generated which lists complete details of the integration definition. If GOP = 4, the surface/axis file is also punched on cards. This option gives the user a means to manually override the computed values on selected panels for special cases. The modified deck is then rerun using GOP = 2. This procedure is fully discussed in section 6.2 and illustrated with an example in section 8.

4.2.2 Pressure Option.- The panel pressure data are usually input from FLEXSTAB punched card decks. In this case, the pressure option parameter (POP) = 1 which directs subroutine POPSR to copy each case to a separate unformatted disk file. If desired, these files can be cataloged for later runs where they are input directly using POP = 2. Pressure data from a source other than FLEXSTAB could be processed if input in the same card format or written directly to the disk files by the generating aerodynamic program or an interface program. If no pressure data are to be input, POP = 0.

4.2.3 Integration Option.- Subroutine IOPSR processes each integration definition on the surface/axis data file by calling subroutine SYNC which searches the current pressure file for matching pressure data. If SYNC cannot find pressure data for the specified body, a message is printed and IOPSR proceeds to the next integration. The user can also individually suppress any particular integration definition residing on the surface/

axis file. Any additional load definitions are processed after all integrations have been completed for the first case. IOPSR then recycles to repeat the process for any succeeding cases.

The user has two options when executing IOPSR which controls the printed output. For IOP = 1, a detailed listing is generated for each integration which shows the area, arms, pressure coefficient, and loads for each panel on the body. If IOP = 2, this detailed listing is suppressed and the loads summary printout option must be used to printout the total integrated loads. The case data (read from cards by the main program) are passed to IOPSR via common and is optional. Its only function in IOPSR is to provide case descriptive data printed in the page header for each integration. If IOP = 0, IOPSR is not called and no integrations are performed.

4.2.4 Wind Tunnel Option.- To compute wind tunnel derived airloads, subroutine WOPSR is initially executed with WOP = 2, which copies the load coefficients from card input to the unformatted disk file. Future runs are then made by using the file directly with WOP = 1. For either option, the load coefficient data file is combined with the case describing data to compute the airloads for each case. The wind tunnel loads printout produces a listing of the coefficients and component loads for each aerodynamic effect.

For comparison purposes, a summary of the wind tunnel loads can be printed out along with the pressure integrated load only if the integration option is executed. The wind tunnel option can also be executed by itself by setting GOP, POP, and IOP to zero. In this mode, only the standard wind tunnel loads printout is generated. If WOP = 0, WOPSR is not called. Creation of the wind tunnel data file is described in detail in section 6.3 and illustrated with an example in section 8.2.

4.3 Option Requirements

The input and computational options discussed above are listed in detail in the input description for CARD 1 (section 6.1). The user can individually select the form by which the data input files are created or accessed and the computational options performed on these files. In general, any combination of program options are allowed through proper system control cards (see JCL section 5.1 and 5.2). The only requirements are listed below.

1. Execution of the geometry option with GOP = 3 or 4 requires access to a FLEXSTAB GDTAPE (TAPE 30).

2. Execution of the integration option requires access to both a surface/axis data file (TAPE 20) and a pressure data file for each case (TAPE 11-19). Thus if either GOP or POP = 0, IOP must = 0.

3. Execution of the wind tunnel option requires access only to a airload coefficient file (TAPE 40).

4.4 Program Restrictions and Limitations

4.4.1 FLEXSTAB Dependent.- The FSLIP program was written to be compatible with any FLEXSTAB GD model. Thus any restrictions in the GD module (ref. 2-4) also apply to FSLIP. While there is no limit on the number of bodies defining a GD model, each slender body is limited to 100 control points and each thin body is limited to 200 panels.

The most important restriction affecting FLEXSTAB jobs involves the use of units. FSLIP assumes the aerodynamic model is defined in inches, thus the units option in the GD module must be INCHES. FSLIP also assumes that dynamic pressure is in PSF, thus the units option in the SDSS module must be IN/FT or FT.

When interfacing with the GDTAPE (GOP = 3 or 4), FSLIP is compatible with any GDTAPE except those produced by Level 3.02 FLEXSTAB. The GDTAPE file structure for Level 3.02 was changed (reference 8) which affects the read statements in GOPSR. There are two ways to circumvent this problem for the user of Level 3.02 FLEXSTAB. The read statements in GOPSR can be changed to be compatible with Level 3.02 or the user can maintain access to an earlier level GD module for creating a FSLIP compatible GDTAPE. Under the FLEXSTAB system, the GDTAPE may contain multiple files with each file defining a different GD model. FSLIP reads the currently positioned file, thus if the user wishes to process other than the first file, appropriate SKIP or COPY utilities should be used to position the desired file after attaching the GDTAPE.

4.4.2 FSLIP Dependent.- Result arrays in FSLIP are currently sized to handle up to 9 different pressure cases per run. The surface/axis data file can contain up to 50 load stations to be processed for each case. The pressure data is usually input from card decks punched by the SD & SS module in FLEXSTAB. However, SD & SS is limited to punching thin body pressures only. If the user wishes to compute loads on slender bodies (such as fuselage loads), FSLIP has provisions for manually adding the slender body force coefficients (computed by SD & SS) to the thin body pressure decks. This procedure is described in section 6.5.

A very general restriction in FSLIP relates to the printed output which makes extensive use of fixed field F formats. These fields have been sized to handle physically realistic problems, and thus should not present a practical limitation. Specific restrictions related to the detailed card input is discussed in the DATA INPUT DESCRIPTION (section 6).

5.0 PROGRAM EXECUTION

FSLIP is presently operational on DFRC's CDC Cyber 73 computer. The program has been executed using both the SCOPE and NOS operating systems. Section 5.1 describes the Job Control Language (JCL) required for the SCOPE 3.4 operating system (reference 9). Section 5.2 contains the JCL required for the NOS 1.4 operating system (reference 10).

5.1 SCOPE JCL

To execute the FSLIP program using SCOPE, the following system control cards are required:

1. Job Card.
2. XXXXX,T300,FTN,YYYY.
3. ATTACH(LGO,FSLIP3,ID=SIMS,MR=1)
4. REQUEST(TAPEXX,*PF)
5. ATTACH(TAPEXX,YYYYYYY,ID=ZZZZ,MR=1)
6. MAP(OFF)
7. LGO(PL=10000)
8. CATALOG(TAPEXX,YYYYYYY,ID=ZZZZ)
9. 7/8/9 End of file card
10. Data Input Deck
11. 6/7/8/9 End of job card

NOTES:

Card 1 - Estimated wall clock time of 2 to 5 minutes should be sufficient for most jobs.

Card 2 - XXXXX = User's Job Name

YYYY = Subtask number

Card 4 and 8 - These two cards are included for each data file to be input on cards and cataloged for use in later runs.

XX = 11 For pressure data file, case 1
12 " " " " , case 2
13 " " " " , case 3
14 " " " " , case 4
15 " " " " , case 5
16 " " " " , case 6
17 " " " " , case 7
18 " " " " , case 8
19 " " " " , case 9

20 For surface/axis data file

40 For wind tunnel data file

YYYYYYY = Permanent File Name

ZZZZ = Owner I.D.

Card 5 - This card is included for each previously cataloged data file to be accessed for job execution. The parameters XX, YYYYYYY, and ZZZZ are the same as for CARD 8, with the addition:

XX = 30 for the FLEXSTAB GDTAPE

Card 7 - For large jobs, the print limit may have to be increased. See section 7.1 for estimating amount of printout.

5.2 NOS JCL

To execute the FSLIP program using NOS, the following system control cards are required:

1. Job Card
2. XXXXX,T300.
3. USER(XXXX,YY)
4. CHARGE(XX,YY,FTN)
5. ATTACH(LGO=FSLIP3/UN=SIMS)
6. DEFINE(TAPEXX=YYYYYYY/CT=SPRIV)
7. ATTACH(TAPEXX=YYYYYYY)
8. LDSET(PRESET=ZERO)
9. MAP(OFF)
10. LGO(PL=10000)
11. 7/8/9 End of file card
12. Data Input Deck
13. 6/7/8/9 End of job card

NOTES:

Card 2 - XXXXX = User's Job Name

Card 3 - XXXX = User's name

YY = User's password

Card 4 - XX,YY = Subtask number

Card 6 - This card replaces cards 4 and 8 defined above for SCOPE with the same XX and YYYYYYY parameters.

Card 7 - This card replaces card 5 defined above for SCOPE with the same XX and YYYYYYY parameters.

5.3 CM and CP Time Requirements

FSLIP requires a maximum execution field length of approximately 115K octal words. Execution CP times are very problem size dependent but relatively quick. Most average size jobs run in 10 to 20 CP seconds. The largest size jobs may require approximately 100 CP seconds.

6.0 DATA INPUT DESCRIPTION

This section contains a detailed description of the card input deck required for execution. Figure 4 illustrates the overall card deck structure which is broken down into 5 major sections. Section 6.1 contains program control data defined with card types 1 through 4. Section 6.2 is the surface/axis data file (card types 5 through 11). Section 6.3 is the wind tunnel data file (card types 12 through 15). Card types 16 through 18 make up section 6.4 containing case description data. Section 6.5 is the pressure data file (card types 19 through 24) which is repeated for each case to be processed. Section

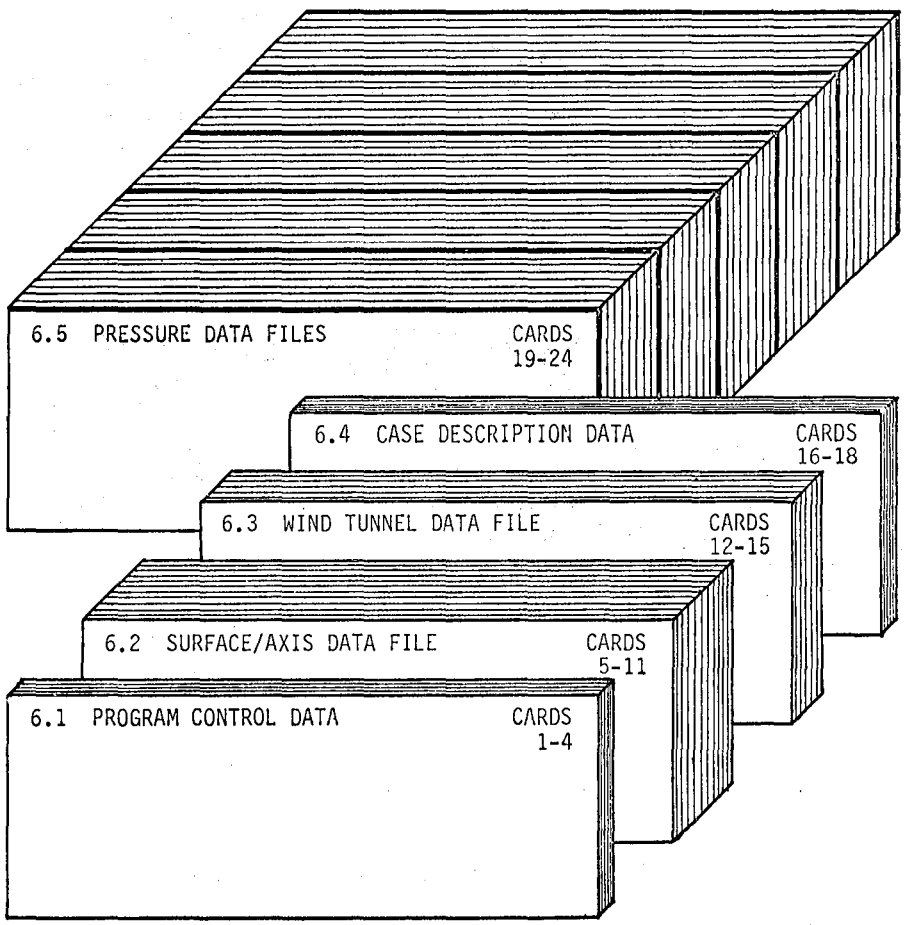

Figure 4. Overall card deck structure.

6.1 is always required for execution. Sections 6.2, 6.3, 6.4, and 6.5 are optional depending on the input options defined on CARD 1. Each of the five major sections are described separately.

6.1 Program Control Data (CARDS 1-4)

The card arrangement for the program control data is shown in figure 5. Particular attention should be paid to the option control parameters on CARD 1 as they affect most of the downstream cards. CARDS 2A and 2B control which integrated and wind tunnel loads are computed. CARD SET 3 controls the summary print option.

In the detailed card descriptions that follow, each data field is listed with its card columns, format, descriptor name, and explanation. In addition, 4 columns labeled R, S, I, and W denote the major computational options listed on CARD 1 as the Repunch option, Section data option, Integration option, and Wind tunnel option. The Repunch and Section data options are not currently incorporated in FSLIP but have been included for compatibility reasons because several input fields have been allocated for varibles that apply only to the Repunch or Section data options. If an X appears in a particular column, it signifies that the varible applies to that option and should be defined. If the column is blank, the varible does not apply to that option and the field may be left blank. If an I appears in the column, it denotes a varible that is not used in any computation but provides information that will be printed as part of the page headers.

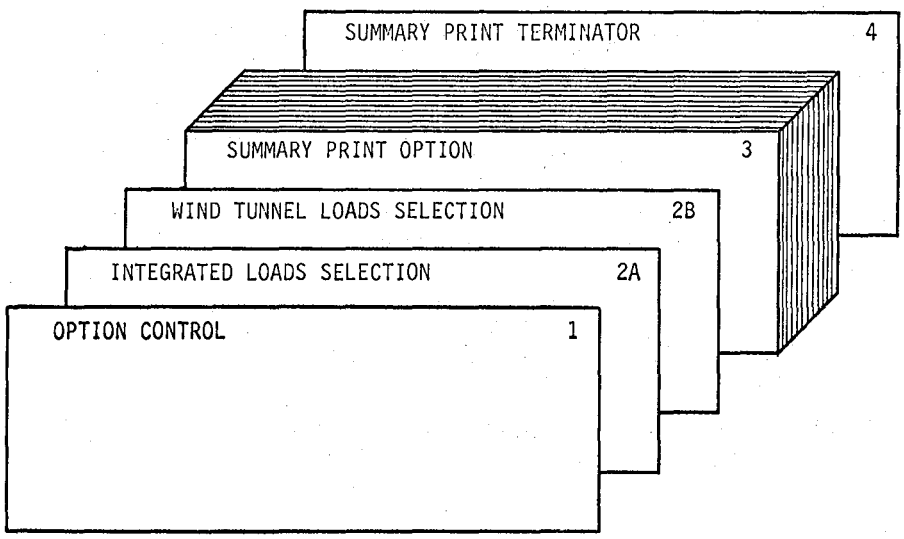

Figure 5. Card arrangement for the program control data.

CARD 1 - OPTION CONTROL.

Note: The following options are not currently available:
ROP=1, ROP=2
SOP=1

C-C	FORMAT	DESCRIPTOR	R	S	I	W	EXPLANATION
10	I1	GOP			X		Geometry input option. = 0 : Surface/axis data not input. = 1 : Data on disk (TAPE20). = 2 : Data read from cards, copied to disk. = 3 : Data computed from input and GDTAPE (TAPE30). = 4 : Data computed and punched from input and GDTAPE (TAPE30).
20	I1	POP			X		Pressure data input option. = 0 : Data not input. = 1 : Data on cards (punched by SD&SS) = 2 : Data on disk (TAPE11-19).
30	I1	ROP	X				Repunch pressure data option. = 0 : Not desired. = 1 : Repunch ΔCP data with new x/c's. = 2 : Punch non-FLEXSTAB ΔCP data.
40	I1	SOP		X			Section data option. = 0 : Not desired. = 1 : Section data computed.
50	I1	IOP			X		Integration option. = 0 : Not desired. = 1 : Integrate pressures and print panel by panel details. = 2 : Integrate pressures but suppress panel by panel details. Summary print option (CARD SET 3) must be used to print loads.
60	I1	WOP				X	Wind tunnel loads option. = 0 : Not desired. = 1 : Compute wind tunnel loads-coefficients on disk (TAPE40). = 2 : Compute wind tunnel loads-coefficients read from cards, copied to disk.

CARD 2A - INTEGRATED LOADS SELECTION.

OMIT this card if IOP=0 (CARD 1).

The card column number corresponds to the load station number defined on CARD 6 or 10. One column for each load station - up to 50 maximum.

Applies to all cases processed in this job.

C-C	FORMAT	DESCRIPTOR	R	S	I	W	EXPLANATION
1-50	50L1	WGI			X		Load station selection. = T : Loads at this station will be computed. = F (or blank) : Loads at this station will NOT be computed.

CARD 2B - WIND TUNNEL LOADS SELECTION.

OMIT this card if WOP=0 (CARD 1).

The card column number corresponds to a particular load as listed in the table below. One column for each load - up to 14 maximum.

Applies to all cases processed in this job.

C-C	FORMAT	DESCRIPTOR	R	S	I	W	EXPLANATION
1-14	14L1	WGW				X	Wind tunnel loads selection. = T : Loads at this station will be computed. = F (or blank) : Loads at this station will NOT be computed.

Load assignments:

Wind tunnel load number (WLN)	Surface number (WTN on CARD13)	Description
1	1	Wing loads - total.
2	1	Wing loads - without α=0 term.
3	2	Horizontal tail loads - total.
4	2	Horizontal tail loads - without α=0 term.
5	3	Vertical tail loads - upper.
6	4	Vertical tail loads - root.
7	5	Forward fuselage - vertical loads.
8	5	Forward fuselage - lateral loads.
9	6	Aft fuselage - vertical loads on fuselage itself.
10	6	Aft fuselage - tail induced vertical loads.
11	6	Aft fuselage - total vertical loads.
12	6	Aft fuselage - lateral loads on fuselage itself.
13	6	Aft fuselage - tail induced lateral loads.
14	6	Aft fuselage - total lateral loads.

CARD SET 3 - SUMMARY PRINT OPTION.

A one page summary is produced for each load station specified.

One card per load station - up to 50 maximum.

C-C	FORMAT	DESCRIPTOR	R	S	I	W	EXPLANATION
1-2	I2	SPI			X		Load station number (SAN on CARD 6 or 10). Can be an integrated or additional load.
6-7	I2	SPW				X	Wind tunnel load number (WLN=1,14). If a wind tunnel load is computed that corresponds to the specified SPI, it can be printed along with the SPI load. SPW should not be specified unless SPI is non-zero.

CARD 4 - SUMMARY PRINT TERMINATOR.

This blank card signifies the end of program control data and is always included.

C-C	FORMAT	DESCRIPTOR	R	S	I	W	EXPLANATION
1-2	I2	-	X	X	X	X	Leave columns blank or zero.
6-7	I2	-	X	X	X	X	Leave columns blank or zero.

6.2 Surface/Axis Data File (CARDS 5-11)

This card section is used to create the surface/axis data file when GOP = 2, 3, or 4. Once the file has been created, this card section is omitted from the input deck if GOP = 0 or 1. Some general usage guidelines are presented here followed by the detailed card input descriptions.

Unlike the FLEXSTAB ALOADS module, FSLIP applies an integration specification to one thin or slender body at a time. More than one integration can be specified for a particular body. For each integration, the data file contains the effective area, bending arm, and torque arm for each panel on the specified body. Two methods are available for creating the data file which are discussed separately in sections 6.2.5 and 6.2.6.

6.2.1 Thin body integrations.- Figure 6 shows an example of the integration geometry for a typical thin body. The panel coordinates are originally defined in the local thin body coordinate system (X_N,Y_N) as established in the FLEXSTAB GD module. An arbitrary load station is defined by the coordinates X_{A_O}, Y_{A_O} and sweep angle Λ_A which determines the bending (X_A) and torque (Y_A) axes. The bending axis may cut through certain panels with the effective area of each panel normally taken as that portion outboard of the bending axis. The effective bending and torque arms are measured normal to the axes from the effective panel centroid. Note that a panel centroid aft of the torque axis produces a negative torque arm.

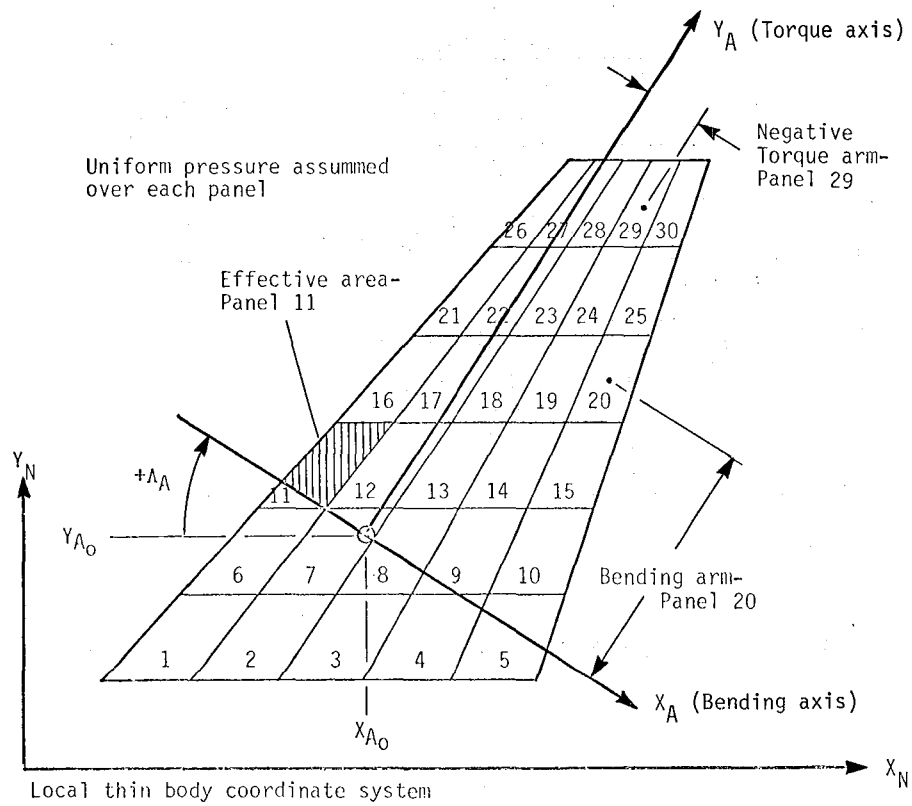

Figure 6. Integration geometry for thin body loads.

When executing GOP = 3 or 4, the geometry subroutine will automatically compute the effective panel geometry as described above. All panel areas inboard of the bending axis are set to zero. If the user wishes to override any computed values, the punched deck from GOP = 4 should be modified and resubmitted using GOP = 2.

6.2.2 Hinge moment integrations.- Control surface hinge moments can be computed as a special class of thin body integrations as shown in figure 7. In this case, the torque axis is aligned with the hinge axis of an aileron made up of 9 panels. If the effective areas of all the non-aileron panels is set to zero, the torque integration is equivalent to the hinge moment.

When executing the automatic geometry option, the bending axis should be located inboard of the aileron panels so that the total area of the 9 panels is computed. Note, however, that the geometry subroutine will also compute a non-zero area for all panels outboard of the bending axis. The user should correct the punched deck (from GOP = 4) by setting the areas of all non-aileron panels to zero. The modified deck is then input using GOP = 2.

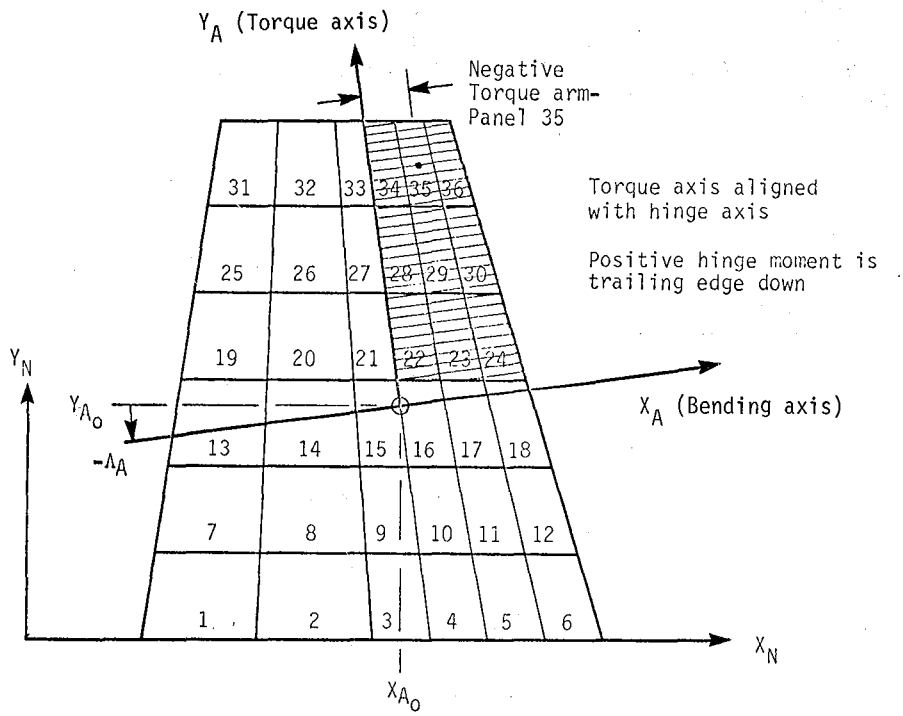

Figure 7. Integration geometry for hinge moments.

6.2.3 Slender body integrations - An example of the integration geometry for a slender body is shown in figure 8. Slender bodies are defined by a series of aerocentroids lying along the local slender body X_M axis. Each aerocentroid has a radius R_i and interval Δx_i which form the equivalent of panels within one row. Both vertical and lateral force coefficients can exist at each aerocentroid. The bending axis Y_A is established at a point along the X_M axis. The torque axis X_A is assummed to be coincident with the X_M axis which implies that torque loads are not normally computed for simple slender bodies.

When executing the automatic geometry option, the integration geometry is determined in a manner unique to slender bodies. First, an integration interval is established by the coordinates X_{FWD} and X_{AFT}. All panel areas outside of this interval are set to zero. Effective panel areas within the interval are computed as shown on the figure. The bending axis location is specified by the coordinate X_{MR} which is independent of X_{FWD} and X_{AFT}. Bending arms are computed from the midpoint of the effective panel area. The parameter MRC controls the sign convention for positive bending moments.

The example shown in the figure represents an integration definition for computing vertical loads at a forward fuselage station. An identical integration definition could be applied separately to compute lateral loads. Other types of load stations can be established by defining appropiate locations to X_{FWD}, X_{AFT}, and X_{MR}. Aft fuselage loads could be defined by placing X_{FWD} and X_{MR} at the load station and placing X_{AFT} at any point aft of the last panel area. Loads on the complete slender body could be defined by placing X_{FWD} ahead of the first panel and placing X_{AFT} aft of the last panel. Bending moments (equivalent to a pitching moment) would be summed about X_{MR} which could be placed at the body quarter chord or center of gravity.

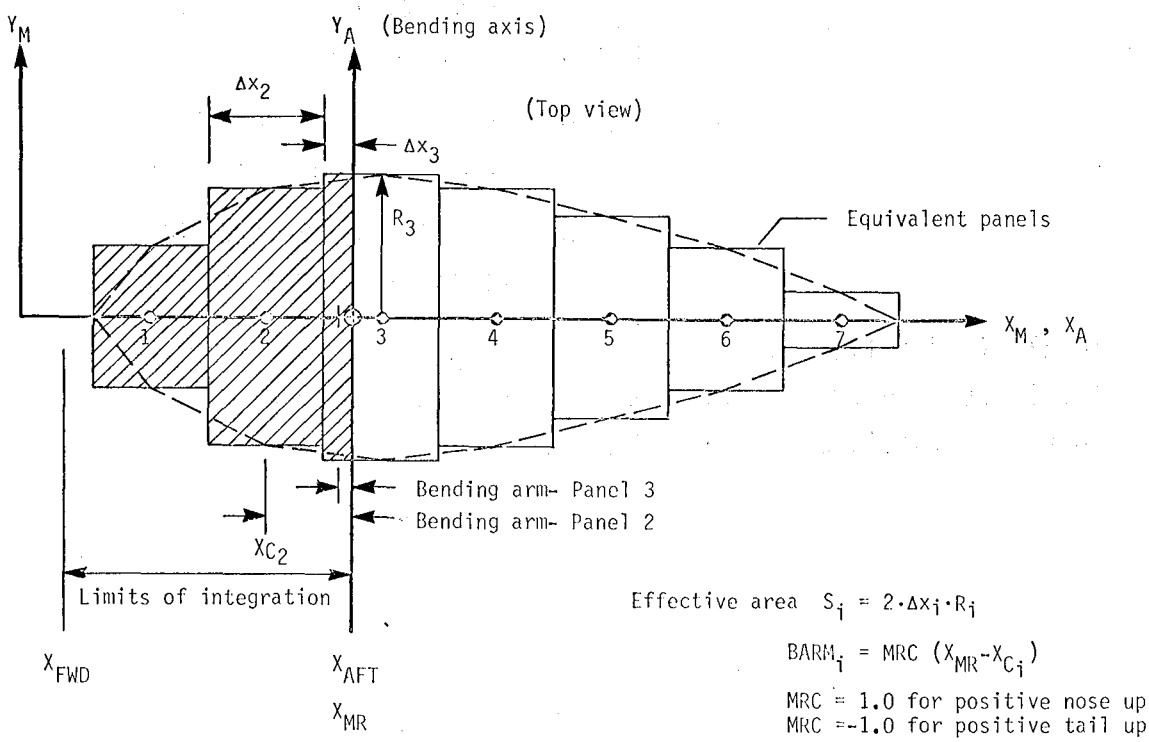

Figure 8. Integration geometry for slender body loads.

6.2.4 Additional load definitions.- This option is used to define any additional loads that are a linear combination of previously integrated loads. To illustrate the general setup, a simple example is shown in figure 9. The total shear and bending at a aft fuselage station (L_7,L_8) are to be computed. These loads are generated from the integrated loads on the aft fuselage itself (L_1,L_2) and the horizontal tail root loads (L_3-L_6). The component factors are assembled in matrix form as shown below. Each row of the matrix is read in using CARD SET 11.

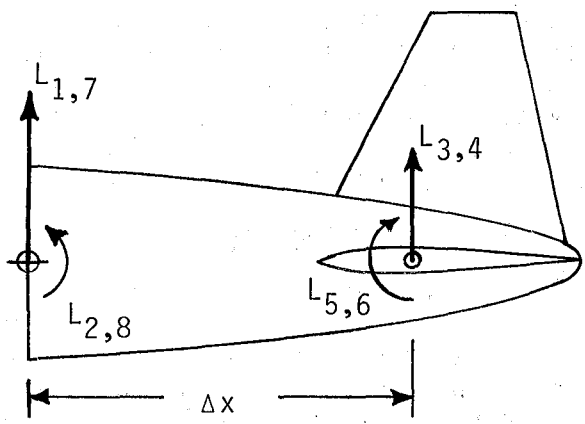

Figure 9. Additional load example.

L_1= Aft fuselage vertical shear
L_2= Aft fuselage bending

L_3= Horizontal tail shear, left
L_4= Horizontal tail shear, right

L_5= Horizontal tail torque, left
L_6= Horizontal tail torque, right

Total aft fuselage shear = $L_7 = L_1 + L_3 + L_4$
Total aft fuselage bending= $L_8 = L_2 + \Delta x \cdot L_3 + \Delta x \cdot L_4 - L_5 - L_6$
Total aft fuselage torque = $L_9 = 0$

$$\begin{bmatrix} L_7 & L_8 & L_9 \end{bmatrix} = \begin{bmatrix} L_1 & L_2 & L_3 & L_4 & L_5 & L_6 \end{bmatrix} \begin{bmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 1 & \Delta x & 0 \\ 1 & \Delta x & 0 \\ 0 & -1 & 0 \\ 0 & -1 & 0 \end{bmatrix}$$

CARD 11.1
CARD 11.2
CARD 11.3
CARD 11.4
CARD 11.5
CARD 11.6

Shear factors
Bending factors
Torque factors

6.2.5 Card input for GOP = 2. - The card arrangement for the surface/axis data file if GOP = 2 is shown in figure 10. Under this option, each integration is defined on a panel by panel basis. In fact, each card record is directly copied to the unformatted disk file (TAPE 20). For each integration definition, the card sequence - CARD 6, CARD 7, CARD SET 8 - is repeated. Within this sequence, CARD 7 and CARD SET 8 is repeated for each row on the body. The order of the integration definitions is arbitrary. More than one integration may be specified for a particular body. The format is the same for both thin and slender bodies.

After all integrations are specified, any additional loads are defined. The card sequence - CARD 10, CARD SET 11 - is repeated for each additional load definition. Note that CARD 9 is not used in this deck.

6.2.6 Card input for GOP = 3 or 4. - A different card arrangement is used for this option as shown in figure 11. The deck format is essentially the same except that all of the row and panel data cards for a given integration are replaced by a single card which specifies the integration axis. CARD 9A is used for thin bodies and CARD 9B is used for slender bodies. The geometry subroutine will then interface the axis data with the FLEXSTAB GDTAPE and automatically generate the row and panel data. Any additional load definitions follow the integration definitions as before. The disk file created by this option is identical to that for GOP = 2.

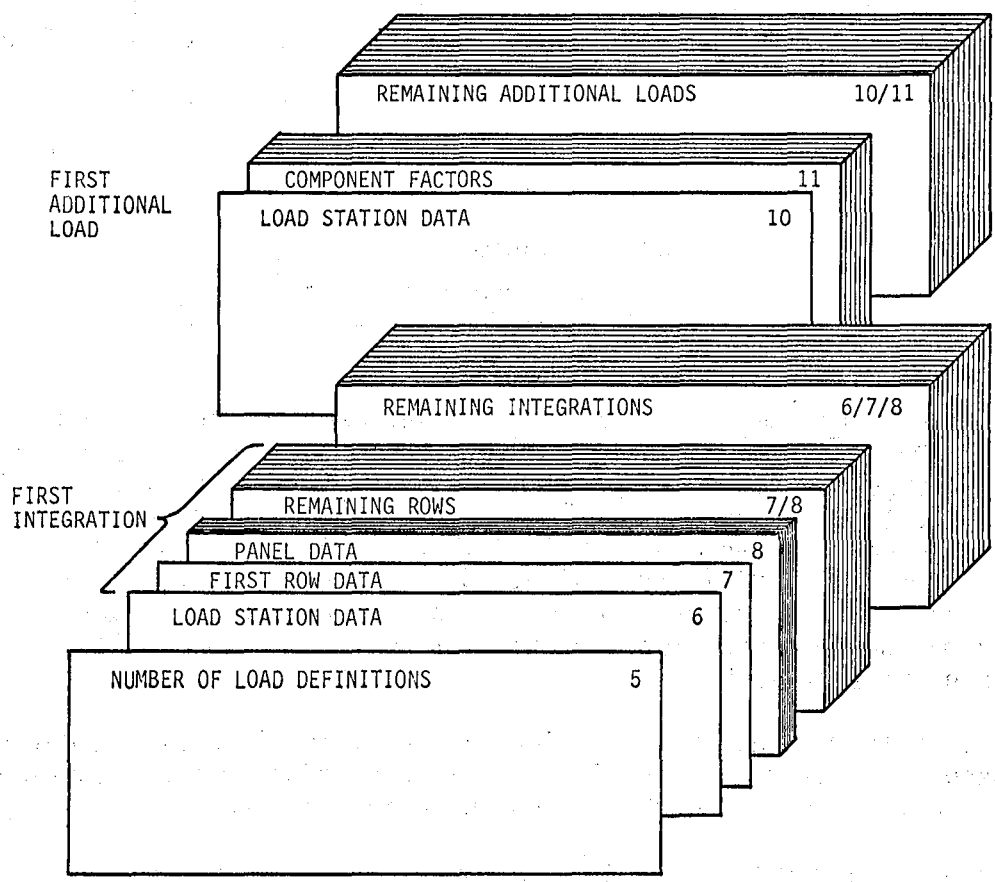

Figure 10. Card arrangement for the surface/axis data file if GOP = 2.

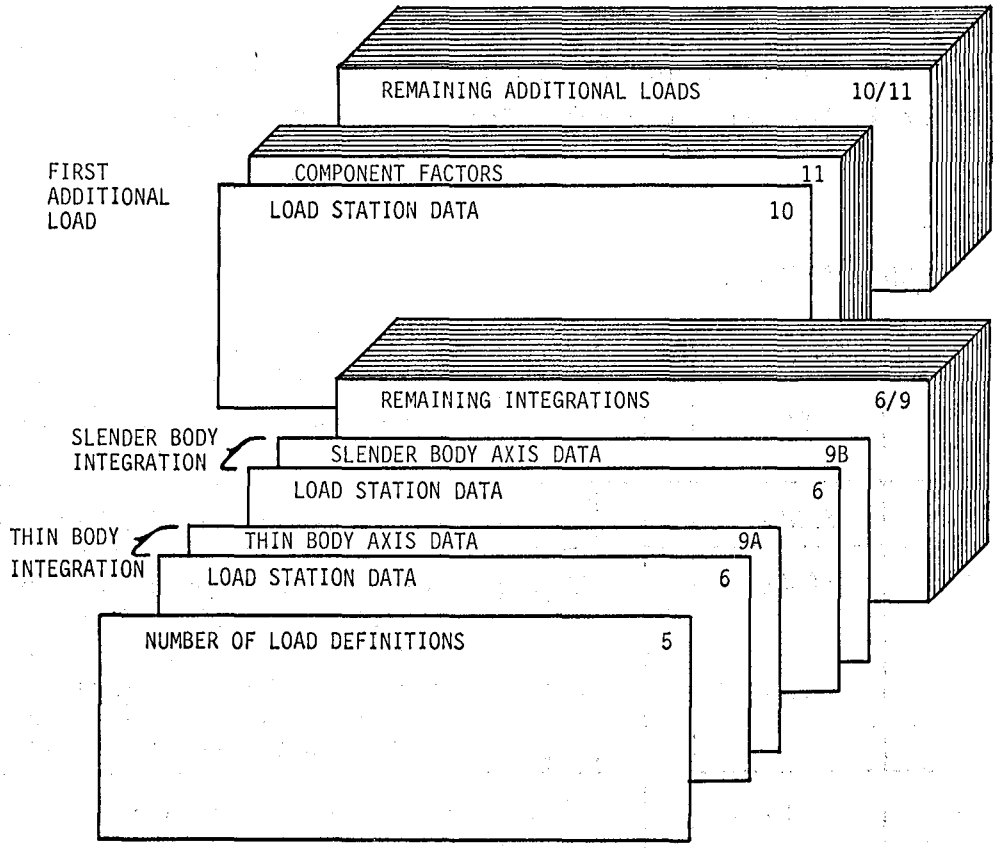

Figure 11. Card arrangement for the surface/axis data file if GOP = 3 or 4.

CARD 5 - NUMBER OF LOAD DEFINITIONS.

If GOP=0 or 1, OMIT this card section and skip to CARD 12.

The total number of load definitions (NSAD+NALD) must not exceed 50.

C-C	FORMAT	DESCRIPTOR	R	S	I	W	EXPLANATION
1-2	I2	NSAD			X		Number of integrations defined with card sequence 6-7-8 (if GOP=2) or card sequence 6-9 (if GOP=3 or 4).
31-32	I2	NALD			X		Number of additional loads defined with card sequence 10-11.

If GOP=2, the card sequence - CARD 6, CARD 7, CARD SET 8 - is repeated for each integration definition (NSAD times).

If GOP=3 or 4, the card sequence - CARD 6, CARD 9 - is repeated for each integration definition (NSAD times).

CARD 6 - LOAD STATION DATA.

C-C	FORMAT	DESCRIPTOR	R	S	I	W	EXPLANATION
1-2	I2	SAN			X		Unique number assigned to this load station (1 to 50).
5-20	4A4	SANAME			X		Name given to this load station.
23-30	2A4	SABODY			X		Name of body associated with this load station. Must match exactly (left justified) with a CPBODY name defined in pressure data files (CARD 22). These are the body names used in the GD program.
33	I1	ITC			X		Integration type code. = 1 : Slender body - vertical load. = 2 : Slender body - lateral load. = 3 : Thin body.
36	I1	SC			X		Symmetry code. = 0 : Body off centerline. = 1 : Body on centerline. (can leave blank if GOP=3 or 4).
39-40	I2	NR			X		Number of rows on body. Always = 1 for slender bodies. (can leave blank if GOP=3 or 4).
41-50	F10.0	SREF			X		Reference area (square feet). Default = 1.0
51-60	F10.0	BREF			X		Reference semispan (bending arm). Default = 1.0 (inches).
61-70	F10.0	CREF			X		Reference chord (torque arm). Default = 1.0 (inches).
71-80	F10.0	CAVG		X			Average chord (inches).

CARD 7 - ROW DATA.

The card sequence - CARD 7, CARD SET 8 - is repeated for each row on the body (NR times- CARD 6).

C-C	FORMAT	DESCRIPTOR	R	S	I	W	EXPLANATION
1-2	I2	RN			X		Row number.
3-10	F8.0	ETA		X			Nondimensional semispan station.
11-20	F10.0	YL		X			Y coordinate in local system of row centroid (inches).
29-30	I2	NP			X		Number of panels in row.
31-40	F10.0	CROW		X			Chord of row at centroid (inches).

CARD SET 8 - PANEL DATA.

Contains NP cards, one card for each panel on row, leading to trailing edge.

C-C	FORMAT	DESCRIPTOR	R	S	I	W	EXPLANATION
1-10	2I5	PN			X		Panel index. 1st integer = row number. 2nd integer = panel number.
11-20	F10.0	SP			X		Effective panel area outboard of load station (square inches). If entire panel is inboard of bending axis, set SP = 0.0 .
21-30	F10.0	BARM			X		Effective bending arm of panel (in.).
31-40	F10.0	TARM			X		Effective torque arm of panel (in.) . (positive for effective panel centroid ahead of torque axis).
41-50	F10.0	XCN	X				New value of x/c, nondimensional x coordinate of panel aerocentroid, for repunch option.

CARD 9A - THIN BODY AXIS DATA.

C-C	FORMAT	DESCRIPTOR	R	S	I	W	EXPLANATION
1-10	F10.0	XAZ			X		X coordinate in local system of integration axis origin (inches).
11-20	F10.0	YAZ			X		Y coordinate in local system of integration axis origin (inches).
21-30	F10.0	LAD			X		Sweep angle of integration axis (deg).

CARD 9B - SLENDER BODY AXIS DATA.

C-C	FORMAT	DESCRIPTOR	R	S	I	W	EXPLANATION
1-10	F10.0	XFWD			X		X coordinate in local system of forward limit of integration (inches).
11-20	F10.0	XAFT			X		X coordinate in local system of aft limit of integration (inches).
21-30	F10.0	XMR			X		X coordinate in local system of moment reference point (inches).
31-40	F10.0	MRC			X		Moment reference sign convention. = 1.0 : Positive nose up or to right. = -1.0 : Positive tail up or to right.

The card sequence - CARD 10, CARD SET 11 - is repeated for each additional load definition (NALD times - CARD 5).

CARD 10 - LOAD STATION DATA.

C-C	FORMAT	DESCRIPTOR	R	S	I	W	EXPLANATION
1-2	I2	SAN			X		Unique number assigned to this load station (1 to 50).
5-20	4A4	SANAME			X		Name given to this load station.
33	I1	ITC			X		Integration type code. = 4 : Additional load.
36	I1	SC			X		Symmetry code. = 0 : Load station off centerline. = 1 : Load station on centerline.
38-40	I3	NT			X		Number of component loads defined with CARD SET 11.
41-50	F10.0	SREF			X		Reference area (square feet). Default = 1.0
51-60	F10.0	BREF			X		Reference semispan (bending arm). Default = 1.0 (inches)
61-70	F10.0	CREF			X		Reference chord (torque arm). Default = 1.0 (inches)

CARD SET 11 - COMPONENT FACTORS.

Repeated NT times - CARD 10.

C-C	FORMAT	DESCRIPTOR	R	S	I	W	EXPLANATION
1-2	I2	CN			X		Load station number (SAN) of this component (1 to 50). If CN = 0, VFAC, BFAC, and TFAC contain simple constants added to additional load. Leave CL,CT blank.
6	I1	CL			X		Component location. = 1 : Left side. = 2 : Right side. = 3 : Centerline.
10	I1	CT			X		Component type. = 1 : Shear load. = 2 : Bending load. = 3 : Torque load.
11-20	F10.3	VFAC			X		Shear factor for this component.
21-30	F10.3	BFAC			X		Bending factor for this component.
31-40	F10.3	TFAC			X		Torque factor for this component.

NOTE : If SC=0 (on CARD 10), define the left hand components only. Both left hand and right hand loads will be computed automatically.

If SC=1 (on CARD 10), additional load station is on centerline which means left hand, right hand, and centerline loads can be specified as components.

If the geometry input option is the only option requested (POP=ROP=SOP=IOP=WOP=0), the remaining CARDS 12-24 are omitted

6.3 Wind Tunnel Data File (CARDS 12-15)

The card arrangement for the wind tunnel data file is shown in figure 12. These cards are included only if WOP = 2 on CARD 1. The card sequence - CARD 13, CARD SET 14 - is repeated for each of 6 possible load stations. Any station that is not applicable to the configuration is simply omitted. For each station, CARD SET 14 contains 15 cards which define the airload coefficients as specified in tables 3 thru 7. Two separate sets of coefficients can be entered for the vertical tail.

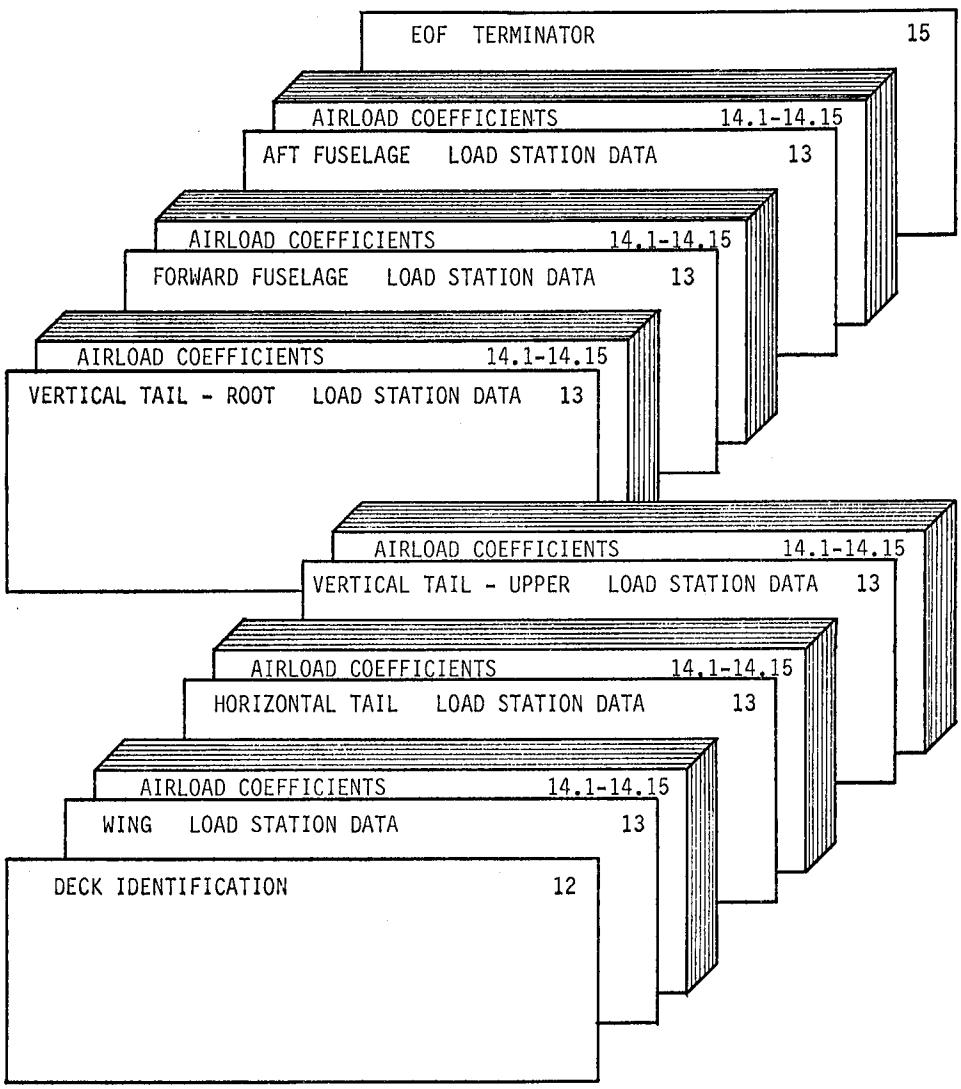

Figure 12. Card arrangement for the wind tunnel data file.

If WOP=0 or 1 , OMIT this card section and skip to CARD SET 16.

CARD 12 - DECK IDENTIFICATION.

C-C	FORMAT	DESCRIPTOR	R	S	I	W	EXPLANATION
1-72	18A4	WID				X	Wind tunnel deck identification. (Alpha-numeric)

The card sequence - CARD 13, CARD SET 14 is repeated for each of the 6 possible load stations to be defined.

CARD 13 - LOAD STATION DATA.

C-C	FORMAT	DESCRIPTOR	R	S	I	W	EXPLANATION
1-2	I2	WTN				X	Load station number. = 1 : Wing. = 2 : Horizontal tail. = 3 : Vertical tail - upper. = 4 : Vertical tail - root. = 5 : Forward fuselage. = 6 : Aft fuselage.
5-20	4A4	WTNAME				X	Name given to this load station.
21-30	F10.0	SWT				X	Reference area (square feet).
31-40	F10.0	BWT				X	Reference semispan (inches).
41-50	F10.0	CWT				X	Reference chord (inches).
53-59	F7.0	XHT				X	Horizontal tail, longitudinal moment transfer arm (inches). (Δx between horizontal tail and aft fuselage load stations)
60-66	F7.0	YHT				X	Horizontal tail, lateral moment transfer arm (inches). (Δy between horizontal tail and aft fuselage load stations)
67-73	F7.0	XVT				X	Vertical tail root, longitudinal moment transfer arm (inches). (Δx between vertical tail root and aft fuselage load stations)
74-80	F7.0	ZVT				X	Vertical tail root, vertical moment transfer arm (inches). (Δz between vertical tail root and aft fuselage load stations)

NOTE : XHT, YHT, XVT, and ZVT are defined for the aft fuselage load station only (WTN=6). Refer to equations 16, 18, and 19. Leave blank for other load stations.

CARD SET 14 - AIRLOAD COEFFICIENTS.

Contains 15 cards as specified in : Table 3 - Wing station
Table 4 - Horizontal tail station
Table 5 - Vertical tail
Table 6 - Forward fuselage station
Table 7 - Aft fuselage station

C-C	FORMAT	DESCRIPTOR	R	S	I	W	EXPLANATION
6-10	I5	NSEQ				X	Component sequence number. (See tables)
11-20	E10.2	CV				X	Shear coefficient for this component effect.
21-30	E10.2	CB				X	Bending coefficient for this component effect.
31-40	E10.2	CT				X	Torque coefficient for this component effect.
43-63	3A7	DES				X	Descriptive name (Alpha-numeric) of this component effect. (See tables)
64-80	Not read	-				X	These columns are available to the user for a deck ID.

TABLE 3. AIRLOAD COEFFICIENTS FOR WING STATION

WTN=1 Refer to equation 8.

CARD	NSEQ	DES (Component effect)
14.1	101	ALPHA = 0
14.2	102	ALPHA
14.3	103	ALPHA DOT
14.4	104	DELTA SPOILER
14.5	105	ROLL DAMPING, P
14.6	106	PITCH DAMPING, Q
14.7	107	BETA, ALPHA=0, A/S
14.8	108	BETA*ALPHA, A/S
14.9	109	BETA, ALPHA=0, SYM
14.10	110	BETA*ALPHA, SYM
14.11	111	BLANK FILLER,NOT USED
14.12	112	BLANK FILLER,NOT USED
14.13	113	BLANK FILLER,NOT USED
14.14	114	BLANK FILLER,NOT USED
14.15	115	BLANK FILLER,NOT USED

TABLE 4. AIRLOAD COEFFICIENTS FOR HORIZONTAL TAIL STATION

WTN=2 Refer to equation 9.

CARD	NSEQ	DES (Component effect)
14.1	201	ALPHA = 0
14.2	202	ALPHA
14.3	203	DELTA H
14.4	204	ALPHA DOT
14.5	205	BETA
14.6	206	DELTA H PRIME
14.7	207	DELTA SPOILER
14.8	208	DELTA SPOILER C/O
14.9	209	ROLL DAMPING, P
14.10	210	PITCH DAMPING, Q
14.11	211	BLANK FILLER,NOT USED
14.12	212	BLANK FILLER,NOT USED
14.13	213	BLANK FILLER,NOT USED
14.14	214	BLANK FILLER,NOT USED
14.15	215	BLANK FILLER,NOT USED

TABLE 5. AIRLOAD COEFFICIENTS FOR UPPER VERTICAL TAIL STATION

WTN=3 Refer to equation 10.

CARD	NSEQ	DES (Component effect)
14.1	301	BETA, ALPHA=0
14.2	302	BETA* ALPHA
14.3	303	DELTA H PRIME
14.4	304	DELTA SPOILER
14.5	305	DELTA RUDDER, UPPER
14.6	306	DELTA RUDDER, LOWER
14.7	307	ROLL DAMPING, P
14.8	308	YAW DAMPING, R
14.9	309	BLANK FILLER,NOT USED
14.10	310	BLANK FILLER,NOT USED
14.11	311	BLANK FILLER,NOT USED
14.12	312	BLANK FILLER,NOT USED
14.13	313	BLANK FILLER,NOT USED
14.14	314	BLANK FILLER,NOT USED
14.15	315	BLANK FILLER,NOT USED

Airload coefficients for the vertical tail root station are input using the same format as TABLE 5 with NSEQ numbers in 400 series. Vertical tail root loads should be defined if tail induced lateral loads at the aft fuselage station are to be computed.

TABLE 6. AIRLOAD COEFFICIENTS FOR FORWARD FUSELAGE STATION

WTN=5 Refer to equations 11&12

CARD	NSEQ	DES (Component effect)
14.1	501	ALPHA=0 (VERTICAL)
14.2	502	ALPHA (VERTICAL)
14.3	503	ROLL DAMP, P (LAT)
14.4	504	BETA (LATERAL)
14.5	505	BLANK FILLER,NOT USED
14.6	506	BLANK FILLER,NOT USED
14.7	507	BLANK FILLER,NOT USED
14.8	508	BLANK FILLER,NOT USED
14.9	509	BLANK FILLER,NOT USED
14.10	510	BLANK FILLER,NOT USED
14.11	511	BLANK FILLER,NOT USED
14.12	512	BLANK FILLER,NOT USED
14.13	513	BLANK FILLER,NOT USED
14.14	514	BLANK FILLER,NOT USED
14.15	515	BLANK FILLER,NOT USED

TABLE 7. AIRLOAD COEFFICIENTS FOR AFT FUSELAGE STATION

WTN=6 Refer to equations 13&14

CARD	NSEQ	DES (Component effect)
14.1	601	ALPHA=0 (VERTICAL)
14.2	602	ALPHA (VERTICAL)
14.3	603	BETA,ALPHA=0,C/0(LAT)
14.4	604	BETA*ALPHA,C/0 (LAT)
14.5	605	DELTA H PRIME (LAT)
14.6	606	DELTA RUD, LOWER(LAT)
14.7	607	ROLL DAMPING, P (LAT)
14.8	608	BETA (LATERAL)
14.9	609	BLANK FILLER,NOT USED
14.10	610	BLANK FILLER,NOT USED
14,11	611	BLANK FILLER,NOT USED
14.12	612	BLANK FILLER,NOT USED
14.13	613	BLANK FILLER,NOT USED
14.14	614	BLANK FILLER,NOT USED
14.15	615	BLANK FILLER,NOT USED

CARD 15 - EOF TERMINATOR.

Terminates wind tunnel data file.

C-C	FORMAT	DESCRIPTOR	R	S	I	W	EXPLANATION
1	-	EOF				X	7-8-9 multipunch.

6.4 Case Description Data (CARDS 16-18)

The card arrangement for the case description data is shown in figure 13. CARD SET 16 defines aerodynamic parameters (α,β, etc.) describing each specific case to be processed. It is required for execution of the wind tunnel option (WOP = 1 or 2). For the integration option, it provides printout header information only, and is optional. (Alpha, beta, and Qbar values only are obtained from the pressure data files for the integration option.) CARD SET 16 contains one card for each parameter to be defined for each case. However, to minimize the card count, an automatic recycle feature is incorporated that works as follows: All parameter values for case 1 are initially defaulted to zero. The user defines any non-zero parameters. These values are automatically used for each succeeding case until reset with an additional card defining the new value. A simple example is included after the card descriptions at the end of this section.

CARD 17 serves as an EOF terminator for CARD SET 16. It is always included even if CARD SET 16 is omitted. CARD 18 controls the number of cases processed for the pressure data, integration, and wind tunnel options.

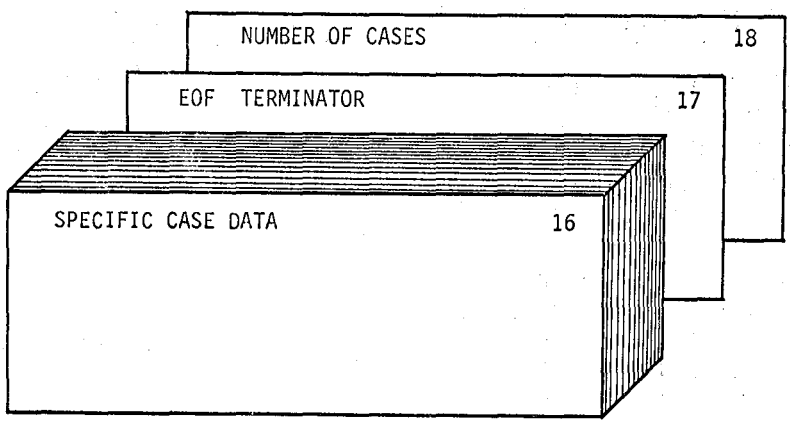

Figure 13. Card arrangement for the case description data.

If POP=0 AND WOP=0, OMIT this card section.

CARD SET 16 - SPECIFIC CASE DATA.

Required for wind tunnel option.
Optional for integration option.

This card set incorporates an automatic recycle feature. Only non-zero value parameters need be defined and/or thereafter only if they change for a succeeding case. Order does not matter as long as the case number for any specific parameter always increases. The use of this card set is clarified in the example after CARD 18.

C-C	FORMAT	DESCRIPTOR	R	S	I	W	EXPLANATION
1	I1	CI	I	I	I	X	Case index (1-9).
5-6	I2	PI	I	I	I	X	Parameter index. = 1 : Angle of attack (deg). = 2 : Angle of sideslip (deg). = 3 : Dynamic pressure (psf). = 4 : True airspeed (ft/sec). = 5 : Alpha dot (deg/sec). = 6 : CNA-airplane normal force coeff. = 7 : Roll rate (deg/sec). = 8 : Pitch rate (deg/sec). = 9 : Yaw rate (deg/sec). =10 : Not used- =11 : Not used. =12 : Not used. =13 : Aileron deflection, $\delta h'$ (deg). =14 : Elevator deflection, δh (deg). =15 : Upper rudder deflection (deg). =16 : Lower rudder deflection (deg). =17 : Left spoiler deflection (deg). =18 : Right spoiler deflection (deg). =19 : Not used. =20 : Not used.
10-19	F10.0	PV	I	I	I	X	Parameter value for this case.

CARD 17 - EOF TERMINATOR.

This card terminates CARD SET 16 and is included even if CARD SET 16 is omitted.

C-C	FORMAT	DESCRIPTOR	R	S	I	W	EXPLANATION
1	-	EOF	X	X	X	X	7-8-9 multipunch.

CARD 18 - NUMBER OF CASES

C-C	FORMAT	DESCRIPTOR	R	S	I	W	EXPLANATION
1	I1	NC	X	X	X	X	Number of cases in this run (1-9). Note that if a decimal point is added in column 2, this card can be used with the pressure data files (CARDS 19-24) to execute the FLEXSTAB PDPLOT program (Level 1.02 only).

Example for the case description data -

Assume the following 4 parameters are to be defined for 4 cases to be processed by the wind tunnel option :

Case 1 : Qbar=1000 , α=0 , β=0 , δh=0

Case 2 : Qbar=1000 , α=5 , β=0 , δh=0

Case 3 : Qbar=1000 , α=0 , β=0 , δh=-5

Case 4 : Qbar= 500 , α=0 , β=5 , δh=0

CARD SECTION 16-18 would consist of the following cards :

CARD	CI	PI	PV	
16.1	1	03	1000.	Qbar, cases 1-3
16.2	4	03	500.	Qbar, case 4
16.3	2	01	5.	α, case 2 (case 1 defaults to 0)
16.4	3	01	0.	α, cases 3-4
16.5	4	02	5.	β, case 4
16.6	3	14	-5.	δh, case 3 (cases 1-3 default to 0)
16.7	4	14	0.	δh, case 4
17	7/8/9			EOF
18	4.			Number of cases

Note that if the integration option were executed without the wind tunnel option, CARD SET 16 would contain CARDS 16.6 and 16.7 only. Alpha, Beta, and Qbar values would be obtained directly from the pressure data files.

6.5 Pressure Data Files (CARDS 19-24)

This card section is for the creation of the pressure data files. If POP = 0 or 2, these cards are omitted. This entire card section is normally punched by the FLEXSTAB SD&SS program (references 2-4). Current versions of FLEXSTAB punch only thin body pressures, but slender body force coefficients can be manually added to the deck punched by FLEXSTAB.

The card arrangement is shown in figure 14. CARDS 19, 20 and 21 are identification and control data. The card sequence -CARD 22, CARD 23, CARD SET 24- is repeated for each thin body. Within this sequence, CARD 23, CARD SET 24 is repeated for each row on the body. Any slender bodies are added to

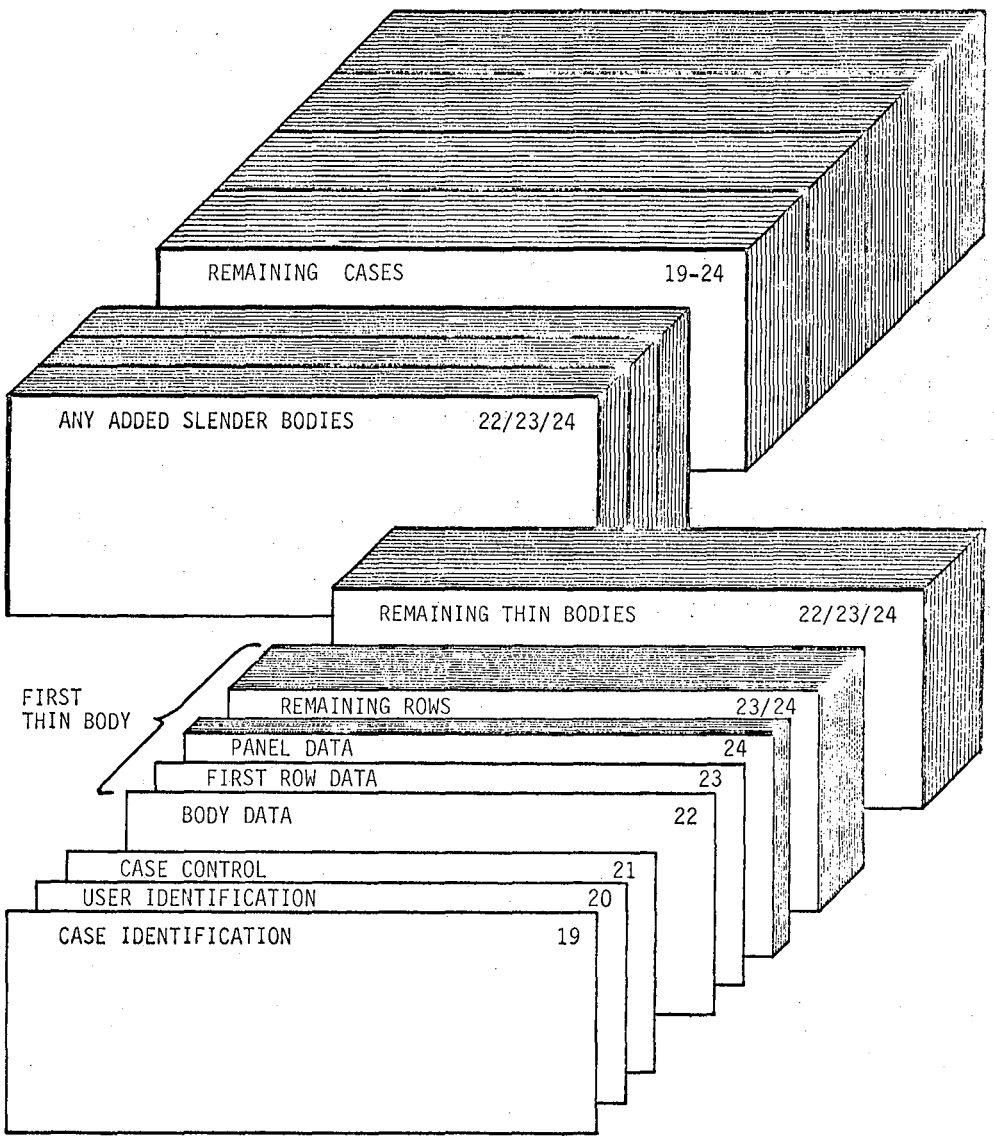

Figure 14. Card arrangement for the pressure data files.

the deck using the same format as for thin bodies. (The slender body data is analogous to a thin body with one row.) If any slender bodies are added, the number of bodies entered on CARD 21 must be changed to reflect the total number of bodies now in the deck.

The entire card sequence 19-24 is repeated for any additional cases. It is important to note that the pressure decks punched by FLEXSTAB contain a "STEADY PRESSURE DISTRIBUTION" header card at the beginning of each case. These header cards must be discarded from each case for execution in both this program and the FLEXSTAB PDPLOT program.

If POP=0 or 2 , OMIT this card section.

CARD 19 - CASE IDENTIFICATION.

C-C	FORMAT	DESCRIPTOR	R	S	I	W	EXPLANATION
1-72	18A4	CID	X	X	X		Case title. This title card is the same as input to the SD&SS program. It is printed as part of the page header for the repunch, section, integration, and summary print options.

CARD 20 - USER IDENTIFICATION.

C-C	FORMAT	DESCRIPTOR	R	S	I	W	EXPLANATION
1-72	18A4	UID	X	X	X		User subtitle.

CARD 21 - CASE CONTROL.

C-C	FORMAT	DESCRIPTOR	R	S	I	W	EXPLANATION
1-10	F10.4	NTB	X	X	X		Number of thin bodies PLUS any slender bodies manually added to this case.
11-20	F10.4	MR	X	X	X		Motion reference. = 1.0 : Symmetric motion. = 2.0 : Asymmetric motion.
21-30	F10.4	M1	X	I	I		Mach number.
31-40	F10.4	A1	X	I	I		Angle of attack (deg).
41-50	F10.4	B1	X	I	I		Angle of sideslip (deg).
51-60	F10.4	Q1	X	X	X		Dynamic pressure (psf).

The card sequence - CARD 22, CARD 23, CARD SET 24 - is repeated for each body in this case (NTB times).

CARD 22 - BODY DATA.

C-C	FORMAT	DESCRIPTOR	R	S	I	W	EXPLANATION
1-8	2A4	CPBODY	X	X	X		Name of body (from GD program).
11-20	F10.4	NAF	X	X	X		Number of rows on body. (always equals 1 for slender bodies)
21-30	F10.4	THETA	X	I	I		Dihedral angle of thin body (deg). (blank or zero for slender bodies)

The card sequence - CARD 23, CARD SET 24 - is repeated for each row on the body (NAF times).

CARD 23 - ROW DATA.

C-C	FORMAT	DESCRIPTOR	R	S	I	W	EXPLANATION
1-10	F10.4	YR	X				Y coordinate in Reference system of row centroid (inches).
11-20	F10.4	NPT	X	X	X		Number of panels in row.

CARD SET 24 - PANEL DATA.

Contains NPT cards, one card for each panel on row, leading to trailing edge.

C-C	FORMAT	DESCRIPTOR	R	S	I	W	EXPLANATION
1-10	F10.4	XC					X/C , nondimensional x coordinate of aerocentroid.
11-20	F10.4	CPS	X	X	X		Pressure coefficient (ΔCP) due to symmetric motion. For thin bodies: If MR=1.0=symmetric motion, CPS is used for both left and right hand surfaces, so that CPR and CPL need not be defined.(CPS=CPR=CPL) For slender bodies: CPS is the vertical force coefficient (DELTA CP(ZM) from the SD&SS printout). Applies to left and right hand or centerline bodies.
21-30	F10.4	CPR	X	X	X		Pressure coefficient for the right hand surface aerocentroid.
31-40	F10.4	CPL	X	X	X		Pressure coefficient for the left hand surface aerocentroid. For thin bodies: If MR=2.0=asymmetric motion, CPR≠CPL≠CPS. Note that for a positive sideslip (nose left), FLEX STAB sign conventions for a vertical tail on the centerline (THETA=+90) result in CPR being positive and CPL=-CPR. Thus only CPL is used to compute loads so that a positive sideslip produces a negative vertical tail load. For slender bodies: CPR is the lateral force coefficient, DELTA CP(YM), on the right hand OR centerline body. CPL is the lateral force coefficient on the left hand slender body.
41-50	F10.4	XR	X				X coordinate in Reference system of aerocentroid (inches).

7.0 OUTPUT DESCRIPTION

Output from FSLIP consists of line printer listings, punched cards, and disk permanent files as described in section 4.2. Each of these is briefly outlined below along with equations for estimating the amount of printed or punched output.

7.1 Printed Output

Printed output is produced by 4 of the major program options as described below. Specific details of the printed output are not presented here as the printout makes generous use of headers and descriptors. See section 8.0 for example output listings.

7.1.1 Geometry option.- If GOP = 3 or 4, the surface/axis data file is created by using the FLEXSTAB GDTAPE. A printout is generated which lists complete details of each integration definition including effective areas and arms computed for each panel on the specified body. Any panels cut by the bending axis are flagged. Total panel area outboard of the bending axis is also listed. Details of any additional load definitions are printed out. An example of these listings is shown in section 8.1. The amount of output can be estimated from the following equation:

Number of pages = 1.5 * NSAD + NALD + 1
where NSAD and NALD are as specified on CARD 5

7.1.2 Integration option.- If IOP = 1, a printout is generated for each integration definition set true on CARD 2A. The listing includes a panel by panel description of the integration process. After all integrations are performed, any additional load definitions are listed. The printout is then repeated for any succeeding cases. Section 8.2 contains an example of this printout. If IOP = 2, this printout is suppressed. The amount of output can be estimated from the following equation:

Number of pages = (1.5 * NSAD + NALD + 1) * NC
where NSAD and NALD are now the number of integrations and additional loads set true on CARD 2A and NC is the number of cases specified on CARD 18.

7.1.3 Wind tunnel option.- A printout is generated for each load station showing the component loads due to each aerodynamic effect. An example is shown in section 8.2. The amount of output varies from 1 to 5 pages per case depending on which stations are set true on CARD 2B. The 5 stations consist of wing, horizontal tail, vertical tail, forward fuselage, and aft fuselage.

7.1.4 Summary print option.- This option produces a concise summary of the total loads and coefficients for each specified load station for all cases processed. If IOP = 2, this option must be used to print the total integrated loads. The amount of output consists of 1 page per load station specified with CARD 3.

7.2 Punched Output

The only punched card output is produced by the GOP = 4 option. It consists of a complete surface/axis data file which may be input using GOP = 2. The format of the punched deck is described in section 6.2. The number of punched cards can be estimated from the following equations:

For each integration defined with CARD 6:

Number of cards = NR + NP + 1
where NR = number of rows on body
NP = number of panels on body

For each additional load specified with CARD 10:

Number of cards = NT + 1
where NT = number of terms (CARD 10)

7.3 Disk File Output

Disk files produced by FSLIP consist of the pressure data files (TAPE 11 to 19), the surface/axis data file (TAPE 20), and the wind tunnel data file (TAPE 40). The detailed format of these files is not presented as they are a direct one-for-one unformatted copy of each card record. Thus the user is referred to sections 6.2, 6.3, and 6.5 for details of the file formats.

8.0 EXAMPLE PROBLEMS

This section includes 3 example problems which illustrate the major program options and suggested job sequencing. Section 8.1 presents an example of creating the integration geometry data base using the FLEXSTAB GDTAPE for input. Section 8.2 is an example which creates a revised geometry data base and wind tunnel coefficient data base from card input and then executes the integration and wind tunnel loads options. Section 8.3 is an example which executes the integration option only using previously created data bases with minimum input/output. All three examples are based on runs from the airloads research study being conducted on the B-1 aircraft. Each section includes a brief discussion followed by listings of the card input and program printouts.

8.1 Geometry Option Only

This example represents what would normally be the first job executed through FSLIP. The only option exercised is GOP = 4 which will punch the integration geometry for the B-1 airload measurement stations as defined in figure 15. Figure 16 shows the equivalent FLEXSTAB GD model which is composed of 7 thin bodies and 1 slender body. Note that the wing and vertical tail are both split into 2 separate thin bodies.

Integration axes are shown at the 8 load stations which were arbitrarily assigned surface/axis numbers 1 through 8. Separate vertical and lateral integra-

tions are defined for the forward and aft fuselage stations. The additional loads option is used to define 3 new loads (surface/axis numbers 31-33) for computing total aft fuselage loads. First, the two vertical tail stations are summed to get the total vertical tail root loads. Second, the horizontal tail components are added to the aft fuselage to get total vertical loads at the aft fuselage station. Third, vertical tail root and horizontal tail components are added to the aft fuselage to get total lateral loads at the aft fuselage station.

Note that the wing integration applies to WING2 only. The geometry subroutine will compute effective areas for all panels outboard of the X_A axis, but it was desired to neglect the area of the two shaded panels to account for the nacelle and fairings. For this reason, the punched deck from this job must be modified and resubmitted with GOP = 2 as shown in the next example.

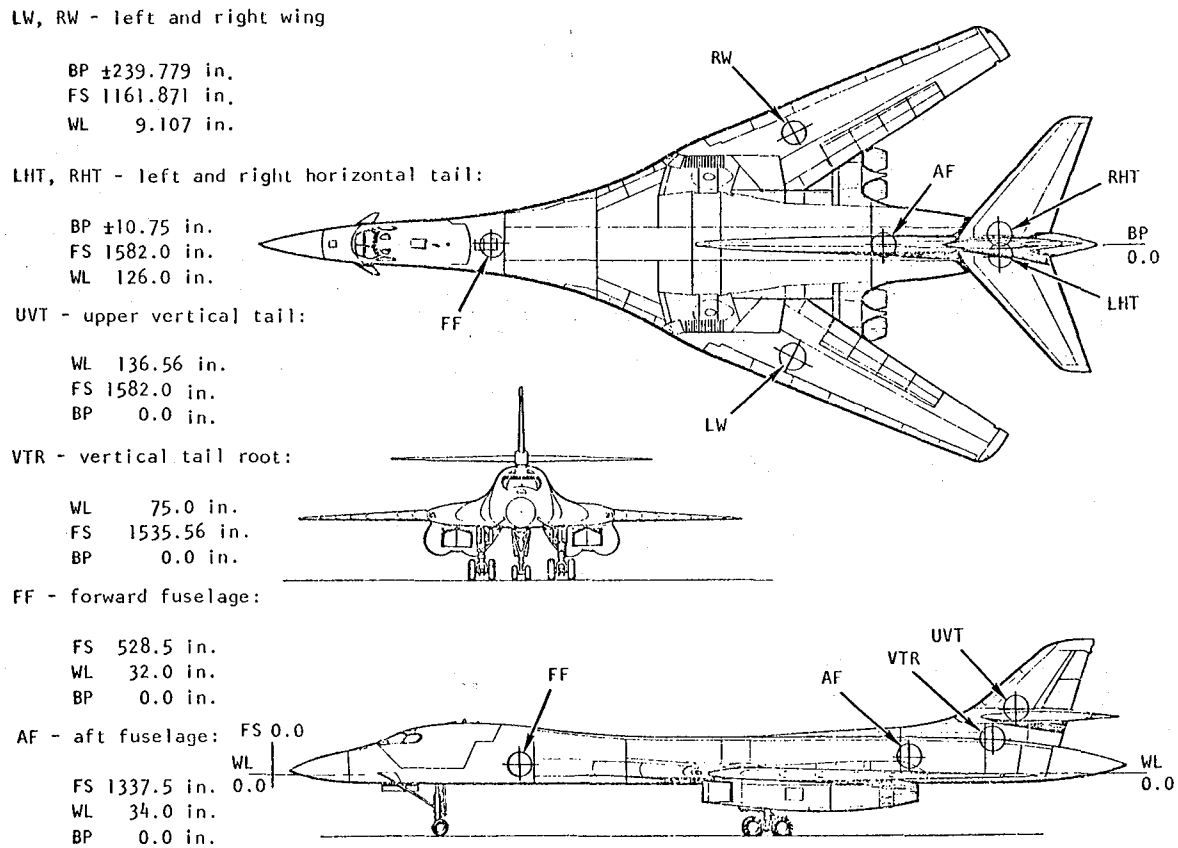

Figure 15. B-1 airload measurement stations.

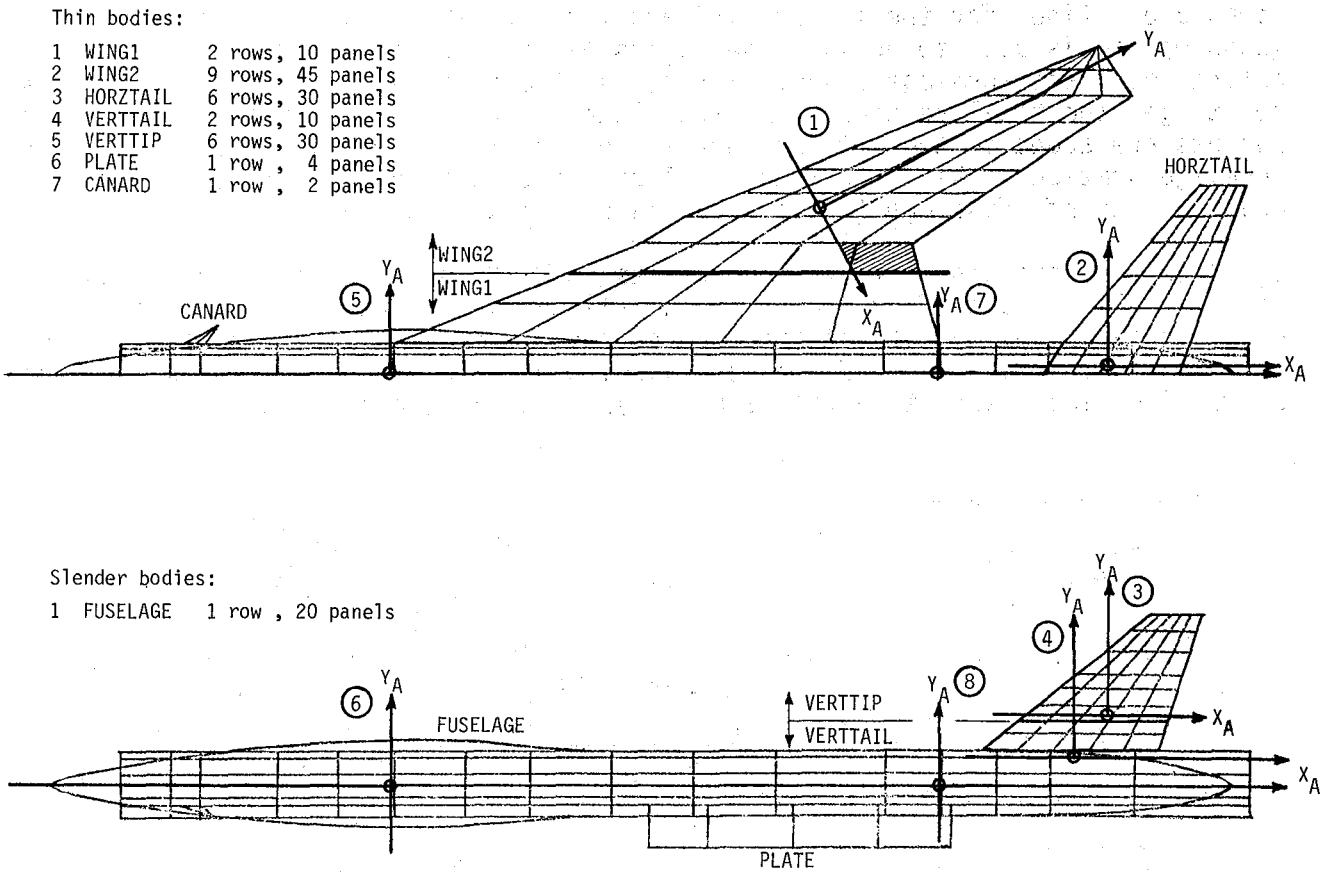

Figure 16. FLEXSTAB aerodynamic model of the B-1.

Card input listing for example 8.1

```
CARD                1                   2                   3                   4                   5                   6                   7                   8
 NO      12345678901234567890123456789012345678901234567890123456789012345678901234567890123456789012345678901234567890

   1          GOP 4      POP 0      POP 0      SOP 0      IOP 0      WCP 0
   2                                SUMMARY PRINT TERMINATOR
   3     08    NSAD                      03    NALD
   4      1   WING - SG AXIS     WING2      3   0    9    1946.00     820.08     184.05     170.85
   5          1161.87     239.92     63.52
   6      2   HORIZ TAIL - SG    HORZTAIL   3   0    6     238.77     259.03     149.38     132.74
   7          1582.00      10.75      0.00
   8      3   VERT TAIL - SG     VERTTIP    3   1    6     247.40     206.76     188.95     172.30
   9          1582.00     136.50      0.00
  10      4   VERT TAIL - ROOT   VERTTAIL   3   1    2     247.40     206.76     188.95     172.30
  11          1535.56      75.00      0.00
  12      5   FWD FUS SG VERT    FUSELAGE   1   1    1    1946.00     820.08     184.05
  13              0.00     528.50     528.50          1.00
  14      6   FWD FUS SG LAT     FUSELAGE   2   1    1    1946.00     820.08     184.05
  15              0.00     528.50     528.50          1.00
  16      7   AFT FUS SG VERT    FUSELAGE   1   1    1    1946.00     820.08     184.05
  17         1337.50    1800.00    1337.50         -1.00
  18      8   AFT FUS SG LAT     FUSELAGE   2   1    1    1946.00     820.08     184.05
  19         1337.50    1800.00    1337.50         -1.00
  20     31   VT ROOT TOTAL                 4   1    6     247.40     206.76     188.95
  21     03    3    1       1.00      64.56        -46.44
  22     03    3    2       0.00       1.00          0.00
  23     03    3    3       0.00       0.00          1.00
  24     04    3    1       1.00       0.00          0.00
  25     04    3    2       0.00       1.00          0.00
  26     04    3    3       0.00       0.00          1.00
  27     32   AFT FUS SG V-TOT               4   1    6    1946.00     820.08     184.05
  28     03    3    1       1.00       0.00          0.00
  29     03    3    2       0.00       1.00          0.00
  30     02    1    1       1.00     244.50          0.00
  31     02    2    1       1.00     244.50          0.00
  32     02    1    3       0.00      -1.00          0.00
  33     02    2    3       0.00      -1.00          0.00
  34     33   AFT FUS SG L-TOT               4   1   10    1946.00     820.08     184.05
  35     08    3    1       1.00       0.00          0.00
  36     08    3    2       0.00       1.00          0.00
  37     08    3    3       0.00       0.00          1.00
  38     31    3    1       1.00     198.06         41.00
  39     31    3    2       0.00       0.00          1.00
  40     31    3    3       0.00      -1.00          0.00
  41     02    1    1       0.00       0.00        10.75
  42     02    2    1       0.00       0.00       -10.75
  43     02    1    2       0.00       0.00          1.00
  44     02    2    2       0.00       0.00         -1.00
```

Program output listing for example 8.1

```
GEOMETRY OPTION = 4

 8  SURFACE/AXIS DEFINITIONS TO BE COMPUTED  AND PUNCHED
    USING FLEXSTAB GDTAPE ,   FILE  1

CASE ID =    B1 AR3   GD-20....67.5WS
::
USER ID =    NASA/DFRC   BOB SIMS   EXT 308
::
UNITS OPTION =   INCH



 3  ADDITIONAL LOADS TO BE DEFINED
```

SURFACE/AXIS NUMBER = 1 SURFACE/AXIS NAME = WING - SG AXIS GD BODY NAME = WING2

INTEGRATION TYPE CODE = 3 SREF = 1940.000 BREF = 820.080 CREF = 184.050

BODY TYPE CODE = 3 SYMMETRY CODE = OFF

NUMBER OF ROWS = 9 THETA = -1.94 DEG

INTEGRATION AXIS DEFINITION ORIGIN AT XN = 1161.870
YN = 239.920
SWEEP ANGLE = 63.520 DEG

ROW DATA

NUMBER	YN	NUMBER OF PANELS
1	166.023	5
2	208.430	5
3	245.245	5
4	280.220	5
5	312.775	5
6	347.552	5
7	387.246	5
8	423.704	5
9	456.000	5

PANEL DATA

INDEX		AREA-IN2	BARM-IN	TARM-IN	
1	1	0.000	0.000	0.000	
1	2	0.000	0.000	0.000	
1	3	0.000	0.000	0.000	
1	4	614.071	9.239	-76.261	CUT PANEL
1	5	4043.684	53.297	-109.024	CUT PANEL
2	1	0.000	0.000	0.000	
2	2	0.000	0.000	0.000	
2	3	240.559	9.391	-23.688	CUT PANEL
2	4	2499.882	37.166	-56.712	CUT PANEL
2	5	3078.947	98.103	-84.051	
3	1	0.000	0.000	0.000	
3	2	348.747	12.541	13.358	CUT PANEL
3	3	2189.756	39.651	-11.371	CUT PANEL
3	4	2618.773	97.892	-42.815	
3	5	2618.773	164.907	-76.199	

PANEL DATA

INDEX		AREA-IN2	BARM-IN	TARM-IN	
4	1	792.891	19.598	46.131	CUT PANEL
4	2	2229.513	50.026	21.195	CUT PANEL
4	3	2389.686	107.243	-8.399	
4	4	2389.686	168.404	-36.866	
4	5	2389.686	229.565	-69.333	
5	1	1865.969	60.901	48.067	
5	2	1865.969	122.612	20.315	
5	3	1865.969	178.323	-7.438	
5	4	1865.969	234.035	-35.190	
5	5	1865.969	289.746	-62.942	
6	1	2226.145	154.478	43.295	
6	2	2226.145	204.368	18.442	
6	3	2226.145	254.258	-6.411	
6	4	2226.145	304.148	-31.263	
6	5	2226.145	354.036	-56.116	
7	1	1904.691	254.436	37.847	
7	2	1904.691	297.681	16.304	
7	3	1904.691	340.927	-5.238	
7	4	1904.691	384.173	-26.781	
7	5	1904.691	427.418	-48.324	
8	1	1216.113	343.147	34.387	
8	2	1216.113	374.094	18.970	
8	3	1216.113	405.042	3.554	
8	4	1216.113	435.990	-11.863	
8	5	1216.113	466.938	-27.279	
9	1	397.976	418.302	33.030	
9	2	397.976	431.496	26.458	
9	3	397.976	444.689	19.886	
9	4	397.976	457.883	13.313	
9	5	397.976	471.076	6.741	

TOTAL AREA 66499.123

SURFACE/AXIS NUMBER = 2 SURFACE/AXIS NAME = HORIZ TAIL - SG GD BODY NAME = HORZTAIL

INTEGRATION TYPE CODE = 3 SREF = 238.770 BREF = 259.030 CREF = 149.380

BODY TYPE CODE = 3 SYMMETRY CODE = OFF

NUMBER OF ROWS = 6 THETA = 1.00 DEG

INTEGRATION AXIS DEFINITION ORIGIN AT XN = 1582.000
YN = 10.754
SWEEP ANGLE = 0.000 DEG

ROW DATA

NUMBER	YN	NUMBER OF PANELS
1	21.506	5
2	68.120	5
3	116.862	5
4	164.204	5
5	207.859	5
6	249.416	5

PANEL DATA

INDEX		AREA-IN2	BARM-IN	TARM-IN	
1	1	1263.184	16.236	54.720	CUT PANEL
1	2	1263.184	16.236	16.141	CUT PANEL
1	3	1263.184	16.236	-22.438	CUT PANEL
1	4	1263.184	16.236	-61.017	CUT PANEL
1	5	1263.184	16.236	-99.595	CUT PANEL
2	1	1765.972	57.370	23.705	
2	2	1765.972	57.370	-11.330	
2	3	1765.972	57.370	-46.365	
2	4	1765.972	57.370	-81.400	
2	5	1765.972	57.370	-116.435	
3	1	1406.099	106.112	-16.883	
3	2	1406.099	106.112	-46.866	
3	3	1406.099	106.112	-76.849	
3	4	1406.099	106.112	-106.832	
3	5	1406.099	106.112	-136.815	
4	1	1199.702	153.454	-56.304	
4	2	1199.702	153.454	-81.301	
4	3	1199.702	153.454	-106.457	
4	4	1199.702	153.454	-131.533	
4	5	1199.702	153.454	-156.610	

PANEL DATA

INDEX		AREA-IN2	BARM-IN	TARM-IN
5	1	798.922	197.109	-92.656
5	2	798.922	197.109	-113.208
5	3	798.922	197.109	-133.760
5	4	798.922	197.109	-154.311
5	5	798.922	197.109	-174.863
6	1	725.942	238.666	-127.261
6	2	725.942	238.666	-143.506
6	3	725.942	238.666	-159.750
6	4	725.942	238.666	-175.994
6	5	725.942	238.666	-192.239

TOTAL AREA 35799.106

SURFACE/AXIS NUMBER = 3 SURFACE/AXIS NAME = VERT TAIL - SG GD BODY NAME = VERTTIP

INTEGRATION TYPE CODE = 3 SREF = 247.400 BREF = 206.760 CREF = 188.950

BODY TYPE CODE = 3 SYMMETRY CODE = CN

NUMBER OF ROWS = 6 THETA = 90.00 DEG

INTEGRATION AXIS DEFINITION ORIGIN AT XN = 1582.000
YN = 136.560
SWEEP ANGLE = 0.000 DEG

ROW DATA

NUMBER	YN	NUMBER OF PANELS
1	137.790	5
2	162.245	5
3	184.576	5
4	210.878	5
5	242.432	5
6	269.123	5

PANEL DATA

INDEX		AREA-IN2	BARM-IN	TARM-IN	
1	1	553.150	6.653	90.303	CUT PANEL
1	2	553.150	6.653	49.133	CUT PANEL
1	3	553.150	6.653	7.964	CUT PANEL
1	4	553.150	6.653	-33.206	CUT PANEL
1	5	553.150	6.653	-74.375	CUT PANEL
2	1	940.289	25.685	68.034	
2	2	940.289	25.685	30.376	
2	3	940.289	25.685	-7.283	
2	4	940.289	25.685	-44.942	
2	5	940.289	25.685	-82.600	
3	1	653.390	48.016	41.906	
3	2	653.390	48.016	8.366	
3	3	653.390	48.016	-25.173	
3	4	653.390	48.016	-58.712	
3	5	653.390	48.016	-92.252	
4	1	971.470	74.318	11.130	
4	2	971.470	74.318	-17.557	
4	3	971.470	74.318	-46.245	
4	4	971.470	74.318	-74.932	
4	5	971.470	74.318	-103.619	

PANEL DATA

INDEX		AREA-IN2	BARM-IN	TARM-IN
5	1	660.096	105.872	-25.790
5	2	660.096	105.872	-48.657
5	3	660.096	105.872	-71.523
5	4	660.096	105.872	-94.390
5	5	660.096	105.872	-117.257
6	1	433.031	132.563	-57.020
6	2	433.031	132.563	-74.963
6	3	433.031	132.563	-92.906
6	4	433.031	132.563	-110.849
6	5	433.031	132.563	-128.792

TOTAL AREA 21057.132

SURFACE/AXIS NUMBER = 4 SURFACE/AXIS NAME = VERT TAIL - ROOT GD BODY NAME = VERTTAIL

INTEGRATION TYPE CODE = 3 SREF = 247.400 BREF = 206.760 CREF = 188.950

BODY TYPE CODE = 3 SYMMETRY CODE = CN

NUMBER OF ROWS = 2 THETA = 90.00 DEG

INTEGRATION AXIS DEFINITION ORIGIN AT XN = 1535.560
YN = 75.000
SWEEP ANGLE = 0.000 DEG

ROW DATA

NUMBER	YN	NUMBER OF PANELS
1	96.566	5
2	117.404	5

PANEL DATA

INDEX		AREA-IN2	BARM-IN	TARM-IN
1	1	1217.063	21.566	98.032
1	2	1217.063	21.566	48.322
1	3	1217.063	21.566	-1.387
1	4	1217.063	21.566	-51.097
1	5	1217.063	21.566	-100.806
2	1	780.196	42.404	73.940
2	2	780.196	42.404	28.029
2	3	780.196	42.404	-17.882
2	4	780.196	42.404	-63.794
2	5	780.196	42.404	-109.705

TOTAL AREA 9986.297

SURFACE/AXIS NUMBER = 5 SURFACE/AXIS NAME = FWD FUS SG VERT GD BODY NAME = FUSELAGE

INTEGRATION TYPE CODE = 1 SREF = 1946.000 BREF = 820.060 CREF = 184.050

BODY TYPE CODE = 1 SYMMETRY CODE = ON

NUMBER OF ROWS = 1

INTEGRATION AXIS DEFINITION FORWARD LIMIT AT XR = 0.000
AFT LIMIT AT XR = 528.500
MOMENTS SUMMED ABOUT XR = 528.500 POSITIVE = NOSE UP

ROW DATA Y = 0.000 NUMBER OF PANELS = 20

PANEL DATA

INDEX		AREA-IN2	BARM-IN	TARM-IN
1	1	2731.606	462.200	0.000
1	2	5677.311	373.600	0.000
1	3	7404.302	285.000	0.000
1	4	9074.412	196.400	0.000
1	5	10341.924	107.800	0.000
1	6	8068.122	31.750	0.000
1	7	0.000	0.000	0.000
1	8	0.000	0.000	0.000
1	9	0.000	0.000	0.000
1	10	0.000	0.000	0.000
1	11	0.000	0.000	0.000
1	12	0.000	0.000	0.000
1	13	0.000	0.000	0.000
1	14	0.000	0.000	0.000
1	15	0.000	0.000	0.000
1	16	0.000	0.000	0.000
1	17	0.000	0.000	0.000
1	18	0.000	0.000	0.000
1	19	0.000	0.000	0.000
1	20	0.000	0.000	0.000

TOTAL AREA 43317.077

SURFACE/AXIS NUMBER = 6 SURFACE/AXIS NAME = FWD FUS SG LAT GU BODY NAME = FUSELAGE

INTEGRATION TYPE CODE = 2 SREF = 1946.000 BREF = 820.080 CREF = 184.050

BODY TYPE CODE = 1 SYMMETRY CODE = ON

NUMBER OF PAIRS = 1

INTEGRATION AXIS DEFINITION FORWARD LIMIT AT XR = 0.000
AFT LIMIT AT XR = 528.500
MOMENTS SUMMED ABOUT XR = 528.500 POSITIVE - NOSE RIGHT

ROW DATA Y = 0.000 NUMBER OF PANELS = 20

PANEL DATA

INDEX		AREA-IN2	BARM-IN	TARM-IN
1	1	2731.006	462.200	0.000
1	2	5677.311	373.600	0.000
1	3	7404.302	285.000	0.000
1	4	9074.412	196.400	0.000
1	5	10341.924	107.800	0.000
1	6	8988.122	31.750	0.000
1	7	0.000	0.000	0.000
1	8	0.000	0.000	0.000
1	9	0.000	0.000	0.000
1	10	0.000	0.000	0.000
1	11	0.000	0.000	0.000
1	12	0.000	0.000	0.000
1	13	0.000	0.000	0.000
1	14	0.000	0.000	0.000
1	15	0.000	0.000	0.000
1	16	0.000	0.000	0.000
1	17	0.000	0.000	0.000
1	18	0.000	0.000	0.000
1	19	0.000	0.000	0.000
1	20	0.000	0.000	0.000

TOTAL AREA 43317.077

SURFACE/AXIS NUMBER = 7 SURFACE/AXIS NAME = AFT FUS SG VERT GD BODY NAME = FUSELAGE

INTEGRATION TYPE CODE = 1 SREF = 946.000 BREF = 820.660 CREF = 184.050

BODY TYPE CODE = 1 SYMMETRY CODE = CN

NUMBER OF ROWS = 1

INTEGRATION AXIS DEFINITION FORWARD LIMIT AT XR = 1337.500
AFT LIMIT AT XR = 1600.000
MOMENTS SUMMED ABOUT XR = 1337.500 POSITIVE - TAIL UP

ROW DATA Y = 0.000 NUMBER OF PANELS = 20

PANEL DATA

INDEX		AREA-IN2	BARM-IN	TARM-IN
1	1	0.000	0.000	0.000
1	2	0.000	0.000	0.000
1	3	0.000	0.000	0.000
1	4	0.000	0.000	0.000
1	5	0.000	0.000	0.000
1	6	0.000	0.000	0.000
1	7	0.000	0.000	0.000
1	8	0.000	0.000	0.000
1	9	0.000	0.000	0.000
1	10	0.000	0.000	0.000
1	11	0.000	0.000	0.000
1	12	0.000	0.000	0.000
1	13	0.000	0.000	0.000
1	14	0.000	0.000	0.000
1	15	1232.397	6.750	0.000
1	16	7982.328	57.600	0.000
1	17	7825.329	146.400	0.000
1	18	7646.180	235.000	0.000
1	19	5779.201	323.600	0.000
1	20	1878.980	412.200	0.000

TOTAL AREA 32344.415

SURFACE/AXIS NUMBER = 8 SURFACE/AXIS NAME = AFT FUS SG LAT GD BODY NAME = FUSELAGE

INTEGRATION TYPE CODE = 2 SREF = 1946.000 BREF = 820.080 CREF = 184.450

BODY TYPE CODE = 1 SYMMETRY CODE = ON

NUMBER OF ROWS = 1

INTEGRATION AXIS DEFINITION FORWARD LIMIT AT XR = 1337.500
AFT LIMIT AT XR = 1800.000
MOMENTS SUMMED ABOUT XR = 1337.500 POSITIVE - TAIL RIGHT

ROW DATA Y = 0.000 NUMBER OF PANELS = 20

PANEL DATA

INDEX		AREA-IN2	BARM-IN	TARM-IN
1	1	0.000	0.000	0.000
1	2	0.000	0.000	0.000
1	3	0.000	0.000	0.000
1	4	0.000	0.000	0.000
1	5	0.000	0.000	0.000
1	6	0.000	0.000	0.000
1	7	0.000	0.000	0.000
1	8	0.000	0.000	0.000
1	9	0.000	0.000	0.000
1	10	0.000	0.000	0.000
1	11	0.000	0.000	0.000
1	12	0.000	0.000	0.000
1	13	0.000	0.000	0.000
1	14	0.000	0.000	0.000
1	15	1232.397	6.750	0.000
1	16	7982.328	57.600	0.000
1	17	7825.329	146.400	0.000
1	18	7646.180	235.000	0.000
1	19	5779.201	323.600	0.000
1	20	1673.980	412.200	0.000

TOTAL AREA 32344.415

ADDITIONAL LOADS OPTION

SURFACE/AXIS NUMBER = 31 SURFACE/AXIS NAME = VT ROOT TOTAL

INTEGRATION TYPE CODE = 4 SREF = 247.460 BREF = 206.760 CREF = 188.950

SYMMETRY CODE = ON NUMBER OF TERMS = 6

COMPONENT DEFINITION FOR CENTERLINE LOAD

TERM	INDICES	COMPONENT DESCRIPTION	V FACTOR	B FACTOR	T FACTOR
1	3 3 1	VERT TAIL - SG CL V	1.000	61.560	-46.440
2	3 3 2	VERT TAIL - SG CL B	0.000	1.000	0.000
3	3 3 3	VERT TAIL - SG CL T	0.000	0.000	1.000
4	4 3 1	VERT TAIL - ROOT CL V	1.000	0.000	0.000
5	4 3 2	VERT TAIL - ROOT CL B	0.000	1.000	0.000
6	4 3 3	VERT TAIL - ROOT CL T	0.000	0.000	1.000

ADDITIONAL LOADS OPTION

SURFACE/AXIS NUMBER = 32 SURFACE/AXIS NAME = AFT FUS SG V-TOT

INTEGRATION TYPE CODE = 4 SREF = 1946.000 BREF = 820.080 CREF = 184.050

SYMMETRY CODE = ON NUMBER OF TERMS = 6

COMPONENT DEFINITION FOR CENTERLINE LOAD

TERM	INDICES	COMPONENT DESCRIPTION			V FACTOR	B FACTOR	T FACTOR
1	7 3 1	AFT FUS SG VERT	CL	V	1.000	0.000	0.000
2	7 3 2	AFT FUS SG VERT	CL	B	0.000	1.000	0.000
3	2 1 1	HORIZ TAIL - SG	LH	V	1.000	244.500	0.000
4	2 2 1	HORIZ TAIL - SG	RH	V	1.000	244.500	0.000
5	2 1 3	HORIZ TAIL - SG	LH	T	0.000	-1.000	0.000
6	2 2 3	HORIZ TAIL - SG	RH	T	0.000	-1.000	0.000

ADDITIONAL LOADS OPTION

SURFACE/AXIS NUMBER = 33 SURFACE/AXIS NAME = AFT FUS SG L-ICT

INTEGRATION TYPE CODE = 4 SREF = 1946.000 BREF = 820.080 CREF = 184.050

SYMMETRY CODE = ON NUMBER OF TERMS = 10

COMPONENT DEFINITION FOR CENTERLINE LOAD

TERM	INDICES			COMPONENT DESCRIPTION			V FACTOR	B FACTOR	T FACTOR
1	8	3	1	AFT FUS SG LAT	CL	V	1.000	0.000	0.000
2	8	3	2	AFT FUS SG LAT	CL	B	0.000	1.000	0.000
3	8	3	3	AFT FUS SG LAT	CL	T	0.000	0.000	1.000
4	31	3	1	VT ROOT TOTAL	CL	V	1.000	198.000	41.000
5	31	3	2	VT ROOT TOTAL	CL	B	0.000	0.000	1.000
6	31	3	3	VT ROOT TOTAL	CL	T	0.000	-1.000	0.000
7	2	1	1	HORIZ TAIL - SG	LH	V	0.000	0.000	10.750
8	2	2	1	HORIZ TAIL - SG	RH	V	0.000	0.000	-10.750
9	2	1	2	HORIZ TAIL - SG	LH	B	0.000	0.000	1.000
10	2	2	2	HORIZ TAIL - SG	RH	B	0.000	0.000	-1.000

```
  NFA     SCOPE 3.4.2        DS17 CMR 6 07/23/81
14.08.15.B1FS14I  FROM
14.08.15.DP   00003384 WORDS - FILE INPUT  , DC 6G
14.08.15.B1FS14,T777,FTN,1462.
14.08.07.ATTACH(LGO,$FSLIP3$,ID=SIMS,MR=1)
14.08.08.PF CYCLE NO. = 001
14.08.08.PAUSE.    PLEASE MOUNT FRC077
14.09.25.GO.
14.09.25.MOUNT(VSN=FRC077,SN=FLRF1)
14.09.29.GO.
14.11.45.MOUNTED VSN=FRC077,SN=FLRF1
14.11.45.ATTACH(GOTAPE,$B1 GO-2C6,ID=SIMS,MR=1,SN
14.11.45.=FLRF1)
14.11.45.PF CYCLE NO. = 002
14.11.47.COPY(GOTAPE,TAPE30)
14.11.48.MAP(OFF)
14.11.48.LGO(PL=100000)
15.57.40.1     STOP
15.57.40.       2.817 CP SECONDS EXECUTION TIME
15.57.40.DP   00002816 WORDS - FILE OUTPUT , DC 4C
15.57.40.DP   0C001344 WORDS - FILE PUNCH  , DC 1M
15.57.40.CPA        2.874 SEC.          2.874 ADJ.
15.57.40.CPB        3.606 SEC.          3.606 ADJ.
15.57.40.PP         1.162 SEC.          1.162 ADJ.
15.57.40.CM       270.049 KWS.         16.482 ADJ.
15.57.40.SS                            24.125
15.57.40.PP         9.419 SEC.      DATE 08/10/81
15.57.40.EJ   END OF JOB, **


**********          B1FS14I  //// END OF LIST ////
**********          B1FS14I  //// END OF LIST ////
```

8.2 Integration and Wind Tunnel Options

This example creates the revised geometry file with GOP = 2 and the wind tunnel coefficient file with WOP = 2 using card input. For brevity, only 1 pressure case for an asymmetric flight condition (α=0, β=+8) is input on cards with POP = 1. The integration and wind tunnel loads options are then executed for all load stations. In addition, comparisons for 6 selected load stations are output using the summary print option.

Card input listing for example 8.2

```
CARD                1                   2                   3                   4                   5                   6                   7                   8
 NO     12345678901234567890123456789012345678901234567890123456789012345678901234567890123456789012345678901234567890

  1           GOP 2      POP 1      ROP 0      SOP 0      IOP 1      WOP 2
  2     TTTTTTTT                        TTT                          INTEGRATE ASYMMETRIC
  3     TTTTTTTTTTTTTT                                               WIND TUNNEL  ASYMMETRIC
  4     01    01    WING - SG AXIS
  5     02    03    H T  - SG AXIS
  6     06    08    F F  - SG AXIS (LAT)
  7     03    05    V T  - SG AXIS
  8     51    06    V T  - ROOF TOTAL
  9     33    14    A F  - TOTAL (LAT)
 10                       SUMMARY PRINT TERMINATOR
 11     08    NSAD                    03    NALD
 12      1    WING - SG AXIS     WING2     3   0    9  1946.000    820.080    184.650
 13      1                166.023                5
 14          1      1       0.000       0.000      0.000
 15          1      2       0.000       0.000      0.000
 16          1      3       0.000       0.000      0.000
 17          1      4
 18          1      5
 19      2                208.430                5
 20          2      1       0.000       0.000      0.000
 21          2      2       0.000       0.000      0.000
 22          2      3     240.559       9.391    -23.688
 23          2      4    2499.882      37.166    -50.712
 24          2      5    3078.947      98.103    -84.051
 25      3                245.245                5
 26          3      1       0.000       0.000      0.000
 27          3      2     348.747      12.541     13.358
 28          3      3    2189.756      39.651    -11.371
 29          3      4    2618.773      97.892    -42.815
 30          3      5    2618.773     164.907    -76.199
 31      4                280.220                5
 32          4      1     792.891      19.598     46.131
 33          4      2    2229.513      50.026     21.195
 34          4      3    2389.686     107.243     -8.399
 35          4      4    2389.686     168.404    -38.866
 36          4      5    2389.686     229.565    -69.333
 37      5                312.775                5
 38          5      1    1865.969      66.901     48.067
 39          5      2    1865.969     122.612     20.315
 40          5      3    1865.969     178.323     -7.438
 41          5      4    1865.969     234.035    -35.190
 42          5      5    1865.969     289.746    -62.942
 43      6                347.552                5
 44          6      1    2226.145     154.478     43.295
 45          6      2    2226.145     204.368     18.442
 46          6      3    2226.145     254.258     -6.411
 47          6      4    2226.145     304.148    -31.263
 48          6      5    2226.145     354.038    -56.116
 49      7                387.246                5
 50          7      1    1904.691     254.436     37.847
 51          7      2    1904.691     297.661     16.304
 52          7      3    1904.691     340.927     -5.238
 53          7      4    1904.691     384.173    -26.781
 54          7      5    1904.691     427.418    -48.324
 55      8                423.704                5
 56          8      1    1216.113     343.147     34.387
 57          8      2    1216.113     374.094     18.970
 58          8      3    1216.113     405.042      3.554
 59          8      4    1216.113     435.990    -11.863
 60          8      5    1216.113     466.938    -27.279
 61      9                456.000                5
 62          9      1     397.976     418.302     33.030
 63          9      2     397.976     431.496     26.458
 64          9      3     397.976     444.689     19.886
 65          9      4     397.976     457.883     13.313
 66          9      5     397.976     471.076      6.741
 67      2    HORIZ TAIL - SG    HORZTAIL  3   0    6   238.770    259.030    149.380
 68      1                 21.506                5
 69          1      1    1263.184      16.236     54.720
 70          1      2    1263.184      16.236     16.141
 71          1      3    1263.184      16.236    -22.438
```

```
CARD                1         2         3         4         5         6         7         8
 NO     12345678901234567890123456789012345678901234567890123456789012345678901234567890

  72        1    4  1263.184     16.236    -61.017
  73        1    5  1263.184     16.236    -99.595
  74   2              68.120           5
  75        2    1  1765.972     57.370     23.705
  76        2    2  1765.972     57.370    -11.330
  77        2    3  1765.972     57.370    -46.365
  78        2    4  1765.972     57.370    -81.400
  79        2    5  1765.972     57.370   -116.435
  80   3             116.362           5
  81        3    1  1406.099    106.112    -16.883
  82        3    2  1406.099    106.112    -46.866
  83        3    3  1406.099    106.112    -76.849
  84        3    4  1406.099    106.112   -106.832
  85        3    5  1406.099    106.112   -136.815
  86   4             164.204           5
  87        4    1  1199.702    153.454    -56.304
  88        4    2  1199.702    153.454    -81.381
  89        4    3  1199.702    153.454   -106.457
  90        4    4  1199.702    153.454   -131.533
  91        4    5  1199.702    153.454   -156.610
  92   5             207.859           5
  93        5    1   798.922    197.109    -92.656
  94        5    2   798.922    197.109   -113.208
  95        5    3   798.922    197.109   -133.760
  96        5    4   798.922    197.109   -154.311
  97        5    5   798.922    197.109   -174.863
  98   6             249.416           5
  99        6    1   725.942    238.666   -127.261
 100        6    2   725.942    238.666   -143.506
 101        6    3   725.942    238.666   -159.750
 102        6    4   725.942    238.666   -175.994
 103        6    5   725.942    238.666   -192.239
 104   3  VERT TAIL - SG    VERTTIP   3  1   6   247.400   206.760   188.950
 105   1             137.790           5
 106        1    1   553.150      6.653     90.303
 107        1    2   553.150      6.653     49.133
 108        1    3   553.150      6.653      7.964
 109        1    4   553.150      6.653    -33.206
 110        1    5   553.150      6.653    -74.375
 111   2             162.245           5
 112        2    1   940.289     25.685     68.034
 113        2    2   940.289     25.685     30.376
 114        2    3   940.289     25.685     -7.283
 115        2    4   940.289     25.685    -44.942
 116        2    5   940.289     25.685    -82.600
 117   3             184.376           5
 118        3    1   653.390     48.016     41.906
 119        3    2   653.390     48.016      8.366
 120        3    3   653.390     48.016    -25.173
 121        3    4   653.390     48.016    -58.712
 122        3    5   653.390     48.016    -92.252
 123   4             210.878           5
 124        4    1   971.470     74.318     11.130
 125        4    2   971.470     74.318    -17.557
 126        4    3   971.470     74.318    -46.245
 127        4    4   971.470     74.318    -74.932
 128        4    5   971.470     74.318   -103.619
 129   5             242.432           5
 130        5    1   660.096    105.872    -25.790
 131        5    2   660.096    105.872    -48.657
 132        5    3   660.096    105.872    -71.523
 133        5    4   660.096    105.872    -94.390
 134        5    5   660.096    105.872   -117.257
 135   6             269.123           5
 136        6    1   433.031    132.563    -57.020
 137        6    2   433.031    132.563    -74.963
 138        6    3   433.031    132.563    -92.906
 139        6    4   433.031    132.563   -110.849
 140        6    5   433.031    132.563   -128.792
 141   4  VERT TAIL - ROOT  VERTTAIL   3  1   2   247.400   206.760   188.950
 142   1              96.566           5
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CARD                1         2         3         4         5         6         7         8
 NO     12345678901234567890123456789012345678901234567890123456789012345678901234567890

  143          1    1   1217.063     21.566     98.032
  144          1    2   1217.063     21.566     48.322
  145          1    3   1217.063     21.566     -1.387
  146          1    4   1217.063     21.566    -51.097
  147          1    5   1217.063     21.566   -100.806
  148     2                117.404          5
  149          2    1    780.196     42.404     73.940
  150          2    2    780.196     42.404     28.029
  151          2    3    780.196     42.404    -17.882
  152          2    4    780.196     42.404    -63.794
  153          2    5    780.196     42.404   -109.705
  154     5  FWD  FUS  SG  VERT    FUSELAGE  1   1    1  1946.000    820.080    184.050
  155     1                0.000         20
  156          1    1  2731.006    462.200      0.000
  157          1    2  5677.311    373.600      0.000
  158          1    3  7404.302    285.000      0.000
  159          1    4  9074.412    196.400      0.000
  160          1    5 10341.924    107.800      0.000
  161          1    6  8088.122     31.750      0.000
  162          1    7     0.000      0.000      0.000
  163          1    8     0.000      0.000      0.000
  164          1    9     0.000      0.000      0.000
  165          1   10     0.000      0.000      0.000
  166          1   11     0.000      0.000      0.000
  167          1   12     0.000      0.000      0.000
  168          1   13     0.000      0.000      0.000
  169          1   14     0.000      0.000      0.000
  170          1   15     0.000      0.000      0.000
  171          1   16     0.000      0.000      0.000
  172          1   17     0.000      0.000      0.000
  173          1   18     0.000      0.000      0.000
  174          1   19     0.000      0.000      0.000
  175          1   20     0.000      0.000      0.000
  176     6  FWD  FUS  SG  LAT     FUSELAGE  2   1    1  1946.000    820.080    184.050
  177     1                0.000         20
  178          1    1  2731.006    462.200      0.000
  179          1    2  5677.311    373.600      0.000
  180          1    3  7404.302    285.000      0.000
  181          1    4  9074.412    196.400      0.000
  182          1    5 10341.924    107.800      0.000
  183          1    6  8088.122     31.750      0.000
  184          1    7     0.000      0.000      0.000
  185          1    8     0.000      0.000      0.000
  186          1    9     0.000      0.000      0.000
  187          1   10     0.000      0.000      0.000
  188          1   11     0.000      0.000      0.000
  189          1   12     0.000      0.000      0.000
  190          1   13     0.000      0.000      0.000
  191          1   14     0.000      0.000      0.000
  192          1   15     0.000      0.000      0.000
  193          1   16     0.000      0.000      0.000
  194          1   17     0.000      0.000      0.000
  195          1   18     0.000      0.000      0.000
  196          1   19     0.000      0.000      0.000
  197          1   20     0.000      0.000      0.000
  198     7  AFT  FUS  SG  VERT    FUSELAGE  1   1    1  1946.000    820.080    184.050
  199     1                0.000         20
  200          1    1     0.000      0.000      0.000
  201          1    2     0.000      0.000      0.000
  202          1    3     0.000      0.000      0.000
  203          1    4     0.000      0.000      0.000
  204          1    5     0.000      0.000      0.000
  205          1    6     0.000      0.000      0.000
  206          1    7     0.000      0.000      0.000
  207          1    8     0.000      0.000      0.000
  208          1    9     0.000      0.000      0.000
  209          1   10     0.000      0.000      0.000
  210          1   11     0.000      0.000      0.000
  211          1   12     0.000      0.000      0.000
  212          1   13     0.000      0.000      0.000
  213          1   14     0.000      0.000      0.000
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CARD
NO        1         2         3         4         5         6         7         8
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  214         1   15  1232.397      6.750      0.000
  215         1   15  7982.328     57.800      0.000
  216         1   17  7825.329    146.400      0.000
  217         1   18  7646.180    235.000      0.000
  218         1   19  5779.201    323.600      0.000
  219         1   20  1878.980    412.200      0.000
  220    8    AFT FUS SG LAT    FUSELAGE  2   1    1   1946.000    820.080    184.050
  221    1                 0.000      20
  222         1    1      0.000      0.000      0.000
  223         1    2      0.000      0.000      0.000
  224         1    3      0.000      0.000      0.000
  225         1    4      0.000      0.000      0.000
  226         1    5      0.000      0.000      0.000
  227         1    6      0.000      0.000      0.000
  228         1    7      0.000      0.000      0.000
  229         1    8      0.000      0.000      0.000
  230         1    9      0.000      0.000      0.000
  231         1   10      0.000      0.000      0.000
  232         1   11      0.000      0.000      0.000
  233         1   12      0.000      0.000      0.000
  234         1   13      0.000      0.000      0.000
  235         1   14      0.000      0.000      0.000
  236         1   15  1232.397      6.750      0.000
  237         1   16  7982.328     57.800      0.000
  238         1   17  7825.329    146.400      0.000
  239         1   18  7646.180    235.000      0.000
  240         1   19  5779.201    323.600      0.000
  241         1   20  1878.980    412.200      0.000
  242   31    VT ROOT TOTAL             4   1    6     247.40     206.76     188.95
  243   03     3   1      1.00     61.56    -46.44
  244   03     3   2      0.00      1.00      0.00
  245   03     3   3      0.00      0.00      1.00
  246   04     3   1      1.00      0.00      0.00
  247   04     3   2      0.00      1.00      0.00
  248   04     3   3      0.00      0.00      1.00
  249   32    AFT FUS SG V-TOT          4   1    6    1946.00     820.08     184.05
  250   07     3   1      1.00      0.00      0.00
  251   07     3   2      0.00      1.00      0.00
  252   02     1   1      1.00    244.50      0.00
  253   02     2   1      1.00    244.50      0.00
  254   02     1   3      0.00     -1.00      0.00
  255   02     2   3      0.00     -1.00      0.00
  256   33    AFT FUS SG L-TOT          4   1   10    1946.00     820.08     184.05
  257   08     3   1      1.00      0.00      0.00
  258   08     3   2      0.00      1.00      0.00
  259   08     3   3      0.00      0.00      1.00
  260   31     3   1      1.00    198.06     41.00
  261   31     3   2      0.00      0.00      1.00
  262   31     3   3      0.00     -1.00      0.00
  263   02     1   1      0.00      0.00     10.75
  264   02     2   1      0.00      0.00    -10.75
  265   02     1   2      0.00      0.00      1.00
  266   02     2   2      0.00      0.00     -1.00
  267   81 ARS    WOP-2D    RIGID WIND TUNNEL DATA     M=1.20    WS=67.5    9-29-80
  268    1 WING - SG AXIS        1946.00     820.08     184.05
  269          101 .029213    .0098831   -.003133    ALPHA = 0                M%1.20  SW % 67.5
  270          102 .012051    .0033229    .000584    ALPHA                    M%1.20  SW % 67.5
  271          103 .0         .0          .0         ALPHA DOT                M%1.20  SW % 67.5
  272          104-.000299   -.0000657    .0000034   DELTA SPOILER            M%1.20  SW % 67.5
  273          105-.003232   -.0000955   -.0000223   ROLL VELOC P             M%1.20  SW % 67.5
  274          106 .042987    .0120062   -.0001284   PITCH VELOC Q            M%1.20  SW % 67.5
  275          107-.000759   -.0000167    .0000149   BETA ALPHA ZERO A/S      M%1.20  SW % 67.5
  276          108-.000226   -.0000058   -.0000025   BETA ALPHA A/S           M%1.20  SW % 67.5
  277          109 .000311    .0000119   -.0000174   BETA ALPHA ZERO SYM      M%1.20  SW % 67.5
  278          110 .000008    .0000005   -.0000011   BETA ALPHA SYM           M%1.20  SW % 67.5
  279          111                       FILLER                              M %1.20  SW % 67.5
  280          112                       FILLER                              M %1.20  SW % 67.5
  281          113                       FILLER                              M %1.20  SW % 67.5
  282          114                       FILLER                              M %1.20  SW % 67.5
  283          115                       FILLER                              M %1.20  SW % 67.5
  284    2 HORIZ TAIL - SG      238.77     259.03     149.38
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CARD                1                   2                   3                   4                   5                   6                   7                   8
 NU      12345678901234567890123456789012345678901234567890123456789012345678901234567890123456789012345678901234567890123456789012345678901234567890

 285                201-.136192   -.049482    .051116    ALPHA = 0                    M%1.20   SW  %  67.5
 286                202  .342237   .016920   -.019427    ALPHA                        M%1.20   SW  %  67.5
 287                203  .066513   .027107   -.027833    DELTA H                      M%1.20   SW  %  67.5
 288                204  .233930   .134789   -.107545    ALPHA DOT                    M%1.20   SW  %  67.5
 289                205-.017738   -.006993    .004648    BETA                         M%1.20   SW  %  67.5
 290                206  .049585   .022735   -.022025    DELTA H PRIME                M%1.20   SW  %  67.5
 291                207-.000754   -.000317    .000269    DELTA SPOILER SYM            M%1.20   SW  %  67.5
 292                208  .000277   .000145   -.000168    DELTA SPOILER A/S            M%1.20   SW  %  67.5
 293                209-.002479   -.002088    .002313    ROLL VELOCITY P              M%1.20   SW  %  67.5
 294                210  .552160   .254971   -.297065    PITCH VELOCITY Q             M%1.20   SW  %  67.5
 295                211                                  FILLER                       M %1.20  SW  %  67.5
 296                212                                  FILLER                       M %1.20  SW  %  67.5
 297                213                                  FILLER                       M %1.20  SW  %  67.5
 298                214                                  FILLER                       M %1.20  SW  %  67.5
 299                215                                  FILLER                       M %1.20  SW  %  67.5
 300     3  VERT TAIL - SG        247.40      206.76      188.95
 301                301-.034484   -.010927    .003146    BETA ALPHA=0  136.56         M%1.20   SW  %  67.5
 302                302-.001115   -.000354    .000102    BETA ALPHA    136.56         M%1.20   SW  %  67.5
 303                303-.003532   -.000809    .000464    DELTA H PRIME 136.56         M%1.20   SW  %  67.5
 304                304-.000270   -.000089    .000023    DELTA SPOILER 136.56         M%1.20   SW  %  67.5
 305                305  .009663   .002854   -.003830    DELTA RUD UP  136.56         M%1.20   SW  %  67.5
 306                306  .0        .0          .0        DELTA RUD LOW 136.56         M%1.20   SW  %  67.5
 307                307-.003995   -.001461    .000756    ROLL VELOC P  136.56         M%1.20   SW  %  67.5
 308                308  .032297   .010244   -.005595    YAW VELOC R   136.56         M%1.20   SW  %  67.5
 309                309                                  FILLER                       M %1.20  SW  %  67.5
 310                310                                  FILLER                       M %1.20  SW  %  67.5
 311                311                                  FILLER                       M %1.20  SW  %  67.5
 312                312                                  FILLER                       M %1.20  SW  %  67.5
 313                313                                  FILLER                       M %1.20  SW  %  67.5
 314                314                                  FILLER                       M %1.20  SW  %  67.5
 315                315                                  FILLER                       M %1.20  SW  %  67.5
 316     4  VERT TAIL ROOT        247.40      206.76      188.95
 317                401-.053487   -.023324    .010230    BETA ALPHA=0  WL  75         M%1.20   SW  %  67.5
 318                402-.001730   -.000755    .000331    BETA ALPHA    WL  75         M%1.20   SW  %  67.5
 319                403-.002353   -.001621    .001072    DELTA H PRIME WL  75         M%1.20   SW  %  67.5
 320                404-.000349   -.000177    .000079    DELTA SPOILER WL  75         M%1.20   SW  %  67.5
 321                405  .009675   .005734   -.006210    DELTA RUD UP  WL  75         M%1.20   SW  %  67.5
 322                406  .003878   .000352   -.001119    DELTA RUD LOW WL  75         M%1.20   SW  %  67.5
 323                407-.003790   -.002645    .002665    ROLL VELOC P  WL  75         M%1.20   SW  %  67.5
 324                408  .047596   .022154   -.013930    YAW VELOC R   WL  75         M%1.20   SW  %  67.5
 325                409                                  FILLER                       M %1.20  SW  %  67.5
 326                410                                  FILLER                       M %1.20  SW  %  67.5
 327                411                                  FILLER                       M %1.20  SW  %  67.5
 328                412                                  FILLER                       M %1.20  SW  %  67.5
 329                413                                  FILLER                       M %1.20  SW  %  67.5
 330                414                                  FILLER                       M %1.20  SW  %  67.5
 331                415                                  FILLER                       M %1.20  SW  %  67.5
 332     5  FWD FUS SG            1946.00      820.08      184.05
 333                501  .00317   -.000822    .0         ALPHA=0 (VERTICAL)           M %1.20  SW  %  67.5
 334                502  .00188    .000605    .0         ALPHA (VERTICAL)             M %1.20  SW  %  67.5
 335                503  .00014    .00004     .00002     ROLL VEL.P (LATERAL)         M %1.20  SW  %  67.5
 336                504-.00571    -.00166    -.00099    BETA (LATERAL)               M %1.20  SW  %  67.5
 337                505                                  FILLER                       M %1.20  SW  %  67.5
 338                506                                  FILLER                       M %1.20  SW  %  67.5
 339                507                                  FILLER                       M %1.20  SW  %  67.5
 340                508                                  FILLER                       M %1.20  SW  %  67.5
 341                509                                  FILLER                       M %1.20  SW  %  67.5
 342                510                                  FILLER                       M %1.20  SW  %  67.5
 343                511                                  FILLER                       M %1.20  SW  %  67.5
 344                512                                  FILLER                       M %1.20  SW  %  67.5
 345                513                                  FILLER                       M %1.20  SW  %  67.5
 346                514                                  FILLER                       M %1.20  SW  %  67.5
 347                515                                  FILLER                       M %1.20  SW  %  67.5
 348     6  AFT FUS SG            1946.00      820.08      184.05    244.50  10.75 198.06   41.00
 349                601  .00530    .002173    .0         ALPHA=0 (VERTICAL)           M %1.20  SW  %  67.5
 350                602-.00046    -.000118   .0         ALPHA (VERTICAL)             M %1.20  SW  %  67.5
 351                603-.00211    -.00030    -.00037    BETA ALPHA=0 C/D(LAT)        M %1.20  SW  %  67.5
 352                604-.00007    -.00001    -.00001    BETA ALPHA C/C (LAT)         M %1.20  SW  %  67.5
 353                605  .00022    .00006     .00004    DELTA H PRIME (LAT)          M %1.20  SW  %  67.5
 354                606  .00009    .00001     .00002    DELTA RUDDER LOWER(L)        M %1.20  SW  %  67.5
 355                607  .00044    .00011     .00008    ROLL VELOCITY P (LAT)        M %1.20  SW  %  67.5
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CARD                1         2         3         4         5         6         7         8
 NO     12345678901234567890123456789012345678901234567890123456789012345678901234567890

 356            608-.00168    -.00034    -.00029      BETA (LATERAL)        M %1.20 SW % 67.5
 357            609                                   FILLER                M %1.20 SW % 67.5
 358            610                                   FILLER                M %1.20 SW % 67.5
 359            611                                   FILLER                M %1.20 SW % 67.5
 360            612                                   FILLER                M %1.20 SW % 67.5
 361            613                                   FILLER                M %1.20 SW % 67.5
 362            614                                   FILLER                M %1.20 SW % 67.5
 363            615                                   FILLER                M %1.20 SW % 67.5

 364    7/8/9       END OF RECORD      1

 365    1   03   982.32     QBAR
 366    1   04   1245.1     VTAS
 367    1   02   8.0        BETA

 368    7/8/9       END OF RECORD      2

 369    1.0         CASE
 370    BI ARS      SOSS-3C.2.1D  67.5WS,1.2M, 20K ALT,RIGID,ALPHA=0,DE=0,BETA=8
 371    NASA/DFRC     808 SIMS    EXT 808
 372        8.0000      2.0000      1.2000      0.0000      8.0000   982.3151
 373    VERTTAIL        2.0000     90.0000
 374       96.5665      5.0000
 375          .0991     0.0000       .6462     -.6462 1437.5285
 376          .2993     0.0000       .4574     -.4574 1487.2380
 377          .4994     0.0000       .5850     -.5850 1536.9475
 378          .6995     0.0000       .4035     -.4035 1585.6570
 379          .8997     0.0000       .1038     -.1038 1636.3664
 380      117.4044      5.0000
 381          .0995     0.0000       .8009     -.8009 1461.6198
 382          .2996     0.0000       .6260     -.6260 1507.5311
 383          .4997     0.0000       .5953     -.5953 1553.4425
 384          .6997     0.0000       .3307     -.3307 1599.3538
 385          .8998     0.0000       .0458     -.0458 1645.2652
 386    VERTTIP         6.0000     90.0000
 387      137.7898      5.0000
 388          .0988     0.0000       .9417     -.9417 1485.3523
 389          .2990     0.0000       .1576     -.1576 1527.5221
 390          .4992     0.0000       .3073     -.3073 1569.6918
 391          .6994     0.0000       .3683     -.3683 1611.8616
 392          .8996     0.0000       .3330     -.3330 1654.0314
 393      162.2446      5.0000
 394          .0984     0.0000      1.0583    -1.0583 1513.9658
 395          .2987     0.0000       .2534     -.2534 1551.6245
 396          .4989     0.0000       .3536     -.3536 1589.2831
 397          .6992     0.0000       .3684     -.3684 1626.9418
 398          .8994     0.0000       .3399     -.3399 1664.6005
 399      184.5756      5.0000
 400          .0988     0.0000      1.1589    -1.1589 1540.0944
 401          .2990     0.0000       .3699     -.3699 1573.6337
 402          .4992     0.0000       .3960     -.3960 1607.1731
 403          .6994     0.0000       .3862     -.3862 1640.7124
 404          .8995     0.0000       .3429     -.3429 1674.2517
 405      210.8781      5.0000
 406          .0949     0.0000      1.3447    -1.3447 1570.8699
 407          .2957     0.0000       .4612     -.4612 1599.5573
 408          .4965     0.0000       .4443     -.4443 1628.2447
 409          .6973     0.0000       .4069     -.4069 1656.9321
 410          .8981     0.0000       .3081     -.3081 1685.6195
 411      242.4320      5.0000
 412          .0942     0.0000      1.5950    -1.5950 1607.7899
 413          .2951     0.0000       .5742     -.5742 1630.6566
 414          .4960     0.0000       .5005     -.5005 1653.5234
 415          .6969     0.0000       .2977     -.2977 1676.3901
 416          .8978     0.0000       .1184     -.1184 1699.2568
 417      269.1231      5.0000
 418          .0934     0.0000      1.8874    -1.8874 1639.0201
 419          .2944     0.0000       .5312     -.5312 1656.9632
 420          .4955     0.0000       .1397     -.1397 1674.9063
 421          .6965     0.0000       .0690     -.0690 1692.8494
 422          .8975     0.0000       .0474     -.0474 1710.7925
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CARD                1         2         3         4         5         6         7         8
NO      12345678901234567890123456789012345678901234567890123456789012345678901234567890

463     WING1           2.0000   -1.9400
464        71.0699      5.0000
465            .0567      .0602      .0052      .1152  675.4890
466            .2975     -.0368     -.0054     -.0083  821.0326
467            .4984      .0010     -.0480     -.0500  966.5762
468            .6992      .0454      .0589      .0320 1112.1198
469            .9000      .0839      .0873      .0805 1257.6634
470        122.1564      5.0000
471            .0970      .0265     -.0227      .0758  789.7062
472            .2978      .0458     -.0232      .1148  906.7428
473            .4986     -.0081     -.0600      .0037 1023.7794
474            .6993      .1029      .0704      .1354 1140.8161
475            .9000      .1793      .1835      .1752 1257.8527
476     WING2           9.0000   -1.9400
477        165.9276      5.0000
478            .0953     -.0231     -.0655      .0193  687.5599
479            .2964      .0223      .2420     -.1974  980.1737
480            .4976      .2447      .0784      .4110 1072.7874
481            .6988      .0723      .1682     -.0237 1165.4011
482            .9000      .0536      .1158     -.0086 1258.0149
483        208.3103      5.0000
484            .0997     -.0332      .0181     -.0846  971.3564
485            .2997      .1249      .1226      .1273 1050.3069
486            .4997      .1662      .1055      .2269 1129.2573
487            .6997      .0556      .1431     -.0319 1208.2077
488            .8997      .1229      .1559      .0898 1287.1582
489        245.1043      5.0000
490            .0984      .0199      .0355      .0044 1043.9731
491            .2985      .1212      .0992      .1433 1118.8429
492            .4987      .0984      .1295      .0673 1193.7127
493            .6988      .1032      .1420      .0644 1268.5825
494            .8989      .1326      .1398      .1253 1343.4523
495        280.0598      5.0000
496            .0981      .0684      .0616      .0753 1124.9494
497            .2983      .0916      .1102      .0730 1193.2784
498            .4984      .1017      .1185      .0849 1261.6074
499            .6986      .1368      .1519      .1217 1329.9365
500            .8987      .1253      .1303      .1202 1398.2655
501        312.5952      5.0000
502            .0983      .0949      .0885      .1012 1200.3195
503            .2985      .0882      .1116      .0655 1262.5606
504            .4986      .1211      .1317      .1106 1324.8017
505            .6987      .1468      .1501      .1436 1387.0428
506            .8989      .1149      .1189      .1110 1449.2840
507        347.3528      5.0000
508            .0963      .1997      .1165      .1028 1280.8371
509            .2966      .1123      .1185      .1061 1336.5746
510            .4969      .1394      .1422      .1365 1392.3120
511            .6972      .1366      .1406      .1325 1448.0494
512            .8975      .1069      .1071      .1067 1503.7868
513        387.6238      5.0000
514            .0952      .1456      .1495      .1418 1372.7372
515            .2955      .1333      .1348      .1318 1421.0515
516            .4959      .1367      .1407      .1328 1469.3658
517            .6963      .1193      .1190      .1196 1517.6801
518            .8967      .0868      .0840      .0896 1565.9945
519        423.4607      5.0000
520           1.0000      .2007      .2002      .2012 1453.6845
521           3.0000      .1333      .1400      .1267 1488.2595
522           5.0000      .1269      .1248      .1329 1522.8346
523           7.0000      .0474      .0456      .0498 1557.4096
524           9.0000      .1478      .1439      .1516 1591.9846
525        455.7366      5.0000
526           1.0000      .2928      .2911      .2946 1521.5604
527           3.0000      .1150      .1117      .1184 1536.3002
528           5.0000     -.0354     -.0385     -.0323 1551.0401
529           7.0000      .3116      .3102      .3130 1565.7799
530           9.0000      .1237      .1214      .1260 1580.5197
531     HORZTAIL        6.0000   1.0000
532        21.5032      5.0000
533            .0992     -.0604      .2846     -.4054 1523.7916
```

```
CARD
NO        1         2         3         4         5         6         7         8
     1234567890123456789012345678901234567890123456789012345678901234567890123456789012345678901234567890

494          .2993    -.0559     .0873    -.1991 1562.6997
495          .4994    -.0437    -.0540    -.0335 1601.6077
496          .6994    -.0321    -.1391     .0349 1640.5158
497          .8995    -.0192    -.1616     .1413 1679.4238
498       68.1097     5.0000
499          .0975    -.0728     .3143    -.4548 1558.2948
500          .2974    -.0517     .0508    -.1543 1593.3298
501          .4977    -.0314    -.0636     .0007 1628.3648
502          .6981    -.0126    -.1593     .1542 1663.3999
503          .8985    -.0221    -.2452     .2010 1698.4349
504       116.8445    5.0000
505          .0964    -.0980     .2745    -.4706 1598.8828
506          .2969    -.0503     .0315    -.1322 1629.8659
507          .4973    -.0320    -.0722     .0081 1660.8490
508          .6978    -.0096    -.1605     .1413 1689.8320
509          .6982    -.0276    -.2262     .1710 1718.8151
510       164.1789    5.0000
511          .0947    -.1351     .2117    -.4819 1638.3045
512          .2954    -.0547     .0215    -.1248 1663.3808
513          .4960    -.0390    -.0703    -.0077 1688.4571
514          .6967    -.0180    -.1495     .1135 1713.5334
515          .8973    -.0281    -.1897     .1335 1738.6098
516       207.8270    5.0000
517          .0948    -.1700     .1720    -.5120 1674.6563
518          .2954    -.0594     .0070    -.1259 1695.2079
519          .4961    -.0305    -.0749    -.0260 1715.7596
520          .6967    -.0357    -.1414     .0701 1736.3112
521          .8974    -.0171    -.1641     .1300 1756.8629
522       249.3778    5.0000
523          .0568    -.2265     .1159    -.5688 1709.2612
524          .2902    -.0721    -.0019    -.1424 1725.5057
525          .4916    -.0278    -.0646     .0091 1741.7501
526          .6930    -.0004    -.1235     .1226 1757.9945
527          .8944     .0032    -.1525     .1589 1774.2389
528    PLATE          1.0000  -87.5000
529       146.4763    4.0000
530          .0989     .0599    -.4056     .5253  951.8000
531          .3384    -.1720     .0250    -.3690 1058.3000
532          .6195     .1093    -.1194     .3381 1183.3000
533          .8800     .0691     .1135     .0246 1299.1500
534    CANARD         1.0000  -30.5000
535        48.2700    2.0000
536          .1250    -.4614   -1.3920     .4691  230.5311
537          .6250    -.1793    -.4972     .1387  244.8045
538    FUSELAGE          1.0       0.0
539             0.0      20.0
540          .0250    -.0976    -.2731
541          .0750    -.1580    -.1389
542          .1250    -.2340    -.1155
543          .1750     .2906    -.0939
544          .2250     .1490    -.0636
545          .2750     .1182    -.0497
546          .3250    -.0363    -.0037
547          .3750    -.1099     .0907
548          .4250    -.0744     .0911
549          .4750    -.0008     .0765
550          .5250     .0202     .1050
551          .5750     .0319     .0135
552          .6250     .0339    -.0113
553          .6750     .1001     .0519
554          .7250     .0935     .0415
555          .7750     .0128    -.0173
556          .8250     .0289    -.1550
557          .8750     .0807    -.2512
558          .9250    -.0507     .0576
559          .9750    -.2572     .5806
```

Program output listing for example 8.2

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INTEGRATION  OPTION

CASE  1      B1 ARS   SDSS-3C.2.1D  67.5WS,1.2M, 20K ALT,RIGID,ALPHA=0,DE=0,BETA=8                ALPHA=  0.00   BETA=  8.00   QBAR= 982.3
MR=ASYM                                                                                                                        TAS =1245.1

SAN=  1  WING - SG AXIS      CPBODY=WING2      ITC=3   SC=OFF   THETA=  -1.94          SREF=  1946.000     BREF=  820.08   CREF=  184.05

PANEL        AREA      BARM      TARM       CP-L        V-L         B-L         T-L          CP-R        V-R         B-R         T-R
             IN2       IN        IN                    KIPS      IN-KIPS     IN-KIPS                   KIPS      IN-KIPS     IN-KIPS

 1  1        0.00      0.00      0.00      .0193       0.000       0.000       0.000       -.0655       0.000       0.000       0.000
 1  2        0.00      0.00      0.00     -.1974       0.000       0.000       0.000        .2420       0.000       0.000       0.000
 1  3        0.00      0.00      0.00      .4110       0.000       0.000       0.000        .0784       0.000       0.000       0.000
 1  4        0.00      0.00      0.00     -.0237       0.000       0.000       0.000        .1662       0.000       0.000       0.000
 1  5        0.00      0.00      0.00     -.0086       0.000       0.000       0.000        .1158       0.000       0.000       0.000

 2  1        0.00      0.00      0.00     -.0846       0.000       0.000       0.000        .0181       0.000       0.000       0.000
 2  2        0.00      0.00      0.00      .1273       0.000       0.000       0.000        .1226       0.000       0.000       0.000
 2  3      240.56      9.39    -23.69      .2269        .372       3.497       -8.820       .1055        .173       1.626      -4.101
 2  4     2499.88     37.17    -50.71     -.0319       -.544     -20.218       27.587       .1431       2.440      90.697    -123.754
 2  5     3078.95     98.10    -84.65      .0898       1.886     185.033     -158.529       .1559       3.274     321.232    -275.220

 3  1        0.00      0.00      0.00      .0044       0.000       0.000       0.000        .0355       0.000       0.000       0.000
 3  2      348.75     12.54     15.36      .1433        .341       4.275       4.554        .0992        .236       2.960       3.152
 3  3     2189.76     39.65    -11.37      .0673       1.005      39.861     -11.431       .1295       1.934      76.702     -21.996
 3  4     2618.77     97.89    -42.82      .0644       1.150     112.621     -49.257       .1420       2.537     248.326    -108.610
 3  5     2618.77    164.91    -76.20      .1253       2.238     369.127    -170.564       .1398       2.497     411.844    -190.302

 4  1      792.89     19.60     46.13      .0753        .407       7.982      18.788        .0616        .333       6.530      15.370
 4  2     2229.51     50.33     21.20      .0730       1.110      55.541      23.532       .1102       1.676      83.845      35.523
 4  3     2389.69    107.24     -8.40      .0849       1.384     148.425     -11.624       .1185       1.932     207.165     -16.225
 4  4     2389.69    168.40    -38.87      .1217       1.984     334.097     -77.106       .1519       2.476     417.003     -96.240
 4  5     2389.69    229.57    -69.33      .1202       1.959     449.821    -135.854       .1303       2.124     487.617    -147.270

 5  1     1865.97     66.90     48.07      .1012       1.288      86.180      61.918       .0885       1.127      75.365      54.148
 5  2     1865.97    122.64     20.32      .0655        .834     102.227      16.938       .1110       1.413     173.240      28.703
 5  3     1865.97    178.32     -7.44      .1106       1.408     251.047     -10.471       .1317       1.676     298.941     -12.469
 5  4     1865.97    234.04    -39.19      .1436       1.828     427.787     -64.323       .1501       1.911     447.151     -67.235
 5  5     1865.97    289.75    -62.94      .1110       1.413     409.386     -88.932       .1189       1.513     438.523     -95.261

 6  1     2226.15    154.48     43.30      .1028       1.561     241.158      67.588       .1165       1.769     273.297      76.596
 6  2     2226.15    204.37     16.44      .1061       1.611     329.284      29.714       .1185       1.800     367.767      33.187
 6  3     2226.15    254.25     -6.41      .1365       2.073     527.047     -13.289       .1422       2.159     549.055     -13.844
 6  4     2226.15    304.15    -31.26      .1325       2.012     611.988     -62.905       .1406       2.135     649.400     -66.751
 6  5     2226.15    354.04    -56.12      .1067       1.620     573.662     -90.927       .1071       1.626     575.813     -91.268

 7  1     1904.69    254.44     37.85      .1418       1.842     468.778      69.730       .1495       1.942     494.234      73.517
 7  2     1904.69    297.68     16.30      .1318       1.712     509.776      27.920       .1348       1.751     521.379      28.556
 7  3     1904.69    340.93     -5.24      .1328       1.725     588.264      -9.038       .1407       1.828     623.259      -9.576
 7  4     1904.69    384.17    -26.78      .1196       1.554     596.995     -41.617       .1190       1.546     594.000     -41.408
 7  5     1904.69    427.42    -48.32      .0896       1.164     497.592     -56.258       .0840       1.091     466.493     -52.742

 8  1     1216.11    343.15     34.39      .2012       1.669     572.757      57.396       .2002       1.661     569.910      57.111
 8  2     1216.11    374.09     16.97      .1267       1.051     393.206      19.939       .1400       1.161     434.481      22.032
 8  3     1216.11    405.04      3.55      .1329       1.103     446.568       3.918       .1248       1.035     419.353       3.680
 8  4     1216.11    435.99    -11.86      .0498        .413     180.123      -4.901       .0450        .373     162.761      -4.429
 8  5     1216.11    466.94    -27.28      .1516       1.258     587.247     -34.308       .1439       1.194     557.420     -32.565
```

INTEGRATION OPTION

SAN= 1 WING - SG AXIS

PANEL	AREA IN2	BARM IN	TARM IN	CP-L	V-L KIPS	B-L IN-KIPS	T-L IN-KIPS	CP-R	V-R KIPS	B-R IN-KIPS	T-R IN-KIPS
9 1	397.98	418.30	33.03	.2946	.800	334.555	26.417	.2911	.790	330.581	26.102
9 2	397.98	431.00	26.46	.1184	.321	138.699	8.505	.1117	.303	130.853	8.023
9 3	397.98	444.69	19.89	-.0323	-.088	-38.995	-1.744	-.0385	-.105	-46.480	-2.079
9 4	397.98	457.88	13.31	.3130	.850	389.085	11.313	.3102	.842	385.604	11.211
9 5	397.98	471.08	6.74	.1260	.342	161.141	2.306	.1214	.330	155.258	2.222
TOTAL INTEGRATED LOADS					44.660	11075.619	-623.834		54.508	12003.200	-994.208
TOTAL LOADS PER QBAR					.045464	11.275017	-.635066		.055490	12.219297	-1.012107
TOTAL LOAD COEFFICIENTS					.023363	.007065	-.001773		.028515	.007657	-.002826

INTEGRATION OPTION

CASE 1 B1 ARS SDSS-3C.2.1D 67.5WS,1.2M, 20K ALT,RIGID,ALPHA=0,DE=0,BETA=8 ALPHA= 0.00 BETA= 8.00 CBAR= 982.3
MR=ASYM TAS =1245.1

SAN= 2 HORIZ TAIL - SG CPBODY=HORZTAIL ITC=3 SC=OFF THETA= 1.00 SREF= 238.770 BREF= 259.03 CREF= 149.38

PANEL		AREA IN2	BARM IN	TARM IN	CP-L	V-L KIPS	B-L IN-KIPS	T-L IN-KIPS	CP-R	V-R KIPS	B-R IN-KIPS	T-R IN-KIPS
1	1	1263.18	16.24	54.72	-.4084	-3.493	-56.718	-191.155	.2846	2.452	39.817	134.195
1	2	1263.18	16.24	16.14	-.1991	-1.716	-27.855	-27.692	.0873	.752	12.214	12.142
1	3	1263.18	16.24	-22.44	-.0335	-.289	-4.687	6.477	-.0540	-.465	-7.555	10.441
1	4	1263.18	16.24	-61.02	.1349	1.162	18.873	-70.928	-.1391	-1.199	-19.461	73.136
1	5	1263.18	16.24	-99.59	.1413	1.218	19.769	-121.265	-.1616	-1.393	-22.609	138.686
2	1	1765.97	57.37	23.71	-.4598	-5.539	-317.780	-131.305	.3143	3.786	217.221	89.755
2	2	1765.97	57.37	-21.33	-.1543	-1.859	-106.641	21.060	.0508	.612	35.109	-8.534
2	3	1765.97	57.37	-46.37	.0007	.008	.484	-.391	-.0036	-.766	-43.956	35.524
2	4	1765.97	57.37	-81.40	.1542	1.858	106.572	-151.210	-.1593	-1.919	-110.096	156.211
2	5	1765.97	57.37	-116.44	.2010	2.421	138.916	-281.937	-.2452	-2.954	-169.464	343.935
3	1	1406.10	106.11	-16.88	-.4706	-4.514	-478.984	76.209	.2745	2.633	279.390	-44.453
3	2	1406.10	106.11	-46.87	-.1322	-1.268	-134.555	59.426	.0315	.302	32.061	-14.160
3	3	1406.10	106.11	-76.85	.0081	.078	8.244	-5.971	-.0722	-.693	-73.486	53.221
3	4	1406.10	106.11	-106.83	.1413	1.355	143.817	-144.793	-.1605	-1.539	-163.359	164.468
3	5	1406.10	106.11	-136.82	.1710	1.640	174.046	-224.496	-.2262	-2.170	-230.230	296.846
4	1	1199.70	153.45	-56.30	-.4819	-3.944	-605.197	222.054	.2117	1.733	265.865	-97.549
4	2	1199.70	153.45	-81.38	-.1248	-1.021	-156.731	83.119	.0215	.176	27.001	-14.319
4	3	1199.70	153.45	-106.46	-.0077	-.063	-9.670	6.709	-.0703	-.575	-88.287	61.248
4	4	1199.70	153.45	-131.53	.1135	.929	142.540	-122.178	-.1495	-1.223	-187.751	160.630
4	5	1199.70	153.45	-156.61	.1335	1.093	167.657	-171.105	-.1897	-1.552	-238.236	243.136
5	1	796.92	197.11	-92.66	-.5120	-2.790	-550.008	258.545	.1720	.937	184.768	-86.851
5	2	796.92	197.11	-113.21	-.1259	-.686	-135.246	77.678	.0070	.038	7.520	-4.319
5	3	796.92	197.11	-133.76	-.0260	-.142	-27.930	18.954	-.0749	-.408	-80.460	54.601
5	4	796.92	197.11	-154.31	.0701	.382	75.304	-58.953	-.1414	-.771	-151.897	118.516
5	5	796.92	197.11	-174.86	.1300	.708	139.651	-123.889	-.1641	-.894	-176.262	156.386
6	1	725.94	238.67	-127.26	-.5688	-2.817	-672.265	358.464	.1159	.574	136.982	-73.041
6	2	725.94	238.67	-143.51	-.1424	-.705	-168.303	101.198	-.0019	-.009	-2.246	1.350
6	3	725.94	238.67	-159.75	.0091	.045	10.755	-7.199	-.0646	-.320	-76.351	51.105
6	4	725.94	238.67	-175.99	.1226	.607	144.901	-106.851	-.1235	-.612	-145.965	107.635
6	5	725.94	238.67	-192.24	.1589	.787	187.804	-151.271	-.1525	-.755	-180.240	145.178
			TOTAL INTEGRATED LOADS			-16.554	-1973.236	-802.605		-6.222	-929.980	2267.415
			TOTAL LOADS PER QBAR			-.016852	-2.008761	-.817054		-.006334	-.946723	2.308236
			TOTAL LOAD COEFFICIENTS			-.070579	-.032479	-.022908		-.026527	-.015307	.064715

INTEGRATION OPTION

CASE 1 81 ARS SDSS-3C.2.10 67.5WS,1.2M, 20K ALT,RIGID,ALPHA=0,DE=0,BETA=8 ALPHA= 0.00 BETA= 8.00 QBAR= 982.3
MR=ASYM TAS =1245.1

SAN= 3 VERT TAIL - SG CPBODY=VERTTIP ITC=3 SC= ON THETA= 90.00 SREF= 247.400 BREF= 206.76 CREF= 166.95

PANEL		AREA IN2	BARM IN	TARM IN	CP-R	V-R KIPS	B-R IN-KIPS	T-R IN-KIPS
1	1	553.15	6.65	90.30	-.9417	-3.553	-23.641	-320.882
1	2	553.15	6.65	49.13	-.1576	-.595	-3.956	-29.219
1	3	553.15	6.65	7.96	-.3073	-1.160	-7.715	-9.235
1	4	553.15	6.65	-33.21	-.3683	-1.390	-9.245	46.148
1	5	553.15	6.65	-74.38	-.3330	-1.257	-8.360	93.455
2	1	940.29	25.69	68.03	-1.0583	-6.788	-174.356	-461.832
2	2	940.29	25.69	30.38	-.2534	-1.625	-41.748	-49.373
2	3	940.29	25.69	-7.28	-.3536	-2.268	-58.256	16.519
2	4	940.29	25.69	-44.94	-.3684	-2.363	-60.694	106.199
2	5	940.29	25.69	-82.60	-.3399	-2.180	-55.999	180.086
3	1	653.39	48.02	41.91	-1.1589	-5.165	-248.023	-216.463
3	2	653.39	48.02	8.37	-.3699	-1.649	-79.165	-13.793
3	3	653.39	48.02	-25.17	-.3960	-1.765	-84.750	44.431
3	4	653.39	48.02	-58.71	-.3862	-1.721	-82.653	101.065
3	5	653.39	48.02	-92.25	-.3429	-1.528	-73.386	140.995
4	1	971.47	74.32	11.13	-1.3447	-8.911	-662.273	-99.183
4	2	971.47	74.32	-17.56	-.4612	-3.056	-227.144	53.661
4	3	971.47	74.32	-46.25	-.4443	-2.944	-218.821	136.163
4	4	971.47	74.32	-74.93	-.4069	-2.697	-200.401	202.656
4	5	971.47	74.32	-103.62	-.3081	-2.042	-151.741	211.567
5	1	660.10	105.87	-25.79	-1.5959	-7.182	-760.391	185.228
5	2	660.10	105.87	-48.66	-.5742	-2.586	-273.741	125.807
5	3	660.10	105.87	-71.52	-.5005	-2.254	-238.606	161.193
5	4	660.10	105.87	-94.39	-.2977	-1.341	-141.924	126.532
5	5	660.10	105.87	-117.26	-.1184	-.533	-56.445	62.515
6	1	433.03	132.56	-57.02	-1.8874	-5.575	-739.084	317.906
6	2	433.03	132.56	-74.96	-.5312	-1.569	-208.012	117.628
6	3	433.03	132.56	-92.91	-.1397	-.413	-54.705	38.340
6	4	433.03	132.56	-110.85	-.0690	-.204	-27.020	22.594
6	5	433.03	132.56	-128.79	-.0474	-.140	-18.561	18.033

TOTAL INTEGRATED LOADS	-76.454	-4990.817	1308.142
TOTAL LOADS PER QBAR	-.077831	-5.080668	1.331692
TOTAL LOAD COEFFICIENTS	-.314595	-.099324	.028488

INTEGRATION OPTION

CASE 1 B1 ARS SDSS-3C.2.1D 67.5WS,1.2M, 20K ALT,RIGID,ALPHA=0,DE=0,BETA=8 ALPHA= 0.00 BETA= 8.00 QBAR= 992.3
MR=ASYM TAS =1245.1

SAN= 4 VERT TAIL - ROOT CPSOOY=VERTTAIL ITC=3 SC= ON THETA= 90.00 SREF= 247.400 BREF= 206.76 CREF= 168.95

PANEL		AREA IN2	BARM IN	TARM IN	CP-R	V-R KIPS	B-R IN-KIPS	T-R IN-KIPS
1	1	1217.06	21.57	98.03	-.6462	-5.365	-115.701	-525.940
1	2	1217.06	21.57	48.32	-.4574	-3.797	-81.897	-183.593
1	3	1217.06	21.57	-1.39	-.5950	-4.857	-104.743	6.736
1	4	1217.06	21.57	-51.10	-.4035	-3.350	-72.246	171.175
1	5	1217.06	21.57	-100.81	-.1038	-.862	-18.585	86.873
2	1	780.20	42.40	73.94	-.8009	-4.263	-180.750	-315.174
2	2	780.20	42.40	28.03	-.6260	-3.332	-141.278	-93.384
2	3	780.20	42.40	-17.98	-.5953	-3.168	-134.349	56.656
2	4	780.20	42.40	-63.79	-.3307	-1.760	-74.633	112.281
2	5	780.20	42.40	-109.71	-.0458	-.244	-10.336	26.741

TOTAL INTEGRATED LOADS	-30.998	-934.519	-657.538
TOTAL LOADS PER QBAR	-.031556	-.951343	-.669376
TOTAL LOAD COEFFICIENTS	-.127549	-.018598	-.014319

INTEGRATION OPTION

CASE 1 81 ARS SDSS-3C.2.1D 67.5WS,1.2M, 20K ALT,RIGID,ALPHA=0,DE=0,BETA=8 ALPHA= 0.00 BETA= 8.00 QBAR= 582.3
MR=ASYM TAS =1245.1

SAN= 5 FWD FUS SG VERT CPBODY=FUSELAGE ITC=1 SC= ON SREF= 1946.000 BREF= 820.08 CREF= 184.65

PANEL	AREA IN2	BARM IN	TARM IN	CP-R	V-R KIPS	B-R IN-KIPS	T-R IN-KIPS
1 1	2731.01	462.23	0.00	-.0978	-1.822	-842.131	0.000
1 2	5677.31	373.63	0.00	-.1880	-7.281	-2720.168	0.000
1 3	7404.30	285.03	0.00	-.2340	-11.819	-3368.474	0.000
1 4	9574.41	196.43	0.00	.2906	17.989	3533.002	0.000
1 5	10341.92	107.83	0.00	.1490	10.512	1133.169	0.000
1 6	8086.12	31.75	0.00	.1182	6.522	207.060	0.000
1 7	0.00	0.00	0.00	-.0363	0.000	0.000	0.000
1 8	0.00	0.00	0.00	-.1099	0.000	0.000	0.000
1 9	0.00	0.00	0.00	-.0744	0.000	0.000	0.000
1 10	0.00	0.00	0.00	-.0038	0.000	0.000	0.000
1 11	0.00	0.00	0.00	.0202	0.000	0.000	0.000
1 12	0.00	0.00	0.00	.0319	0.000	0.000	0.000
1 13	0.00	0.00	0.00	.0339	0.000	0.000	0.000
1 14	0.00	0.00	0.00	.1001	0.000	0.000	0.000
1 15	0.00	0.00	0.00	.0935	0.000	0.000	0.000
1 16	0.00	0.00	0.00	.0120	0.000	0.000	0.000
1 17	0.00	0.00	0.00	.0289	0.000	0.000	0.000
1 18	0.00	0.00	0.00	.0807	0.000	0.000	0.000
1 19	0.00	0.00	0.00	-.0507	0.000	0.000	0.000
1 20	0.00	0.00	0.00	-.2572	0.000	0.000	0.000

TOTAL INTEGRATED LOADS	14.100	-2057.541	0.000
TOTAL LOADS PER QBAR	.014354	-2.094584	0.000000
TOTAL LOAD COEFFICIENTS	.007376	-.001312	0.000000

INTEGRATION OPTION

CASE 1 81 ARS SDSS-3C.2.1D 67.5WS,1.2M, 20K ALT,RIGID,ALPHA=0,DE=0,BETA=6 ALPHA= 0.00 BETA= 8.00 CBAR= 982.3
MR=ASYM TAS =1245.1

SAN= 6 FWD FUS SG LAT CPBODY=FUSELAGE ITC=2 SC= ON SREF= 1946.000 BREF= 620.98 CREF= 184.05

PANEL	AREA IN2	BARM IN	TARM IN	CP-R	V-R KIPS	B-R IN-KIPS	T-R IN-KIPS
1 1	2731.01	462.29	0.00	-.2731	-5.088	-2351.596	0.000
1 2	5677.31	373.60	0.00	-.1369	-5.379	-2009.741	0.000
1 3	7404.30	285.00	0.00	-.1155	-5.834	-1662.644	0.000
1 4	9074.41	196.40	0.00	-.0939	-5.813	-1141.606	0.000
1 5	10341.92	107.80	0.00	-.0636	-4.487	-483.688	0.000
1 6	8368.12	31.75	0.00	-.0497	-2.742	-87.054	0.000
1 7	0.00	0.00	0.00	-.0037	0.000	0.000	0.000
1 8	0.00	0.00	0.00	.0907	0.000	0.000	0.000
1 9	0.00	0.00	0.00	.0911	0.000	0.000	0.000
1 10	0.00	0.00	0.00	.0765	0.000	0.000	0.000
1 11	0.00	0.00	0.00	.1050	0.000	0.000	0.000
1 12	0.00	0.00	0.00	.0135	0.000	0.000	0.000
1 13	0.00	0.00	0.00	-.0113	0.000	0.000	0.000
1 14	0.00	0.00	0.00	.0519	0.000	0.000	0.000
1 15	0.00	0.00	0.00	.0425	0.000	0.000	0.000
1 16	0.00	0.00	0.00	-.0173	0.000	0.000	0.000
1 17	0.00	0.00	0.00	-.1550	0.000	0.000	0.000
1 18	0.00	0.00	0.00	-.2512	0.000	0.000	0.000
1 19	0.00	0.00	0.00	.0576	0.000	0.000	0.000
1 20	0.00	0.00	0.00	.5806	0.000	0.000	0.000

TOTAL INTEGRATED LOADS	-29.343	-7736.332	0.000
TOTAL LOADS PER QBAR	-.029871	-7.875612	0.000000
TOTAL LOAD COEFFICIENTS	-.015350	-.004935	0.000000

INTEGRATION OPTION

CASE 1 81 ARS SDSS-30.2.1D 67.5WS,1.2M, 20K ALT,RIGID,ALPHA=0,DE=0,BETA=8 ALPHA= 0.00 BETA= 8.00 CBAR= 582.3
MK=ASYM TAS =1245.1

SAN= 7 AFT FUS SG VERT CPBODY=FUSELAGE ITC=1 SC= ON SREF= 1946.000 BREF= 820.08 CREF= 184.05

PANEL	AREA IN2	BARM IN	TARM IN	CP-R	V-R KIPS	B-R IN-KIPS	T-R IN-KIPS
1 1	0.00	0.00	0.00	-.0978	0.000	0.000	0.000
1 2	0.00	0.00	0.00	-.1880	0.000	0.000	0.000
1 3	0.00	0.00	0.00	-.2340	0.000	0.000	0.000
1 4	0.00	0.00	0.00	.2906	0.000	0.000	0.000
1 5	0.00	0.00	0.00	.1490	0.000	0.000	0.000
1 6	0.00	0.00	0.00	.1182	0.000	0.000	0.000
1 7	0.00	0.00	0.00	-.0363	0.000	0.000	0.000
1 8	0.00	0.00	0.00	-.1099	0.000	0.000	0.000
1 9	0.00	0.00	0.00	-.0744	0.000	0.000	0.000
1 10	0.00	0.00	0.00	-.0088	0.000	0.000	0.000
1 11	0.00	0.00	0.00	.0202	0.000	0.000	0.000
1 12	0.00	0.00	0.00	.0319	0.000	0.000	0.000
1 13	0.00	0.00	0.00	.0339	0.000	0.000	0.000
1 14	0.00	0.00	0.00	.1001	0.000	0.000	0.000
1 15	1232.40	6.75	0.00	.0935	.786	5.306	0.000
1 16	7982.33	57.61	0.00	.0120	.653	37.768	0.000
1 17	7825.33	146.40	0.00	.0289	1.543	225.858	0.000
1 18	7646.18	235.00	0.00	.0807	4.209	989.178	0.000
1 19	5779.20	323.60	0.00	-.0507	-1.999	-646.804	0.000
1 20	1678.98	412.20	0.00	-.2572	-3.297	-1358.906	0.000
		TOTAL INTEGRATED LOADS			1.896	-747.603	0.000
		TOTAL LOADS PER QBAR			.001930	-.761063	0.000000
		TOTAL LOAD COEFFICIENTS			.000992	-.000477	0.000000

INTEGRATION OPTION

CASE 1 B1 ARS SCSS-3C.2.1D 67.5WS,1.2M, 20K ALT,RIGID,ALPHA=0,DE=0,BETA=8 ALPHA= 0.00 BETA= 8.00 QBAR= 982.3
MR=ASYM TAS =1245.1

SAN= 8 AFT FUS SG LAT CPBODY=FUSELAGE ITC=2 SC= ON SREF= 1946.000 BREF= 820.08 CREF= 184.05

PANEL	AREA IN2	BARM IN	TARM IN	CP-R	V-R KIPS	B-R IN-KIPS	T-R IN-KIPS
1 1	0.00	0.00	0.00	-.2731	0.000	0.000	0.000
1 2	0.00	0.00	0.00	-.1389	0.000	0.000	0.000
1 3	0.00	0.00	0.00	-.1155	0.000	0.000	0.000
1 4	0.00	0.00	0.00	-.0939	0.000	0.000	0.000
1 5	0.00	0.00	0.00	-.0536	0.000	0.000	0.000
1 6	0.00	0.00	0.00	-.0497	0.000	0.000	0.000
1 7	0.00	0.00	0.00	-.0037	0.000	0.000	0.000
1 8	0.00	0.00	0.00	.0907	0.000	0.000	0.000
1 9	0.00	0.00	0.00	.0911	0.000	0.000	0.000
1 10	0.00	0.00	0.00	.0765	0.000	0.000	0.000
1 11	0.00	0.00	0.00	.1050	0.000	0.000	0.000
1 12	0.00	0.00	0.00	.0135	0.000	0.000	0.000
1 13	0.00	0.00	0.00	-.0113	0.000	0.000	0.000
1 14	0.00	0.00	0.00	.0519	0.000	0.000	0.000
1 15	1232.40	6.75	0.00	.0415	.349	2.355	0.000
1 16	7962.33	57.30	0.00	-.0173	-.942	-54.449	0.000
1 17	7825.33	146.40	0.00	-.1550	-8.274	-1211.333	0.000
1 18	7646.18	235.00	0.00	-.2512	-13.102	-3079.076	0.000
1 19	5779.20	323.60	0.00	.0576	2.271	734.830	0.000
1 20	1878.98	412.20	0.00	.5806	7.442	3067.577	0.000
		TOTAL INTEGRATED LOADS			-12.257	-540.096	0.000
		TOTAL LOADS PER QBAR			-.012478	-.549819	0.000000
		TOTAL LOAD COEFFICIENTS			-.006412	-.000345	0.000000

ADDITIONAL LOADS OPTION

CASE 1 B1 ARS SDSS-3C.2.1D 67.8WS,1.2M, 20K ALT,RIGID,ALPHA=0,DE=0,BETA=8 ALPHA= 0.00 BETA= 8.00 QBAR= 982.3
MR=ASYM TAS =1245.1

SAN= 31 VT ROOT TOTAL ITC=4 SC= ON NT= 6 SREF= 247.400 BREF= 206.76 CREF= 186.95

CENTERLINE

	COMPONENT DESCRIPTION	VALUE	V FACTOR	B FACTOR	T FACTOR	V KIPS	B IN-KIPS	T IN-KIPS	CV	CB	CT
1	3 VERT TAIL - SG CL V	-76.454	1.000	61.560	-46.440	-76.454	-4706.534	3550.543	-.314595	-.093666	.077321
2	3 VERT TAIL - SG CL B	-4990.817	0.000	1.000	0.000	0.000	-4990.817	0.000	0.000000	-.099324	0.000000
3	3 VERT TAIL - SG CL T	1308.142	0.000	0.000	1.000	0.000	0.000	1308.142	0.000000	0.000000	.026468
4	4 VERT TAIL - ROOT CL V	-30.998	1.000	0.000	0.000	-30.998	0.000	0.000	-.127549	0.000000	0.000000
5	4 VERT TAIL - ROOT CL B	-934.519	0.000	1.000	0.000	0.000	-934.519	0.000	0.000000	-.018598	0.000000
6	4 VERT TAIL - ROOT CL T	-657.538	0.000	0.000	1.000	0.000	0.000	-657.538	0.000000	0.000000	-.014319
	TOTAL LOADS AND COEFFICIENTS					-107.452	-10631.869	4201.147	-.442144	-.211589	.091489

ADDITIONAL LOADS OPTION

CASE 1 B1 ARS SOSS-3C.2.1D 67.5WS,1.2M, 20K ALT,RIGID,ALPHA=0,DE=0,BETA=8 ALPHA= 0.00 BETA= 8.00 QBAR= 982.3
MR=ASYM TAS =1245.1

SAN= 32 AFT FUS SG V-TOT ITC=4 SC= ON NT= 6 SREF= 1946.000 BREF= 820.08 CREF= 184.05

CENTERLINE

	COMPONENT DESCRIPTION		VALUE	V FACTOR	B FACTOR	T FACTOR	V KIPS	B IN-KIPS	T IN-KIPS	CV	CB	CT
1	7 AFT FUS SG VERT	CL V	1.896	1.000	0.000	0.000	1.896	0.000	0.000	.000992	0.000000	0.000000
2	7 AFT FUS SG VERT	CL B	-747.603	0.000	1.000	0.000	0.000	-747.603	0.000	0.000000	-.000477	0.000000
3	2 HORIZ TAIL - SG	LH V	-16.554	1.000	244.500	0.000	-16.554	-4047.497	0.000	-.008660	-.002582	0.000000
4	2 HORIZ TAIL - SG	RH V	-6.222	1.000	244.500	0.000	-6.222	-1521.231	0.000	-.003255	-.000970	0.000000
5	2 HORIZ TAIL - SG	LH T	-802.605	0.000	-1.000	0.000	0.000	802.605	0.000	0.000000	.000512	0.000000
6	2 HORIZ TAIL - SG	RH T	2267.415	0.000	-1.000	0.000	0.000	-2267.415	0.000	0.000000	-.001446	0.000000
	TOTAL LOADS AND COEFFICIENTS						-20.880	-7781.141	0.000	-.010923	-.004964	0.000000

ADDITIONAL LOADS OPTION

CASE 1 B1 ARS SDSS-3C.2.1D 67.5WS,1.2M, 20K ALT,RIGID,ALPHA=0,DE=0,BETA=8 ALPHA= 0.00 BETA= 8.00 QBAR= 982.3
MR=ASYM TAS =1245.1

SAN= 33 AFT FUS SG L-TOT ITC=4 SC= ON NT= 10 SREF= 1946.000 BREF= 820.08 CREF= 184.05

CENTERLINE

	COMPONENT DESCRIPTION		VALUE	V FACTOR	B FACTOR	T FACTOR	V KIPS	B IN-KIPS	T IN-KIPS	CV	CB	CT
1	8 AFT FUS SG LAT	CL V	-12.257	1.000	0.000	0.000	-12.257	0.000	0.000	-.000412	0.000000	0.000000
2	8 AFT FUS SG LAT	CL B	-540.096	0.000	1.000	0.000	0.000	-540.096	0.000	0.000000	-.000345	0.000000
3	8 AFT FUS SG LAT	CL T	0.000	0.000	0.000	1.000	0.000	0.000	0.000	0.000000	0.000000	0.000000
4	31 VT ROOT TOTAL	CL V	-107.452	1.000	198.060	41.000	-107.452	-21281.932	-4405.530	-.036211	-.013576	-.012522
5	31 VT ROOT TOTAL	CL B	-10631.869	0.000	0.000	1.000	0.000	0.000	-10631.869	0.000000	0.000000	-.036219
6	31 VT ROOT TOTAL	CL T	4201.147	0.000	-1.000	0.000	0.000	-4201.147	0.000	0.000000	-.002680	0.000000
7	2 HORIZ TAIL - SG	LH V	-16.554	0.000	0.000	10.750	0.000	0.000	-177.957	0.000000	0.000000	-.000516
8	2 HORIZ TAIL - SG	RH V	-5.222	0.000	0.000	-10.750	0.000	0.000	56.864	0.000000	0.000000	.000190
9	2 HORIZ TAIL - SG	LH B	-1973.236	0.000	0.000	1.000	0.000	0.000	-1973.236	0.000000	0.000000	-.005609
10	2 HORIZ TAIL - SG	RH B	-929.980	0.000	0.000	-1.000	0.000	0.000	929.980	0.000000	0.000000	.002643
	TOTAL LOADS AND COEFFICIENTS						-119.709	-26023.175	-16191.728	-.062623	-.016660	-.046022

INTEGRATION OPTION AND ADDITIONAL LOADS OPTION

CASE 1 COMPLETE

WIND TUNNEL OPTION

CASE 1 B1 ARS WDP-20 RIGID WIND TUNNEL DATA M=1.20 WS=67.5 9-29-80 ALPHA= 0.0000 BETA= 8.0000 QBAR= 982.32
P= 0.0 Q= 0.0 R= 0.0 DSL= 0.0 DSR= 0.0 DRU= 0.00 DRL= 0.00 DE= 0.0000 DA= 0.0000 TAS=1245.10

WIN= 1 WING - SG AXIS SREF= 1946.000 BREF= 820.08 CREF= 184.05

LEFT HAND

NSEQ	AERODYNAMIC EFFECT	VALUE	CV PER	CB PER	CT PER	CV	CB	CT	V KIPS	B IN-KIPS	T IN-KIPS
101	ALPHA = 0	1.00	.029213	.008831	-.003133	.029213	.008831	-.003133	55.843	13844.011	-1102.280
102	ALPHA	0.00	.012051	.003229	.000584	0.000000	0.000000	0.000000	0.000	0.000	0.000
103	ALPHA DOT	0.00	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000	0.000	0.000
104	DELTA SPOILER	0.00	.000290	.000057	-.000034	0.000000	0.000000	0.000000	0.000	0.000	0.000
105	ROLL VELOC P	0.00	-.000232	-.000955	-.000223	0.000000	0.000000	0.000000	0.000	0.000	0.000
106	PITCH VELOC Q	0.00	.042987	.012062	-.001284	0.000000	0.000000	0.000000	0.000	0.000	0.000
107	BETA ALPHA ZERO A/S	8.00	-.000759	-.000167	.000149	-.006072	-.001336	.001192	-11.607	-2094.395	419.380
108	BETA ALPHA A/S	0.00	-.000226	-.000058	-.000025	0.000000	0.000000	0.000000	0.000	0.000	0.000
109	BETA ALPHA ZERO SYM	8.00	.000311	.000119	-.000174	.002488	.000952	-.001392	4.756	1492.413	-489.746
110	BETA ALPHA SYM	0.00	.000008	.000005	-.000011	0.000000	0.000000	0.000000	0.000	0.000	0.000
WLN= 1	TOTAL LOADS ON SURFACE					.025629	.008447	-.003333	48.992	13242.029	-1172.646
WLN= 2	TOTAL LOADS ON SURFACE WITHOUT ALPHA=0 TERM					-.003584	-.000384	-.000200	-6.851	-601.982	-70.366

RIGHT HAND

NSEQ	AERODYNAMIC EFFECT	VALUE	CV PER	CB PER	CT PER	CV	CB	CT	V KIPS	B IN-KIPS	T IN-KIPS
101	ALPHA = 0	1.00	.029213	.008831	-.003133	.029213	.008831	-.003133	55.843	13844.011	-1102.280
102	ALPHA	0.00	.012051	.003229	.000584	0.000000	0.000000	0.000000	0.000	0.000	0.000
103	ALPHA DOT	0.00	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000	0.000	0.000
104	DELTA SPOILER	0.00	-.000290	-.000057	.000034	0.000000	0.000000	0.000000	0.000	0.000	0.000
105	ROLL VELOC P	0.00	.000232	.000955	.000223	0.000000	0.000000	0.000000	0.000	0.000	0.000
106	PITCH VELOC Q	0.00	.042987	.012062	-.001284	0.000000	0.000000	0.000000	0.000	0.000	0.000
107	BETA ALPHA ZERO A/S	8.00	.000759	.000167	-.000149	.006072	.001336	-.001192	11.607	2094.395	-419.380
108	BETA ALPHA A/S	0.00	.000226	.000058	.000025	0.000000	0.000000	0.000000	0.000	0.000	0.000
109	BETA ALPHA ZERO SYM	8.00	.000311	.000119	-.000174	.002488	.000952	-.001392	4.756	1492.413	-489.746
110	BETA ALPHA SYM	0.00	.000008	.000005	-.000011	0.000000	0.000000	0.000000	0.000	0.000	0.000
WLN= 1	TOTAL LOADS ON SURFACE					.037773	.011119	-.005717	72.207	17430.618	-2011.406
WLN= 2	TOTAL LOADS ON SURFACE WITHOUT ALPHA=0 TERM					.008560	.002288	-.002584	16.363	3586.607	-909.126

*IND TUNNEL OPTION

CASE 1 B1 ARS WOP-29 RIGID WIND TUNNEL DATA M=1.20 WS=67.5 9-29-80 ALPHA= 0.0000 BETA= 8.0000 QBAR= 982.32
P= 0.0 Q= 0.0 R= 0.0 DSL= 0.0 DSR= 0.0 DRU= 0.00 DRL= 0.00 DE= 0.0000 DA= 0.0000 TAS=1245.10

*IN= 2 HORIZ TAIL - SG SREF= 238.770 BREF= 259.03 CREF= 149.38

LEFT HAND

NSEQ	AERODYNAMIC EFFECT	VALUE	CV PER	CB PER	CT PER	CV	CB	CT	V KIPS	B IN-KIPS	T IN-KIPS
201	ALPHA = 0	1.00	-.136182	-.049482	.051116	-.136182	-.049482	.051116	-31.941	-3306.284	1790.944
202	ALPHA	0.00	.042237	.018920	-.019427	0.000000	0.000000	0.000000	0.000	0.000	0.000
203	DELTA H	0.00	.060513	.027107	-.027833	0.000000	0.000000	0.000000	0.000	0.000	0.000
204	ALPHA DOT	0.00	.233930	.104789	-.107545	0.000000	0.000000	0.000000	0.000	0.000	0.000
205	BETA	8.00	-.017738	-.006993	.004648	-.141904	-.055944	.037184	-33.283	-3398.884	1302.811
206	DELTA H PRIME	0.00	.049585	.022735	-.022025	0.000000	0.000000	0.000000	0.000	0.000	0.000
207	DELTA SPOILER SYM	0.00	.000750	.000317	-.000369	0.000000	0.000000	0.000000	0.000	0.000	0.000
208	DELTA SPOILER A/S	0.00	.000277	.000145	-.000168	0.000000	0.000000	0.000000	0.000	0.000	0.000
209	ROLL VELOCITY P	0.00	-.002479	-.002088	.002313	0.000000	0.000000	0.000000	0.000	0.000	0.000
210	PITCH VELOCITY Q	0.00	.552160	.254971	-.297065	0.000000	0.000000	0.000000	0.000	0.000	0.000
*LN= 3	TOTAL LOADS ON SURFACE					-.278086	-.105426	.088300	-65.225	-6705.168	3093.755
*LN= 4	TOTAL LOADS ON SURFACE WITHOUT ALPHA=0 TERM					-.141904	-.055944	.037184	-33.283	-3398.884	1302.811

RIGHT HAND

NSEQ	AERODYNAMIC EFFECT	VALUE	CV PER	CB PER	CT PER	CV	CB	CT	V KIPS	B IN-KIPS	T IN-KIPS
201	ALPHA = 0	1.00	-.136182	-.049482	.051116	-.136182	-.049482	.051116	-31.941	-3306.284	1790.944
202	ALPHA	0.00	.042237	.018920	-.019427	0.000000	0.000000	0.000000	0.000	0.000	0.000
203	DELTA H	0.00	.060513	.027107	-.027833	0.000000	0.000000	0.000000	0.000	0.000	0.000
204	ALPHA DOT	0.00	.233930	.104789	-.107545	0.000000	0.000000	0.000000	0.000	0.000	0.000
205	BETA	8.00	.017738	.006993	-.004648	.141904	.055944	-.037184	33.283	3398.884	-1302.811
206	DELTA H PRIME	0.00	-.049585	-.022735	.022025	0.000000	0.000000	0.000000	0.000	0.000	0.000
207	DELTA SPOILER SYM	0.00	-.000750	-.000317	.000369	0.000000	0.000000	0.000000	0.000	0.000	0.000
208	DELTA SPOILER A/S	0.00	-.000277	-.000145	.000168	0.000000	0.000000	0.000000	0.000	0.000	0.000
209	ROLL VELOCITY P	0.00	.002479	.002088	-.002313	0.000000	0.000000	0.000000	0.000	0.000	0.000
210	PITCH VELOCITY Q	0.00	.552160	.254971	-.297065	0.000000	0.000000	0.000000	0.000	0.000	0.000
*LN= 3	TOTAL LOADS ON SURFACE					.005722	.006462	.013932	1.342	392.600	488.134
*LN= 4	TOTAL LOADS ON SURFACE WITHOUT ALPHA=0 TERM					.141904	.055944	-.037184	33.283	3398.884	-1302.811

WIND TUNNEL OPTION

CASE 1 B1 ARS WOP-20 RIGID WIND TUNNEL DATA M=1.20 WS=67.5 9-29-80 ALPHA= 0.0000 BETA= 8.0000 QBAR= 982.32
P= 0.0 Q= 0.0 R= 0.0 DSL= 0.0 DSR= 0.0 DRU= 0.00 DRL= 0.00 DE= 0.0000 DA= 0.0000 TAS=1245.10

WTN= 3 VERT TAIL — SG SREF= 247.400 BREF= 206.76 CREF= 188.95

NSEQ	AERODYNAMIC EFFECT	VALUE	CV PER	CB PER	CT PER	CV	CB	CT	V KIPS	B IN-KIPS	T IN-KIPS
301	BETA ALPHA=0 136.56	8.00	-.034464	-.010927	.003146	-.275872	-.087416	.025168	-67.044	-4392.483	1155.708
302	BETA ALPHA 136.56	0.00	-.001115	-.000354	.000102	0.000000	0.000000	0.000000	0.000	0.000	0.000
303	DELTA H PRIME 136.56	0.00	-.003032	-.000800	.000464	0.000000	0.000000	0.000000	0.000	0.000	0.000
304	DELTA SPOILER 136.56	0.00	-.000270	-.000089	.000023	0.000000	0.000000	0.000000	0.000	0.000	0.000
305	DELTA RUD UP 136.56	0.00	.009663	.002854	-.003830	0.000000	0.000000	0.000000	0.000	0.000	0.000
306	DELTA RUD LOW 136.56	0.00	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000	0.000	0.000
307	ROLL VELOC P 136.56	0.00	-.003995	-.001461	.000756	0.000000	0.000000	0.000000	0.000	0.000	0.000
308	YAW VELOC R 136.56	0.00	.032297	.010244	-.005596	0.000000	0.000000	0.000000	0.000	0.000	0.000
WLN= 5	TOTAL LOADS ON SURFACE					-.275872	-.087416	.025168	-67.044	-4392.483	1155.708

WTN= 4 VERT TAIL ROOT SREF= 247.400 BREF= 206.76 CREF= 188.95

NSEQ	AERODYNAMIC EFFECT	VALUE	CV PER	CB PER	CT PER	CV	CB	CT	V KIPS	B IN-KIPS	T IN-KIPS
401	BETA ALPHA=0 WL 75	8.00	-.053487	-.023324	.010230	-.427896	-.186592	.081840	-103.990	-9375.884	3758.073
402	BETA ALPHA WL 75	0.00	-.001730	-.000755	.000331	0.000000	0.000000	0.000000	0.000	0.000	0.000
403	DELTA H PRIME WL 75	0.00	-.002353	-.001621	.001072	0.000000	0.000000	0.000000	0.000	0.000	0.000
404	DELTA SPOILER WL 75	0.00	-.000349	-.000177	.000079	0.000000	0.000000	0.000000	0.000	0.000	0.000
405	DELTA RUD UP WL 75	0.00	.009675	.005734	-.006210	0.000000	0.000000	0.000000	0.000	0.000	0.000
406	DELTA RUD LOW WL 75	0.00	.003876	.000352	-.001119	0.000000	0.000000	0.000000	0.000	0.000	0.000
407	ROLL VELOC P WL 75	0.00	-.003703	-.002645	.002065	0.000000	0.000000	0.000000	0.000	0.000	0.000
408	YAW VELOC R WL 75	0.00	.047596	.022154	-.013930	0.000000	0.000000	0.000000	0.000	0.000	0.000
WLN= 6	TOTAL LOADS ON SURFACE					-.427896	-.186592	.081840	-103.990	-9375.884	3758.073

WIND TUNNEL OPTION

CASE 1 81 ARS WOP-20 RIGID WIND TUNNEL DATA M=1.20 WS=67.5 9-29-80 ALPHA= 0.0000 BETA= 8.0000 QBAR= 982.32
P= 0.0 Q= 0.0 R= 0.0 DSL= 0.0 DSR= 0.0 DRU= 0.00 DRL= 0.00 DE= 0.0000 DA= 0.0000 TAS=1245.10

WTN= 5 FWD FUS SG SREF= 1946.000 BREF= 820.08 CREF= 184.05

VERTICAL

NSEQ	AERODYNAMIC EFFECT	VALUE	CV PER	CB PER	CT PER	CV	CB	CT	V KIPS	B IN-KIPS	T IN-KIPS
501	ALPHA=0 (VERTICAL)	1.00	.003170	-.000822	0.000000	.003170	-.000822	0.000000	6.060	-1288.617	0.000
502	ALPHA (VERTICAL)	0.00	.001880	.000605	0.000000	0.000000	0.000000	0.000000	0.000	0.000	0.000
WLN= 7	TOTAL LOADS ON SURFACE					.003170	-.000822	0.000000	6.060	-1288.617	0.000

LATERAL

NSEQ	AERODYNAMIC EFFECT	VALUE	CV PER	CB PER	CT PER	CV	CB	CT	V KIPS	B IN-KIPS	T IN-KIPS
503	ROLL VEL.P (LATERAL)	0.00	.000140	.000040	.000020	0.000000	0.000000	0.000000	0.000	0.000	0.000
504	BETA (LATERAL)	8.00	-.005710	-.001660	-.000990	-.045680	-.013280	-.007920	-87.322	-20818.533	-2786.486
WLN= 8	TOTAL LOADS ON SURFACE					-.045680	-.013280	-.007920	-87.322	-20818.533	-2786.486

WIND TUNNEL OPTION

CASE 1 81 ARS WOP-20 RIGID WIND TUNNEL DATA M=1.20 WS=67.5 9-29-80 ALPHA= 0.0000 BETA= 8.0000 QBAR= 952.32
P= 0.0 Q= 0.0 R= 0.0 DSL= 0.0 DSR= 0.0 DRU= 0.00 DRL= 0.00 DE= 0.0000 DA= 0.0000 TAS=1245.10

WIN= 6 AFT FUS SG SREF= 1946.000 BREF= 820.08 CREF= 164.05 XHT=244.50 YHT= 10.75 XVT=198.06 ZVT= 41.00

VERTICAL

NSEQ	AERODYNAMIC EFFECT	VALUE	CV PER	CB PER	CT PER	CV	CB	CT	V KIPS	B IN-KIPS	T IN-KIPS
601	ALPHA=0 (VERTICAL)	1.00	.005300	.002173	0.000000	.005300	.002173	0.000000	10.131	3406.526	0.000
602	ALPHA (VERTICAL)	0.00	-.000460	-.000118	0.000000	0.000000	0.000000	0.000000	0.000	0.000	0.000
WLN= 9	TOTAL LOADS ON SURFACE					.005300	.002173	0.000000	10.131	3406.526	0.000
	TAIL INDUCED LOADS		V FACTOR	B FACTOR	T FACTOR						
	LHT V -65.225	KIPS	1.00	244.50	-	-.034121	-.010173	-	-65.225	-15947.431	-
	RHT V 1.342	KIPS	1.00	244.50	-	.000702	.000209	-	1.342	328.140	-
	LHT T 3093.755	IN-KIPS	-	-1.00	-	-	-.001973	-	-	-3093.755	-
	RHT T 488.134	IN-KIPS	-	-1.00	-	-	-.000311	-	-	-488.134	-
WLN= 10	TOTAL TAIL LOADS ADDING TO AFT FUSELAGE					-.033418	-.012248	-	-63.883	-19201.179	-
WLN= 11	TOTAL LOADS ON AFT FUSELAGE - VERTICAL					-.028118	-.010075	-	-53.751	-15794.653	-

LATERAL

NSEQ	AERODYNAMIC EFFECT	VALUE	CV PER	CB PER	CT PER	CV	CB	CT	V KIPS	B IN-KIPS	T IN-KIPS
603	BETA ALPHA=0 C/D(LAT)	8.00	-.002110	-.000300	-.000370	-.016880	-.002400	-.002960	-32.268	-3762.385	-1041.414
604	BETA ALPHA C/D (LAT)	0.00	-.000070	-.000010	-.000010	0.000000	0.000000	0.000000	0.000	0.000	0.000
605	DELTA H PRIME (LAT)	0.00	.000220	.000060	.000040	0.000000	0.000000	0.000000	0.000	0.000	0.000
606	DELTA RUDDER LOWER(L)	0.00	.000090	.000010	.000020	0.000000	0.000000	0.000000	0.000	0.000	0.000
607	ROLL VELOCITY P (LAT)	0.00	.000440	.000110	.000080	0.000000	0.000000	0.000000	0.000	0.000	0.000
608	BETA (LATERAL)	8.00	-.001660	-.000340	-.000290	-.013440	-.002720	-.002320	-25.692	-4264.037	-816.243
WLN= 12	TOTAL LOADS ON SURFACE					-.030320	-.005120	-.005280	-57.960	-8026.422	-1857.657
	TAIL INDUCED LOADS		V FACTOR	B FACTOR	T FACTOR						
	VTR V -103.990	KIPS	1.00	198.06	41.00	-.054400	-.013138	-.012118	-103.990	-20596.228	-4263.583
	VTR B -9375.884	IN-KIPS	-	-	1.00	-	-	-.026649	-	-	-9375.884
	VTR T 3758.073	IN-KIPS	-	-1.00	-	-	-.002397	-	-	-3758.073	-
	LHT V -65.225	KIPS	-	-	10.75	-	-	-.001993	-	-	-701.165
	RHT V 1.342	KIPS	-	-	-10.75	-	-	-.000041	-	-	-14.427
	LHT B -6405.168	IN-KIPS	-	-	1.00	-	-	-.018205	-	-	-6405.165
	RHT B 392.600	IN-KIPS	-	-	-1.00	-	-	-.001116	-	-	-392.600
WLN= 13	TOTAL TAIL LOADS ADDING TO AFT FUSELAGE					-.054400	-.015535	-.060122	-103.990	-24354.301	-21152.628
WLN= 14	TOTAL LOADS ON AFT FUSELAGE - LATERAL					-.084720	-.020655	-.065402	-161.949	-32380.723	-23010.485

SUMMARY PRINT OPTION

CASE 1
MR=ASYM 81 ARS SDSS-3C.2.1D 67.5WS,1.2M, 20K ALT,RIGID,ALPHA=0,DE=0,BETA=8 ALPHA= C.CO BETA= 8.00 QBAR= 982.3
TAS =1249.1

SAN= 1
WLN= 1 WING - SG AXIS ITC= 3 SC= OFF SREF= 1946.000 BREF= 820.08 CREF= 184.05

LEFT SIDE CASE	PRESSURE INTEGRATED LOADS V KIPS	B IN-KIPS	T IN-KIPS	COEFFICIENTS CV	CB	CT	WIND TUNNEL DERIVED LOADS V KIPS	B IN-KIPS	T IN-KIPS	COEFFICIENTS CV	CB	CT
1	44.660	11075.619	-623.834	.023363	.007065	-.001773	48.992	13242.029	-1172.646	.025629	.008447	-.003353
RIGHT SIDE LOADS FOR ASYMMETRIC CASES												
1	54.508	12003.200	-994.208	.028515	.007657	-.002826	72.207	17430.818	-2011.406	.037773	.011119	-.005717

SUMMARY PRINT OPTION

CASE 1 B1 ARS SDSS-3C.2.1D 67.5WS,1.2M, 20K ALT,RIGID,ALPHA=0,DE=0,BETA=8 ALPHA= 0.00 BETA= 8.00 CBAR= 982.3
MR=ASYM TAS =1245.1

SAN= 2 HORIZ TAIL - SG ITC= 3 SC= OFF SREF= 238.770 BREF= 259.03 CREF= 149.38
WLN= 3

LEFT SIDE PRESSURE INTEGRATED LOADS				COEFFICIENTS			WIND TUNNEL DERIVED LOADS			COEFFICIENTS		
CASE	V KIPS	B IN-KIPS	T IN-KIPS	CV	CB	CT	V KIPS	B IN-KIPS	T IN-KIPS	CV	CB	CT
1	-16.554	-1973.236	-802.605	-.070579	-.032479	-.022908	-65.225	-6405.168	3093.755	-.278086	-.105426	.088300
RIGHT SIDE LOADS FOR ASYMMETRIC CASES												
1	-6.222	-929.980	2267.415	-.026527	-.015307	.064715	1.342	392.600	488.134	.005722	.006462	.013932

SUMMARY PRINT OPTION

CASE 1
MR=ASYM 81 ARS SDSS-3C.2.1D 67.5WS,1.2M, 20K ALT,RIGID,ALPHA=0,DE=0,BETA=8 ALPHA= 0.00 BETA= 8.00 CBAR= 982.3
TAS =1245.1

SAN= 6 FWD FUS SG LAT ITC= 2 SC= ON SREF= 1946.000 BREF= 820.08 CREF= 184.05
WLN= 8

CENTERLINE CASE	PRESSURE INTEGRATED LOADS V KIPS	B IN-KIPS	T IN-KIPS	COEFFICIENTS CV	CB	CT	WIND TUNNEL DERIVED LOADS V KIPS	B IN-KIPS	T IN-KIPS	COEFFICIENTS CV	CB	CT
1	-29.343	-7736.332	0.000	-.015350	-.004935	0.000000	-87.322	-20818.533	-2786.486	-.045680	-.013280	-.007920

SUMMARY PRINT OPTION

CASE 1 B1 ARS SDSS-3C.2.1D 67.5WS,1.2M, 20K ALT,RIGID,ALPHA=0,DE=0,BETA=8 ALPHA= 0.00 BETA= 8.00 QBAR= 982.3
MK=ASYM TAS =1245.1

SAN= 3 VERT TAIL - SG ITC= 3 SC= ON SREF= 247.400 BREF= 206.76 CREF= 168.95
WLN= 5

CENTERLINE CASE	PRESSURE INTEGRATED LOADS V KIPS	B IN-KIPS	T IN-KIPS	COEFFICIENTS CV	CB	CT	WIND TUNNEL DERIVED LOADS V KIPS	B IN-KIPS	T IN-KIPS	COEFFICIENTS CV	CB	CT
1	-76.454	-4990.317	1308.142	-.314595	-.099324	.026488	-67.044	-4392.483	1155.708	-.275872	-.087416	.025168

SUMMARY PRINT OPTION

CASE 1 B1 ARS SDSS-3C.2.1D 67.5WS,1.2M, 20K ALT,RIGID,ALPHA=0,DE=0,BETA=8 ALPHA= 0.00 BETA= 8.00 CBAR= 962.3
MR=ASYM TAS =1245.1

SAN= 31 VT ROOT TOTAL ITC= 4 SC= ON SREF= 247.400 BREF= 206.76 CREF= 188.95
WLN= 6

CENTER LINE PRESSURE INTEGRATED LOADS				COEFFICIENTS			WIND TUNNEL DERIVED LOADS			COEFFICIENTS		
CASE	V KIPS	B IN-KIPS	T IN-KIPS	CV	CB	CT	V KIPS	B IN-KIPS	T IN-KIPS	CV	CB	CT
1	-107.452	-10631.859	4201.147	-.442144	-.211589	.091489	-103.990	-9375.884	3758.073	-.427896	-.186592	.081840

SUMMARY PRINT OPTION

CASE 1 MR=ASYM B1 ARS SDSS-3C.2.1D 67.5WS,1.2M, 20K ALT,RIGID,ALPHA=0,DE=0,BETA=8 ALPHA= 0.00 BETA= 8.00 QBAR= 982.3 TAS =1245.1

SAN= 33 WLN= 14 AFT FUS SG L-TOT ITC= 4 SC= ON SREF= 1946.000 BREF= 820.08 CREF= 164.05

CENTERLINE CASE	PRESSURE INTEGRATED LOADS V KIPS	B IN-KIPS	T IN-KIPS	COEFFICIENTS CV	CB	CT	WIND TUNNEL DERIVED LOADS V KIPS	B IN-KIPS	T IN-KIPS	COEFFICIENTS CV	CB	CT
1	-119.709	-26023.175	-16191.728	-.062623	-.016600	-.046022	-161.949	-32380.723	-23010.485	-.084720	-.020655	-.065402

```
 SIMSALD. 81/07/02.DFRC NOS (NOS10).

10.50.24.81FS2,T100.
10.50.24.UCCR, AA01,       0.566KCDS.
10.50.24.USER(SIMS,)
10.50.24.CHARGE(14,62,FTN)
10.50.25.ATTACH(LGO=FSLIP3)
10.50.25.DEFINE(TAPE20=3160P/CT=SPRIV)
10.50.25.DEFINE(TAPE40=8140P2/CT=SPRIV)
10.50.26.LDSET(PRESET=ZERO)
10.50.26.MAP(OFF)
10.50.26.LGO.
10.50.29.  CM LWA+1 =1031546, LOADER USED 123300B
10.50.42.     STOP
10.50.42.     114100 MAXIMUM EXECUTION FL.
10.50.42.       5.493 CP SECONDS EXECUTION TIME.
10.50.43.UEAD,       0.092KUNS.
10.50.43.UEPF,       0.029KUNS.
10.50.43.UEMS,       3.294KUNS.
10.50.43.UECP,       7.276SECS.
10.50.43.AESR,      11.913UNTS.
10.51.37.UCLP, AA04,       1.918KLNS.
```

8.3 Integration Option With Minimum I/O

In this final example, the geometry file and pressure data files already exist (GOP = 1 and POP = 2) so the card input is at a minimum. Output is minimized by executing IOP = 2 for symmetric flight cases where the aircraft is trimmed at 4 different load factors. Output for the vertical tail and lateral fuselage stations is suppressed with CARD 2A. The wind tunnel option is not executed. The only printed output is generated by the summary print option for the wing, horizontal tail, and vertical fuselage stations.

Card input listing for example 8.3

```
CARD
 NO      1         2         3         4         5         6         7         8
        12345678901234567890123456789012345678901234567890123456789012345678901234567890

   1
   2    TT  T T     GOP 1      FOP 2     ROP 0      SOP 0     IOP 2     WOP 0
   3    01    01    WING - SG AXIS          T                          INTEGRATE  SYMMETRIC
   4    02    03    H T  - SG AXIS
   5    05    07    F F  - SG AXIS (VERT)
   6    07    09    A F  - SG AXIS (VERT)
   7    32    11    A F  - TOTAL   (VERT)
   8
   9    1.    04    1255.0     SUMMARY PRINT TERMINATOR
  10    1     14    -2.16      VTAS
  11    2     14    -3.90      DE
  12    3     14    -4.75      DE
  13    4     14    -6.66      DE

  14    7/8/9       END OF RECORD       1

  15    4.0         CASES
```

Program output listing for example 8.3

```
INTEGRATION OPTION    AND    ADDITIONAL LOADS OPTION

CASE  1  COMPLETE

CASE  2  COMPLETE

CASE     COMPLETE

CASE  4  COMPLETE
```

SUMMARY PRINT OPTION

CASE 1 MR= SYM	B1 ARS	SDSS-3E.2.2A	67.5WS,1.20M,18K ALT,ELASTIC,316K GW,NZ=0.65	ALPHA= .84 DE= -2.76	BETA= 0.00	CBAR=1067.3 TAS =1255.0
CASE 2 MR= SYM	B1 ARS	SDSS-3E.2.2B	67.5WS,1.20M,18K ALT,ELASTIC,316K GW,NZ=1.0	ALPHA= 1.86 DE= -3.60	BETA= 0.00	CBAR=1067.3 TAS =1255.0
CASE 3 MR= SYM	B1 ARS	SDSS-3E.2.2C	67.5WS,1.20M,18K ALT,ELASTIC,316K GW,NZ=1.685	ALPHA= 3.93 DE= -4.75	BETA= 0.00	CBAR=1067.3 TAS =1255.0
CASE 4 MR= SYM	B1 ARS	SDSS-3E.2.2D	67.5WS,1.20M,18K ALT,ELASTIC,316K GW,NZ=2.436	ALPHA= 6.20 DE= -6.68	BETA= 0.00	CBAR=1067.3 TAS =1255.0

SAN= 1 WING - SG AXIS ITC= 3 SC= OFF SREF= 1946.000 BREF= 820.68 CREF= 184.05

LEFT SIDE PRESSURE INTEGRATED LOADS COEFFICIENTS

CASE	V KIPS	B IN-KIPS	T IN-KIPS	CV	CB	CT
1	41.576	8805.004	-883.997	.020018	.005169	-.001789
2	57.732	12142.315	-456.559	.027796	.007129	-.001194
3	90.651	18924.751	7.635	.043598	.011111	.000020
4	126.512	26357.385	536.362	.060912	.015475	.001351

RIGHT SIDE LOADS = LEFT SIDE (SYMMETRIC MOTION FOR ALL CASES)

SUMMARY PRINT OPTION

CASE 1 MR= SYM	B1 ARS	SDSS-3L.2.2A	67.5WS,1.20M,18K ALT,ELASTIC,316K GW,NZ=0.65	ALPHA= .84 DE= -2.16	BETA= 0.00	CBAR=1067.3 TAS =1255.0
CASE 2 MR= SYM	B1 ARS	SDSS-3E.2.2B	67.5WS,1.20M,18K ALT,ELASTIC,316K GW,NZ=1.0	ALPHA= 1.86 DE= -3.00	BETA= 0.00	CBAR=1067.3 TAS =1255.0
CASE 3 MR= SYM	B1 ARS	SDSS-3E.2.2C	67.5WS,1.20M,18K ALT,ELASTIC,316K GW,NZ=1.685	ALPHA= 3.53 DE= -4.75	BETA= 0.00	CBAR=1067.3 TAS =1255.0
CASE 4 MR= SYM	B1 ARS	SDSS-3L.2.2D	67.5WS,1.20M,18K ALT,ELASTIC,316K GW,NZ=2.436	ALPHA= 5.20 DE= -6.68	BETA= 0.00	CBAR=1067.3 TAS =1255.0

SAN= 2 HORIZ TAIL - SG ITC= 3 SC= OFF SREF= 238.770 BREF= 259.03 CREF= 149.38

LEFT SIDE PRESSURE INTEGRATED LOADS COEFFICIENTS

CASE	V KIPS	B IN-KIPS	T IN-KIPS	CV	CB	CT
1	-29.737	-3079.208	1303.309	-.116689	-.046647	.035813
2	-32.264	-3274.798	1385.721	-.126605	-.049610	.036428
3	-37.805	-3715.817	1455.706	-.148349	-.056291	.038240
4	-44.091	-4222.117	1542.576	-.173015	-.063961	.040522

RIGHT SIDE LOADS = LEFT SIDE (SYMMETRIC MOTION FOR ALL CASES)

SUMMARY PRINT OPTION

CASE 1 MR= SYM	61 ARS	SDSS-3E.2.2A	67.5WS,1.2JM,18K ALT,ELASTIC,316K GW,NZ=0.65	ALPHA= .84 DE= -2.16	BETA= 0.00	QBAR=1067.3 TAS =1255.0
CASE 2 MR= SYM	61 ARS	SDSS-3E.2.2B	67.5WS,1.2JM,18K ALT,ELASTIC,316K GW,NZ=1.0	ALPHA= 1.86 DE= -3.00	BETA= 0.00	QBAR=1067.3 TAS =1255.0
CASE 3 MR= SYM	61 ARS	SDSS-3E.2.2C	67.5WS,1.2JM,18K ALT,ELASTIC,316K GW,NZ=1.685	ALPHA= 3.93 DE= -4.75	BETA= 0.00	QBAR=1067.3 TAS =1255.0
CASE 4 MR= SYM	61 ARS	SDSS-3E.2.2D	67.5WS,1.2JM,18K ALT,ELASTIC,316K GW,NZ=2.436	ALPHA= 6.20 DE= -6.68	BETA= 0.00	QBAR=1067.3 TAS =1255.0

SA= 5 F-D FUS SG VERT ITC= 1 SC= ON SREF= 1946.000 BREF= 820.00 CREF= 184.05

CENTERLINE PRESSURE INTEGRATED LOADS

CASE	V KIPS	B IN-KIPS	T IN-KIPS	COEFFICIENTS CV	CB	CT
1	16.123	-1593.754	0.000	.008726	-.000936	0.000000
2	22.223	-588.619	0.000	.010700	-.000329	0.000000
3	30.537	1523.798	0.000	.014703	.000895	0.000000
4	39.602	3794.594	0.000	.019067	.002228	0.000000

SUMMARY PRINT OPTION

CASE 1 MR= SYM	B1 ARS	SDSS-3E.2.2A	67.5WS,1.20M,18K ALT,ELASTIC,316K GW,NZ=0.65	ALPHA= .64 DE= -2.16	BETA= 0.00	QBAR=1067.3 TAS =1255.0
CASE 2 MR= SYM	B1 ARS	SDSS-3E.2.2B	67.5WS,1.20M,18K ALT,ELASTIC,316K GW,NZ=1.0	ALPHA= 1.86 DE= -5.00	BETA= 0.00	QBAR=1067.3 TAS =1255.0
CASE 3 MR= SYM	B1 ARS	SDSS-3E.2.2C	67.5WS,1.20M,18K ALT,ELASTIC,316K GW,NZ=1.685	ALPHA= 3.92 DE= -4.75	BETA= 0.00	QBAR=1067.3 TAS =1255.0
CASE 4 MR= SYM	B1 ARS	SDSS-3E.2.2D	67.5WS,1.20M,18K ALT,ELASTIC,316K GW,NZ=2.436	ALPHA= 6.20 DE= -6.68	BETA= 0.00	QBAR=1067.3 TAS =1255.0

SAN= 7 AFT FUS SG VERT ITC= 1 SC= ON SREF= 1946.000 BREF= 820.08 CREF= 184.05

CENTERLINE PRESSURE INTEGRATED LOADS COEFFICIENTS

CASE	V KIPS	B IN-KIPS	T IN-KIPS	CV	CB	CT
1	1.066	-1707.227	0.000	.000513	-.001002	0.000000
2	-.549	-2445.591	0.000	-.000264	-.001436	0.000000
3	-3.803	-3947.876	0.000	-.001831	-.002318	0.000000
4	-7.342	-5592.994	0.000	-.003535	-.003284	0.000000

SUMMARY PRINT OPTION

CASE 1 MR= SYM	B1 ARS	SDSS-3E.2.2A	67.5WS,1.20M,18K ALT,ELASTIC,316K GW,NZ=0.65	ALPHA= .84 DE= -2.16	BETA= 0.00 CREF=1067.3 TAS =1255.0
CASE 2 MR= SYM	B1 ARS	SDSS-3E.2.2B	67.5WS,1.20M,18K ALT,ELASTIC,316K GW,NZ=1.0	ALPHA= 1.86 DE= -3.00	BETA= 0.00 CREF=1067.3 TAS =1255.0
CASE 3 MR= SYM	B1 ARS	SDSS-3E.2.2C	67.5WS,1.20M,18K ALT,ELASTIC,316K GW,NZ=1.685	ALPHA= 3.93 DE= -4.75	BETA= 0.00 CREF=1067.3 TAS =1255.0
CASE 4 MR= SYM	B1 ARS	SDSS-3E.2.2D	67.5WS,1.20M,18K ALT,ELASTIC,316K GW,NZ=2.435	ALPHA= 6.20 DE= -6.68	BETA= 0.00 CREF=1067.3 TAS =1255.0

SAN= 32 AFT FUS SG V-TOT ITC= 4 SC= ON SREF= 1946.000 BREF= 820.08 CREF= 184.05

CENTERLINE PRESSURE INTEGRATED LOADS

CASE	V KIPS	B IN-KIPS	I IN-KIPS	COEFFICIENTS CV	CB	CT
1	-58.406	-18975.180	0.000	-.029122	-.011140	0.000000
2	-61.077	-20995.837	0.000	-.031333	-.012327	0.000000
3	-79.413	-25345.970	0.000	-.038235	-.014881	0.000000
4	-95.524	-30238.610	0.000	-.045992	-.017753	0.000000

```
 SIMQAZE. 81/07/07.UFRC NOS (NOS10).

15.50.50.EIFSS,T100.
15.50.50.LCCR, AA01,       0.026KCDS.
15.50.51.USER(SIMS,)
15.50.51.CHARGE(14,62,FTN)
15.50.51.ATTACH(LGO=FSLIP3)
15.50.51.ATTACH(TAPE20=81GDP)
15.50.52.ATTACH(TAPE11=83E22A)
15.50.52.ATTACH(TAPE12=83E22B)
15.50.52.ATTACH(TAPE13=83E22C)
15.50.53.ATTACH(TAPE14=83E22D)
15.51.04.LDSET(PRESET=ZERO)
15.51.04.MAP(OFF)
15.51.04.LGO.
15.51.04.  CM LWA+1 =105154B, LOADER USED 1233008
15.51.20.     STOP
15.51.20.     114466 MAXIMUM EXECUTION FL.
15.51.20.      3.602 CP SECONDS EXECUTION TIME.
15.51.21.UEAD,       0.012KUNS.
15.51.21.UEPF,       0.053KUNS.
15.51.21.UEMS,       2.931KUNS.
15.51.21.UECP,       5.411,ECS.
15.51.21.AESR,       9.523UNTS.
15.51.45.ULLP, AA04,       0.745KLNS.
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Dryden Flight Research Center
National Aeronautics and Space Administration
July 17, 1981

REFERENCES

1. Tinoco, E. N.; and Mercer, J. E.: FLEXSTAB - A Summary of the Functions and Capabilities of the NASA Flexible Airplane Analysis Computer System. NASA CR-2564, 1974.

2. Hink, G. R.; Snow, R. N.; Bhatia, K. G.; Maier, R. E.; Bills, G. R.; Henderson, D. M.; Bailey, D. C.; Dornfeld, G. M.; and D'Auria, P. V.: A Method for Predicting the Stability Characteristics of an Elastic Airplane - Volume II: FLEXSTAB 1.02.00 User's Manual. NASA CR-114713, 1974.

3. Bills, G. R.; Hink, G. R.; and Dornfeld, G. M.: A Method for Predicting the Stability Characteristics of an Elastic Airplane, Volume II - FLEXSTAB 3.01.00 User's Manual. AFFDL-TR-77-55, Vol. II, Air Force Flight Dynamics Lab., Wright-Patterson AFB, Ohio, June 1977.

4. A Method for Predicting the Stability Characteristics of an Elastic Airplane, Volume II - FLEXSTAB 3.02.00 User's Manual. D6-44361-2, Boeing Commercial Airplane Co. and Boeing Computer Services Co., Oct. 1978.

5. Carter, Alan L.; and Sims, Robert L.: Comparison of Theoretical Predictions of Orbiter Airloads with Wind Tunnel and Flight Test Results for a Mach Number of 0.52. NASA TM-81358, 1981.

6. Bartlett, M. D.; Olsen, A. D., Jr.; and Wildermuth, P. F.: Airloads Research Study - Airload Coefficients Derived from Wind Tunnel Data. NA-76-563, Rockwell International, Los Angeles Div., Sept. 1976. (Revised Aug. 1979.)

7. FORTRAN Extended Version 4 Reference Manual. Pubn. No. 60305600, Control Data Corp., c.1974

8. A Method for Predicting the Stability Characteristics of an Elastic Airplane, Volume III - FLEXSTAB 3.02.00 Program Description. D6-44361-3, Boeing Commercial Airplane Co. and Boeing Computer Services Co., Oct. 1978.

9. SCOPE Version 3.4 Reference Manual. Pubn. No. 60307200, Control Data Corp., c.1974.

10. NOS Version 1 Reference Manual. Pubn. No. 60435400, Control Data Corp., c.1980.

1. Report No.	2. Government Accession No.	3. Recipient's Catalog No.
NASA TM-81364		

4. Title and Subtitle	5. Report Date
USER'S MANUAL FOR FSLIP-3, FLEXSTAB LOADS INTEGRATION PROGRAM	August 1981
	6. Performing Organization Code RTOP 505-33-54
7. Author(s) Robert L. Sims	8. Performing Organization Report No. H-1158
	10. Work Unit No.
9. Performing Organization Name and Address NASA Dryden Flight Research Center P.O. Box 273 Edwards, California 93523	11. Contract or Grant No.
	13. Type of Report and Period Covered Technical Memorandum
12. Sponsoring Agency Name and Address National Aeronautics and Space Administration Washington, D.C. 20546	14. Sponsoring Agency Code

15. Supplementary Notes

Microfiche supplement is attached.

16. Abstract

This report constitutes the FSLIP program documentation and user's manual. As a follow-on program to the FLEXSTAB computer analysis system, the primary function of this Fortran IV program is to integrate panel pressure coefficients computed by FLEXSTAB to obtain total shear, bending, and torque airloads on various surfaces, summed relative to user specified axes. The program essentially replaces the ALOADS module in FLEXSTAB with expanded capabilities and flexibility. As such, FSLIP is generalized to work on any FLEXSTAB model or other pressure data if in a compatible format.

17. Key Words (Suggested by Author(s))	18. Distribution Statement
FLEXSTAB Fortran program Airload prediction Pressure integration	Unclassified--Unlimited Subject category 61

19. Security Classif. (of this report)	20. Security Classif. (of this page)	21. No. of Pages	22. Price*
Unclassified	Unclassified	116	A06

For sale by the National Technical Information Service, Springfield, Virginia 22161

SLIT THIS END

Microfiche supplement for NASA TM-81364

USER'S MANUAL FOR FSLIP-3,
FLEXSTAB LOADS INTEGRATION PROGRAM

by Robert L. Sims

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C     FLEXSTAB LOADS INTEGRATION PROGRAM
C
C     6 PRIMARY OPTIONS ARE...(1) REPUNCH PRESSURE DATA WITH NEW X/C
C                             (2) SECTION DATA
C                             (3) INTEGRATED SURFACE/AXIS LOADS
C                             (4) WIND TUNNEL DERIVED AIRLOADS
C
C
C        TAPE11 IS DISK COPY OF PUNCHED CP CARDS, CASE 1
C        TAPE12 IS DISK COPY OF PUNCHED CP CARDS, CASE 2
C        TAPE13 IS DISK COPY OF PUNCHED CP CARDS, CASE 3
C        TAPE14 IS DISK COPY OF PUNCHED CP CARDS, CASE 4
C        TAPE15 IS DISK COPY OF PUNCHED CP CARDS, CASE 5
C        TAPE16 IS DISK COPY OF PUNCHED CP CARDS, CASE 6
C        TAPE17 IS DISK COPY OF PUNCHED CP CARDS, CASE 7
C        TAPE18 IS DISK COPY OF PUNCHED CP CARDS, CASE 8
C        TAPE19 IS DISK COPY OF PUNCHED CP CARDS, CASE 9
C        TAPE20 IS DISK INPUT OF SURFACE/AXIS DATA
C        TAPE30 IS GDTAPE DISK INPUT
C        TAPE40 IS DISK INPUT OF WIND TUNNEL COEFFICIENT DATA
C        TAPE50 IS TEMPORARY SCRATCH DISK
C
      PROGRAM FLIP(INPUT=65,OUTPUT=129,PUNCH=65,TAPE11=513,TAPE12=513,
     1         TAPE13=513,TAPE14=513,TAPE15=513,TAPE16=513,TAPE17=513,
     2         TAPE18=513,TAPE19=513,TAPE20=513,TAPE30=513,TAPE40=513,
     3         TAPE50=513,TAPE1=INPUT)
      INTEGER SPI(51),SPW(51)
      LOGICAL WGR(50),WGS(50),WGI(50),WGW(14),RS
      INTEGER GOP,POP,ROP,SOP,IOP,WOP,AC(2,2),NC,NSB,LRVL(4),SCN(2)
      INTEGER LRC(3),VBT(3)
      REAL RD(20,9),FAL(9,50,6),FCL(9,50,6),WAL(9,14,6),WCL(9,14,6)
      INTEGER NSAD,N,SANAME(4,50),SABODY(2,50),BTC(50),SC(50),NR
      INTEGER RN,NP,PN(2),NALD,NT,CN,CL,CT
      REAL SREF(50),BREF(50),CREF(50),CAVG,ETA,YL,CROW
      REAL SP,BARM,TARM,XCN,C(3)
      LOGICAL SB
      INTEGER DN,DUMMY(4),TIT1(18,9),TIT2(18),INTB,IMR(9),CPBODY(2)
      INTEGER INAF,INPT,MRN(2)
      REAL NTP,MR,M1(9),A1(9),B1(9),Q1(9),NAF,THETA,YR,NPT
      REAL XC,CPS,CPR,CPL,XR
      COMMON/GENCOM/GOP,POP,ROP,SOP,IOP,WOP,WGR,WGS,WGI,WGW,AC,NC,NSB,
     1       RD,LRVL,FAL,FCL,WAL,WCL,SCN,IC,LRC,VBT,RS
      COMMON/GOPCOM/NSAD,N,SANAME,SABODY,BTC,SC,NR,SREF,BREF,CREF,CAVG,
     1       RN,ETA,YL,NP,CROW,PN,SP,BARM,TARM,XCN,NALD,NT,CN,CL,CT,C
      COMMON/POPCOM/DN,DUMMY,TIT1,TIT2,NTP,MR,M1,A1,B1,Q1,INTB,IMR,
     1       CPBODY,NAF,THETA,INAF,YR,NPT,INPT,XC,CPS,CPR,CPL,XR,MRN,SB
      DATA FCL/2700*0.0/,FAL/2700*0.0/
      DATA WCL/0756*0.0/,WAL/0756*0.0/
      DATA SREF/50*1.0/,BREF/50*1.0/,CREF/50*1.0/
      DATA BTC/50*9/,SC/50*0/
      DATA SANAME/200('    ')/,SABODY/100('    ')/
      DATA LRVL/"LEFT HAND ","RIGHT HAND","VERTICAL  ","LATERAL   "/
      DATA SCN/"OFF"," ON"/
      DATA LRC/"LH","RH","CL"/,VBT/"V","B","T"/
      DATA MRN/" SYM","ASYM"/
      DATA RD/180*0.0/
      DATA WGR/50*.TRUE./,WGS/50*.TRUE./,WGI/50*.TRUE./,WGW/14*.TRUE./
      NC= 0
```

```
400         C     CUT PANEL
              650 SP= ST(1)+ST(2)+ST(3)
                  IF(SP.EQ.0.0)   SP=1.0
                  BARM= (YT(1)*ST(1)+YT(2)*ST(2)+YT(3)*ST(3))/SP
                  TARM=-(XT(1)*ST(1)+XT(2)*ST(2)+XT(3)*ST(3))/SP
405               GO TO 700
            C     INBOARD PANEL
              660 SP= 0.0
                  BARM= 0.0
                  TARM= 0.0
410               GO TO 700
            C     OUTBOARD PANEL
              670 SP= AP(J)
                  BARM= YA(5,J)
                  TARM=-XA(5,J)
415         C     PRINT PANEL DATA PLUS ANY MESSAGE
              700 PRINT 3600,   PN,SP,BARM,TARM
                  IF(JJ.EQ.0)    GO TO 710
                  IF(JJ.GE.90)   PRINT 7000
                  IF(JJ.GE.91)   PRINT 7001
420               IF(JJ.EQ.91)   PRINT 7011
                  IF(JJ.EQ.92)   PRINT 7012
                  IF(JJ.EQ.93)   PRINT 7013
                  IF(JJ.EQ.99)   PRINT 7019,   NV
             7000 FORMAT(*+*,T61,*CUT PANEL*)
425          7001 FORMAT(*+*,T71,19H***** WARNING *****,
                1       * ERROR DETECTED IN GEOMETRY -*)
             7011 FORMAT(*+*,T121,*TRIANGLE 1*)
             7012 FORMAT(*+*,T121,*TRIANGLE 2*)
             7013 FORMAT(*+*,T121,*TRIANGLE 3*)
430          7019 FORMAT(*+*,T119,I3,* VERTICES*)
            C     WRITE,PUNCH PANEL DATA
              710 WRITE(20)     PN,SP,BARM,TARM,XCN
                  IF(GOP.NE.4)   GO TO 720
                  PUNCH 3601,   PN,SP,BARM,TARM
435           720 TA= TA+SP
            C     GO TO NEXT PANEL
               50 CONTINUE
            C     PRINT TOTAL AREA OUTBOARD OF AXIS
                  PRINT 3700,   TA
440         C     THIN BODY COMPLETED - GO TO NEXT SURFACE/AXIS DEFINITION
               20 CONTINUE
            C
            C     READ,WRITE,PRINT,PUNCH ANY ADDITIONAL LOAD DEFINITIONS
            C
445           800 IF(NALD.LE.0)   GO TO 999
                  DO 80 I=1,NALD
                  READ(1,8000)   N,(SANAME(L,N),L=1,4),
                 1               BTC(N),SC(N),NT,SREF(N),BREF(N),CREF(N)
             8000 FORMAT(I2,2X,4A4,10X,2I3,I4,3F10.3)
450         C     CHECK FOR INPUT ERROR
                  IF(N.LT.1.OR.N.GT.50)   GO TO 991
                  BTC(N)= 4
                  IF(SC(N).NE.0)   SC(N)= 1
                  JJ= SC(N) + 1
455               IF(NT.LE.0)   GO TO 991
                  IF(SREF(N).EQ.0.0)   SREF(N)= 1.0
```

```
      SUBROUTINE IOPSR
C
C     INTEGRATES PANEL PRESSURES TO OBTAIN SURFACE/AXIS LOADS
C        AND COMPUTES ANY LOADS DERIVED FROM INTEGRATED LOADS
C
      REAL CP(2),PL(6)
      LOGICAL WGR(50),WGS(50),WGI(50),WGW(14),RS
      INTEGER GOP,POP,ROP,SOP,IOP,WOP,AC(2,2),NC,NSB,LRVL(4),SCN(2)
      INTEGER LRC(3),VBT(3)
      REAL RD(20,9),FAL(9,50,6),FCL(9,50,6),WAL(9,14,6),WCL(9,14,6)
      INTEGER NSAD,N,SANAME(4,50),SABODY(2,50),BTC(50),SC(50),NR
      INTEGER RN,NP,PN(2),NALD,NT,CN,CL,CT
      REAL SREF(50),BREF(50),CREF(50),CAVG,ETA,YL,CROW
      REAL SP,BARM,TARM,XCN,C(3)
      LOGICAL SB
      INTEGER DN,DUMMY(4),TIT1(18,9),TIT2(18),INTB,IMR(9),CPBODY(2)
      INTEGER INAF,INPT,MRN(2)
      REAL NTB,MR,M1(9),A1(9),B1(9),Q1(9),NAF,THETA,YR,NPT
      REAL XC,CPS,CPR,CPL,XR
      COMMON/GENCOM/GOP,POP,ROP,SOP,IOP,WOP,WGR,WGS,WGI,WGW,AC,NC,NSB,
     1      RD,LRVL,FAL,FCL,WAL,WCL,SCN,IC,LRC,VBT,RS
      COMMON/GOPCOM/NSAD,N,SANAME,SABODY,BTC,SC,NR,SREF,BREF,CREF,CAVG,
     1      RN,ETA,YL,NP,CROW,PN,SP,BARM,TARM,XCN,NALD,NT,CN,CL,CT,C
      COMMON/POPCOM/DN,DUMMY,TIT1,TIT2,NTB,MR,M1,A1,B1,Q1,INTB,IMR,
     1      CPBODY,NAF,THETA,INAF,YR,NPT,INPT,XC,CPS,CPR,CPL,XR,MRN,SB
      DO 10 IC=1,NC
      REWIND 20
      DN= IC+10
      READ(20)       NSAD,NALD
      DO 20 I=1,NSAD
      CALL SYNC(3),RETURNS(20,500)
C     NORMAL RETURN FOR CPBODY MATCHED WITH SABODY
C     RETURNS 20 FOR SABODY SKIPPED
C     RETURNS 500 FOR MATCH NOT FOUND
C     SUPPRESS ALL PRINTED DETAIL OUTPUT IF IOP=2
      IF(IOP.EQ.2)   GO TO 200
      PRINT 1000
 1000 FORMAT(*1*/* INTEGRATION  OPTION*)
C     PRINT CASE INFO HEADER
      CALL CHEAD
C     PRINT SURFACE/AXIS GEOMETRY INFO
      JJ= SC(N)+1
      IF(SC(N).NE.0)   JJ= 2
      PRINT 1020,    N,(SANAME(L,N),L=1,4),CPBODY,BTC(N),SCN(JJ)
      IF(BTC(N).EQ.3)   PRINT 1021,    THETA
      PRINT 1022,    SREF(N),BREF(N),CREF(N)
 1020 FORMAT( //* SAN= *,I2,2X,4A4,4X,*CPBODY=*,2A4,3X,*ITC=*,I1,3X,
     1      *SC=*,A3)
 1021 FORMAT(*+*,T66,*THETA=*,F7.2)
 1022 FORMAT(*+*,T88,*SREF=*,F10.3,3X,*  BREF=*,F8.2,3X,*CREF=*,F8.2)
      IF(SC(N).EQ.0)   PRINT 1030
      IF(SC(N).NE.0)   PRINT 1031
 1030 FORMAT(*0*,*PANEL      AREA       BARM       TARM    *, 5X,
     1           *CP-L        V-L        B-L        T-L  *,10X,
     2           *CP-R        V-R        B-R        T-R  */* *,
     3           *          IN2         IN         IN     *, 5X,
     4           *          KIPS      IN-KIPS    IN-KIPS*,10X
```

```
      SUBROUTINE CHEAD
C
C     PRINTS CASE HEADER
C
      LOGICAL WGR(50),WGS(50),WGI(50),WGW(14),RS
      INTEGER GOP,POP,ROP,SOP,IOP,WOP,AC(2,2),NC,NSB,LRVL(4),SCN(2)
      INTEGER LRC(3),VBT(3)
      REAL RD(20,9),FAL(9,50,6),FCL(9,50,6),WAL(9,14,6),WCL(9,14,6)
      LOGICAL SB
      INTEGER DN,DUMMY(4),TIT1(18,9),TIT2(18),INTB,IMR(9),CPBODY(2)
      INTEGER INAF,INPT,MRN(2)
      REAL NTB,MR,M1(9),A1(9),B1(9),Q1(9),NAF,THETA,YR,NPT
      REAL XC,CPS,CPR,CPL,XR
      COMMON/GENCOM/GOP,POP,ROP,SOP,IOP,WOP,WGR,WGS,WGI,WGW,AC,NC,NSB,
     1       RD,LRVL,FAL,FCL,WAL,WCL,SCN,IC,LRC,VBT,RS
      COMMON/POPCOM/DN,DUMMY,TIT1,TIT2,NTB,MR,M1,A1,B1,Q1,INTB,IMR,
     1       CPBODY,NAF,THETA,INAF,YR,NPT,INPT,XC,CPS,CPR,CPL,XR,MRN,SB
      JJ= IMR(IC)
      PRINT 1001,    IC,(TIT1(L,IC),L=1,18),A1(IC),B1(IC),Q1(IC)
      PRINT 1002,    MRN(JJ)
 1001 FORMAT(*0*,*CASE  *,I1,5X,18A4,T97,*ALPHA=*,F6.2,*   BETA=*,F6.2,
     1       *   QBAR=*,F6.1)
 1002 FORMAT(* MR=*,A4)
      IF(RD( 7,IC).NE.0.0)   PRINT 1003,   RD( 7,IC)
      IF(RD( 8,IC).NE.0.0)   PRINT 1004,   RD( 8,IC)
      IF(RD( 9,IC).NE.0.0)   PRINT 1005,   RD( 9,IC)
      IF(RD(17,IC).NE.0.0)   PRINT 1006,   RD(17,IC)
      IF(RD(18,IC).NE.0.0)   PRINT 1007,   RD(18,IC)
      IF(RD(15,IC).NE.0.0)   PRINT 1008,   RD(15,IC)
      IF(RD(16,IC).NE.0.0)   PRINT 1009,   RD(16,IC)
      IF(RD( 6,IC).NE.0.0)   PRINT 1013,   RD( 6,IC)
      IF(RD(14,IC).NE.0.0)   PRINT 1010,   RD(14,IC)
      IF(RD(13,IC).NE.0.0)   PRINT 1011,   RD(13,IC)
      IF(RD( 4,IC).NE.0.0)   PRINT 1012,   RD( 4,IC)
 1003 FORMAT(***,T14 ,*P=*    ,F6.1)
 1004 FORMAT(***,T24 ,*Q=*    ,F5.1)
 1005 FORMAT(***,T33 ,*R=*    ,F5.1)
 1006 FORMAT(***,T42 ,*DSL=*  ,F5.1)
 1007 FORMAT(***,T53 ,*DSR=*  ,F5.1)
 1008 FORMAT(***,T64 ,*DRU=*  ,F6.2)
 1009 FORMAT(***,T76 ,*DRL=*  ,F6.2)
 1013 FORMAT(***,T88 ,*CNA=*  ,F6.3)
 1010 FORMAT(***,T100,*DE=*   ,F6.2)
 1011 FORMAT(***,T114,*DA=*   ,F6.2)
 1012 FORMAT(***,T126,*TAS =*,F6.1)
      RETURN
      END
```

***** A04 *****

NASA DFRC

```
      C
      C     READ OPTION CONTROL,SURFACE/AXIS SKIP CONTROL,
      C
            READ(1,1000)   GOP,POP,ROP,SOP,IOP,WOP
 1000 FORMAT( 6(9X,I1) )
            IF(IOP.NE.0)   READ(1,1001)   WGI
            IF(WOP.NE.0)   READ(1,1001)   WGW
 1001 FORMAT( 50L1 )
      C
      C     READ CASE SUMMARY PRINT SPECS
      C
            DO 5 I=1,51
            READ(1,1003)   SPI(I),SPW(I)
 1003 FORMAT(I2,3X,I2)
            IF(SPI(I).EQ.0)   GO TO 100
    5 CONTINUE
  100 NSP= I-1
      C
      C     IF SURFACE/AXIS INFO NOT ON DISK, CREATE FROM CARDS OR GDTAPE
      C
            IF(GOP.GE.2)   CALL GOPSR
      C     TERMINATE IF ERROR IN GEOMETRY OPTION OR IF NO OTHER OPTION REQ.
            IF(GOP.EQ.9)   GO TO 999
            IF(POP.EQ.0.A.WOP.EQ.0)   GO TO 999
      C
      C     IF WIND TUNNEL COEFFICIENTS NOT ON DISK, COPY FROM CARD INPUT
      C
            IF(WOP.EQ.2)   CALL WOPSR
      C
      C     READ RUN DATA FOR ALL CASES
      C
  200 READ(1,2000)   I,J,RD(J,I)
 2000 FORMAT(I1,3X,I2,3X,F10.0)
            IF(EOF(1).NE.0.0)   GO TO 300
            IF(I.GE.9)   GO TO 200
            DO 10 K=I,8
   10 RD(J,K+1)= RD(J,I)
            GO TO 200
  300 READ(1,3000)   NC,NSB
 3000 FORMAT(I1,27X,I2)
      C
      C     READ PRESSURE DATA IF ON CARDS (INCLUDING SLENDER BODIES IF ANY)
      C
            IF(POP.EQ.1)   CALL POPSR
      C
      C     ALL DATA INPUT COMPLETE - PROCEED WITH ROP,SOP,IOP,WOP
      C
            IF(IOP.NE.0)   CALL IOPSR
            IF(WOP.NE.0.AND.NC.NE.0)   CALL WOPSR
      C     SUMMARY PRINT OPTION
  500 IF(NSP.EQ.0)   GO TO 999
            IF(IOP.EQ.0)   GO TO 999
      C     COMPRESS VERTICAL SPACING TO 8 LINES/INCH
            PRINT 5000
 5000 FORMAT(*T*)
      C     PROCESS EACH SUMMARY PRINT SPECIFICATION
            DO 50 I=1,NSP
```

```
            IF(BREF(N).EQ.0.0)   BREF(N)= 1.0
            IF(CREF(N).EQ.0.0)   CREF(N)= 1.0
            WRITE(20)       N,(SANAME(L,N),L=1,4),
460        1                BTC(N),SC(N),NT,SREF(N),BREF(N),CREF(N)
            IF(GOP.EQ.2)    GO TO 850
            PRINT 8200,     N,(SANAME(L,N),L=1,4),
           1                BTC(N),          SREF(N),BREF(N),CREF(N)
            PRINT 8201,     SCN(JJ),NT
465      8200 FORMAT(*1*/1X,*ADDITIONAL LOADS OPTION*///* SURFACE/AXIS NUMBER =*
           1   ,I3,6X,*SURFACE/AXIS NAME = *,4A4///* INTEGRATION TYPE CODE =*
           2   ,I3,4X,*SREF =*,F10.3,4X,*BREF =*,F10.3,4X,*CREF =*,F10.3/)
         8201 FORMAT(* SYMMETRY CODE = *,A3,7X,*NUMBER OF TERMS =*,I3////
           1   * COMPONENT DEFINITION FOR  *)
470         IF(SC(N).EQ.0)   PRINT 8202
            IF(SC(N).EQ.1)   PRINT 8205
         8202 FORMAT(*++,T30,*LEFT SIDE LOAD *)
         8203 FORMAT(*++,T30,*CENTERLINE LOAD*)
            PRINT 8300
475      8300 FORMAT(///*  TERM     INDICES        COMPONENT DESCRIPTION     *,
           1         *V FACTOR  B FACTOR  T FACTOR*/)
            IF(GOP.EQ.3)    GO TO 850
            PUNCH 8000,     N,(SANAME(L,N),L=1,4),
           1                BTC(N),SC(N),NT,SREF(N),BREF(N),CREF(N)
480      C     PROCESS EACH COMPONENT SPECIFICATION
           850 DO 85 J=1,NT
            READ(1,8500)    CN,CL,CT,C
         8500 FORMAT(I2,2I4,3F10.3)
         C     CHECK FOR INPUT ERROR
485         IF(CN.EQ.0)   GO TO 855
            IF(CN.LT.1.OR.CN.GT.50)   GO TO 991
            IF(CL.LT.1.OR.CL.GT.3)    GO TO 991
            IF(CT.LT.1.OR.CT.GT.3)    GO TO 991
            855 WRITE(20)       CN,CL,CT,C
490         IF(GOP.EQ.2)    GO TO 85
            IF(J.EQ.041.OR.J.EQ.081.OR.J.EQ.121)   GO TO 860
            IF(J.EQ.161.OR.J.EQ.201.OR.J.EQ.241)   GO TO 860
            GO TO 870
         C     NEW PAGE WITH HEADER
495         860 PRINT 3500
            PRINT 8300
         C     SPECIAL CASE IF CN=0  (CONSTANT)
           870 IF(CN.GE.1)   GO TO 875
            PRINT 8700,     J,CN,CL,CT,C
500         8700 FORMAT(* *,I3,5X,3I3,6X,*CONSTANTS   *,14X,3F10.3)
            GO TO 880
            875 PRINT 8750,   J,CN,CL,CT,(SANAME(L,CN),L=1,4),LRC(CL),VBT(CT),C
           8750 FORMAT(* *,I3,5X,3I3,6X,4A4,3X,A2,2X,A1,2X,3F10.3)
            880 IF(GOP.EQ.3)    GO TO 85
505         PUNCH 8500,     CN,CL,CT,C
             85 CONTINUE
             80 CONTINUE
            GO TO 999
         C
510      C     PRINT ERROR MESSAGES
         C
           990 PRINT 9900
            GO TO 998
```

```
      5          *          KIPS      IN-KIPS     IN-KIPS*)
 1031 FORMAT(*0*,*PANEL     AREA      BARM        TARM      *, 5X,
     1          *CP-R       V-R       B-R          T-R   */* *,
     2          *          IN2        IN          IN        *, 5X,
     3          *          KIPS      IN-KIPS     IN-KIPS*)
      LU= 17
C     PROCESS ROW DATA
  200 DO 30 J=1,NR
      READ(20)       RN,ETA,YL,NP,CROW
      READ(DN)       YR,NPT
      IF(IOP.EQ.2)   GO TO 300
C     CHECK FOR NEW PAGE / PRINT HEADER
      IF((LU+NP+1).LE.66)   GO TO 250
      PRINT 1000
      PRINT 2000,    N,(SANAME(L,N),L=1,4)
 2000 FORMAT(*0*,*SAN= *,I2,2X,4A4)
      IF(SC(N).EQ.0)   PRINT 1030
      IF(SC(N).NE.0)   PRINT 1031
      LU= 13
  250 LU= LU+NP+1
      PRINT 2500
 2500 FORMAT(* *)
C     PROCESS PANEL DATA
  300 DO 40 K=1,NP
      READ(20)       PN,SP,BARM,TARM,XCN
      READ(DN)       XC,CPS,CPR,CPL,XP
C     SET UP PRESSURES FOR CURRENT BODY TYPE
      GO TO (310,320,330) BTC(N)
C     SLENDER BODY - VERTICAL
  310 CP(1)= CPS
      CP(2)= CPS
      GO TO 400
C     SLENDER BODY - LATERAL
  320 CP(1)= CPL
      CP(2)= CPR
      GO TO 400
C     THIN BODY
  330 IF(MR.EQ.1.0)   CP(1)= CPS
      IF(MR.EQ.1.0)   CP(2)= CPS
      IF(MR.EQ.2.0)   CP(1)= CPL
      IF(MR.EQ.2.0)   CP(2)= CPR
C     SPECIAL CONVENTION FOR VERTICAL TAIL ON CENTERLINE
      IF(MR.EQ.2.0.AND.SC(N).NE.0.AND.THETA.EQ.90.0)   CP(2)= CPL
C     COMPUTE PANEL LOADS
  400 PL(1)= CP(1)*Q1(IC)*SP/144.0
      PL(4)= CP(2)*Q1(IC)*SP/144.0
      PL(2)= PL(1)*BARM
      PL(5)= PL(4)*BARM
      PL(3)= PL(1)*TARM
      PL(6)= PL(4)*TARM
C     RUNNING TOTAL
      DO 35 L=1,6
   35 FAL(IC,N,L)= FAL(IC,N,L) + PL(L)
      IF(IOP.EQ.2)   GO TO 40
      IF(SC(N).EQ.0)   PRINT 4000,  PN,SP,BARM,TARM,CP(1),(PL(L),L=1,3),
     1                                                    CP(2),(PL(L),L=4,6)
      IF(SC(N).NE.0)   PRINT 4001,  PN,SP,BARM,TARM,CP(2),(PL(L),L=4,6)
```

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SYMBOLIC REFERENCE MAP (R=3)

ENTRY POINTS DEF LINE REFERENCES
1 CHEAD 1 46

VARIABLES	SN	TYPE		RELOCATION								
252	AC	INTEGER	ARRAY	GENCOM	REFS	6	14					
304	A1	REAL	ARRAY	POPCOM	REFS	12	16	19				
315	B1	REAL	ARRAY	POPCOM	REFS	12	16	19				
351	CPBODY	INTEGER	ARRAY	POPCOM	REFS	10	16					
364	CPL	REAL		POPCOM	REFS	13	16					
363	CPR	REAL		POPCOM	REFS	13	16					
362	CPS	REAL		POPCOM	REFS	13	16					
0	DN	INTEGER		POPCOM	REFS	10	16					
1	DUMMY	INTEGER	ARRAY	POPCOM	REFS	10	16					
550	FAL	REAL	ARRAY	GENCOM	REFS	8	14					
5764	FCL	REAL	ARRAY	GENCOM	REFS	8	14					
0	GOP	INTEGER		GENCOM	REFS	6	14					
16152	IC	INTEGER		GENCOM	REFS	14	18	5*19	2*24	2*25	2*26	2*27
						2*28	2*29	2*30	2*31	2*32	2*33	2*34
340	IMR	INTEGER	ARRAY	POPCOM	REFS	10	16	18				
355	INAF	INTEGER		POPCOM	REFS	11	16					
360	INPT	INTEGER		POPCOM	REFS	11	16					
337	INTB	INTEGER		POPCOM	REFS	10	16					
4	IOP	INTEGER		GENCOM	REFS	6	14					
321	JJ	INTEGER			REFS	20	DEFINED	18				
322	L	INTEGER			REFS	19	DEFINED	19				
16153	LRC	INTEGER	ARRAY	GENCOM	REFS	7	14					
544	LRVL	INTEGER	ARRAY	GENCOM	REFS	6	14					
272	MR	REAL		POPCOM	REFS	12	16					
366	MRN	INTEGER	ARRAY	POPCOM	REFS	11	16	20				
273	M1	REAL	ARRAY	POPCOM	REFS	12	16					
353	NAF	REAL		POPCOM	REFS	12	16					
256	NC	INTEGER		GENCOM	REFS	6	14					
357	NPT	REAL		POPCOM	REFS	12	16					
257	NSB	INTEGER		GENCOM	REFS	6	14					
271	NTB	REAL		POPCOM	REFS	12	16					
1	POP	INTEGER		GENCOM	REFS	6	14					
326	Q1	REAL	ARRAY	POPCOM	REFS	12	16	19				
260	RD	REAL	ARRAY	GENCOM	REFS	8	14	2*24	2*25	2*26	2*27	2*28
						2*29	2*30	2*31	2*32	2*33	2*34	
2	ROP	INTEGER		GENCOM	REFS	6	14					
16161	RS	LOGICAL		GENCOM	REFS	5	14					
370	SB	LOGICAL		POPCOM	REFS	9	16					
16150	SCN	INTEGER	ARRAY	GENCOM	REFS	6	14					
3	SOP	INTEGER		GENCOM	REFS	6	14					
354	THETA	REAL		POPCOM	REFS	12	16					
5	TIT1	INTEGER	ARRAY	POPCOM	REFS	10	16	19				
247	TIT2	INTEGER	ARRAY	POPCOM	REFS	10	16					
16156	VBT	INTEGER	ARRAY	GENCOM	REFS	7	14					
13200	WAL	REAL	ARRAY	GENCOM	REFS	8	14					
14564	WCL	REAL	ARRAY	GENCOM	REFS	8	14					
152	WGI	LOGICAL	ARRAY	GENCOM	REFS	5	14					
6	WGR	LOGICAL	ARRAY	GENCOM	REFS	5	14					
70	WGS	LOGICAL	ARRAY	GENCOM	REFS	5	14					
234	WGW	LOGICAL	ARRAY	GENCOM	REFS	5	14					
5	WOP	INTEGER		GENCOM	REFS	6	14					

***** 804 *****

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```
115         C     SET INTEGRATION LOAD INDEX
                  N= SPI(I)
                  IF(.NOT.WGI(N))   GO TO 50
            C     SET WINDTUNNEL LOAD INDEX IF DEFINED
                  M= SPW(I)
120               IF(M.EQ.0)      GO TO 520
                  IF(WOP.EQ.0)    GO TO 510
                  IF(WGW(M))      GO TO 520
            C     WINDTUNNEL LOAD OUTPUT SUPPRESSED
              510 M= 0
125         C     INIALIZE INDEX FOR LEFT SIDE LOAD
              520 RS= .FALSE.
                  LR= 0
                  PRINT 5200
             5200 FORMAT(*1*/* SUMMARY  PRINT  OPTION*)
130         C     PRINT CASE DATA
                  DO 54 IC=1,NC
               54 CALL CHEAD
            C     PRINT SURFACE/AXIS DATA
                  JJ= SC(N)+1
135               PRINT 5400,   N,(SANAME(L,N),L=1,4),BTC(N),SCN(JJ),
                 1                SREF(N),BREF(N),CREF(N)
             5400 FORMAT(/////* SAN=*,I3,3X,4A4,14X,*ITC=*,I2,4X,*SC= *,A3,13X,
                 1          *SREF=*,F10.3,5X,*BREF=*,F10.2,5X,*CREF=*,F10.2/)
                  IF(M.NE.0)   PRINT 5401,   M
140          5401 FORMAT(**,*WLN=*,I3/)
            C     PRINT HEADER INFO
                  IF(SC(N).EQ.0.AND..NOT.RS)   PRINT 5500
                  IF(SC(N).EQ.1)               PRINT 5501
                  PRINT 5502
145               IF(M.NE.0)                   PRINT 5503
             5500 FORMAT(*-*,*LEFT SIDE *)
             5501 FORMAT(*-*,*CENTERLINE*)
             5502 FORMAT(**,T17,*PRESSURE INTEGRATED LOADS*,11X,*COEFFICIENTS*)
             5503 FORMAT(**,T80,*WIND TUNNEL DERIVED LOADS*,14X,*COEFFICIENTS*)
150               PRINT 5510
                  IF(M.NE.0)   PRINT 5511
                  PRINT 5520
                  IF(M.NE.0)   PRINT 5521
             5510 FORMAT(*0*,*CASE       V          B          T*,
155                1          *         CV         CB         CT*)
             5511 FORMAT(**,T80,          *V         B          T*,
                 1          *         CV         CB         CT*)
             5520 FORMAT(* *,*            KIPS       IN-KIPS    IN-KIPS*)
             5521 FORMAT(**,T79,          *KIPS      IN-KIPS    IN-KIPS*)
160         C     RIGHT SIDE RECYCLE ENTRY POINT
            C     RESET INDEX FOR RIGHT SIDE OR CENTERLINE LOAD
              560 IF(RS.OR.SC(N).EQ.1)   LR= 3
            C     PRINT V,B,T,CV,CB,CT FOR EACH CASE
                  DO 57 IC=1,NC
165         C     SKIP RIGHT SIDE LOADS IF SYMMETRIC MOTION
                  IF(RS.AND.IMR(IC).EQ.1)   GO TO 57
                  PRINT 5700,   IC,(FAL(IC,N,K+LR),K=1,3),(FCL(IC,N,K+LR),K=1,3)
            C     PRINT WINDTUNNEL LOADS IF DEFINED
                  IF(M.EQ.0)   GO TO 57
170               PRINT 5701,       (WAL(IC,M,K+LR),K=1,3),(WCL(IC,M,K+LR),K=1,3)
             5700 FORMAT(*0*,I2,2X,-3P,3F12.3,0P,3F10.6)
```

```
      991 PRINT 9910
          GO TO 998
      992 PRINT 9920
     9900 FORMAT(///* EOF ENCOUNTERED ON GDTAPE - PROGRAM TERMINATED*)
     9910 FORMAT(///* CARD INPUT ERROR DETECTED - PROGRAM TERMINATED*)
     9920 FORMAT(///* GDTAPE TRAILER RECORD ENCOUNTERED - *,
     1          *CAN NOT FIND REQUESTED BODY - PROGRAM TERMINATED*)
      998 GOP= 9
      999 REWIND 20
          RETURN
          END
```

```
115          4000 FORMAT(* *,I2,1X,I2,2X,3F10.2,F12.4,      3(-3PF12.3),2X,0P,
                 1                    F12.4,      3(-3PF12.3))
             4001 FORMAT(* *,I2,1X,I2,2X,3F10.2,F12.4,      3(-3PF12.3))
               40 CONTINUE
               30 CONTINUE
120          C     TOTAL LOADS, LOADS PER QBAR, AND COEFFICIENTS
                   IF(IOP.EQ.2)   GO TO 450
             C     CHECK FOR NEW PAGE
                   IF((LU+7).LE.66)   GO TO 430
                   PRINT 1000
125                PRINT 2000,    N,(SANAME(L,N),L=1,4)
                   IF(SC(N).EQ.0)   PRINT 4100
                   IF(SC(N).NE.0)   PRINT 4101
             4100 FORMAT(*+*,T59*V-L        B-L         T-L  *,
                 1          T109*V-R        B-R         T-R  */
130              2           T59*KIPS     IN-KIPS     IN-KIPS*,
                 3          T109*KIPS     IN-KIPS     IN-KIPS*)
             4101 FORMAT(*+*,T59*V-R        B-R         T-R  */
                 1           T59*KIPS     IN-KIPS     IN-KIPS*)
              430 DO 45 L=1,6
135            45 FCL(IC,N,L) = FAL(IC,N,L)/(Q1(IC))
                   IF(SC(N).EQ.0) PRINT 4300, (FAL(IC,N,L),L=1,6),(FCL(IC,N,L),L=1,6)
                   IF(SC(N).NE.0) PRINT 4301, (FAL(IC,N,L),L=4,6),(FCL(IC,N,L),L=4,6)
             4300 FORMAT(///T22,*TOTAL  INTEGRATED  LOADS*,T51,-3P,3F12.3,14X,3F12.3
                 1        //T22,*TOTAL  LOADS  PER  QBAR *,T51,3F12.6,14X,3F12.6)
140          4301 FORMAT(///T22,*TOTAL  INTEGRATED  LOADS*,T51,-3P,3F12.3
                 1        //T22,*TOTAL  LOADS  PER  QBAR *,T51,    3F12.6)
              450 FCL(IC,N,1) = FAL(IC,N,1) / (Q1(IC)*SREF(N))
                   FCL(IC,N,4) = FAL(IC,N,4) / (Q1(IC)*SREF(N))
                   FCL(IC,N,2) = FAL(IC,N,2) / (Q1(IC)*SREF(N)*BREF(N))
145                FCL(IC,N,5) = FAL(IC,N,5) / (Q1(IC)*SREF(N)*BREF(N))
                   FCL(IC,N,3) = FAL(IC,N,3) / (Q1(IC)*SREF(N)*CREF(N))
                   FCL(IC,N,6) = FAL(IC,N,6) / (Q1(IC)*SREF(N)*CREF(N))
                   IF(IOP.EQ.2)   GO TO 20
                   IF(SC(N).EQ.0)   PRINT 4500,   (FCL(IC,N,L),L=1,6)
150                IF(SC(N).NE.0)   PRINT 4501,   (FCL(IC,N,L),L=4,6)
             4500 FORMAT( / T22,*TOTAL  LOAD  COEFFICIENTS*,T51,3F12.6,T101,3F12.6)
             4501 FORMAT( / T22,*TOTAL  LOAD  COEFFICIENTS*,T51,3F12.6)
                   GO TO 20
              500 PRINT 1000
155                PRINT 5000,    (SABODY(L,N),L=1,2),N,(SANAME(L,N),L=1,4)
             5000 FORMAT(////,10X,*CAN NOT FIND CPBODY NAMED   *,2A4,5X,*FOR SAN= *,
                 1       I2,5X,4A4)
             C     READY FOR NEXT SURFACE/AXIS DEFINITION
               20 CONTINUE
160          C     ADDITIONAL LOADS OPTION
                   IF(NALD.EQ.0)   GO TO 800
                   DO 60 I=1,NALD
                   REWIND 50
             C     READ NEXT ADDITIONAL LOAD DEFINITION
165                READ(20)   N,(SANAME(L,N),L=1,4),BTC(N),SC(N),
                  1           NT,SREF(N),BREF(N),CREF(N)
             C     READ AND STORE COMPONENT TERMS
                   DO 62 J=1,NT
                   READ(20)   CN,CL,CT,C
170              62 WRITE(50)  CN,CL,CT,C
             C     CHECK FOR LOAD TO BE SKIPPED
```

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VARIABLES	SN	TYPE	RELOCATION			
361	XC	REAL	POPCOM	REFS	13	16
365	XR	REAL	POPCOM	REFS	13	16
356	YR	REAL	POPCOM	REFS	12	16

FILE NAMES	MODE								
OUTPUT	FMT	WRITES	19	20	24	25	26	27	28	29
			30	31	32	33	34			

STATEMENT LABELS			DEF LINE	REFERENCES
155	1001	FMT	21	19
166	1002	FMT	23	20
245	1003	FMT	35	24
251	1004	FMT	36	25
255	1005	FMT	37	26
261	1006	FMT	38	27
265	1007	FMT	39	28
271	1008	FMT	40	29
275	1009	FMT	41	30
305	1010	FMT	43	32
311	1011	FMT	44	33
315	1012	FMT	45	34
301	1013	FMT	42	31

COMMON BLOCKS	LENGTH	MEMBERS - BIAS	NAME	(LENGTH)								
GENCOM	7282	0	GOP	(1)	1	POP	(1)	2	ROP	(1)		
		3	SOP	(1)	4	IOP	(1)	5	WOP	(1)		
		6	WGR	(50)	56	WGS	(50)	106	WGI	(50)		
		156	WGW	(14)	170	AC	(4)	174	NC	(1)		
		175	NSB	(1)	176	RD	(180)	356	LRVL	(4)		
		360	FAL	(2700)	3060	FCL	(2700)	5760	WAL	(756)		
		6516	WCL	(756)	7272	SCN	(2)	7274	IC	(1)		
		7275	LRC	(3)	7278	VBT	(3)	7281	RS	(1)		
POPCOM	249	0	DN	(1)	1	DUMMY	(4)	5	TIT1	(162)		
		167	TIT2	(18)	185	NTB	(1)	186	MR	(1)		
		187	M1	(9)	196	A1	(9)	205	B1	(9)		
		214	Q1	(9)	223	INTB	(1)	224	IMR	(9)		
		233	CPBODY	(2)	235	NAF	(1)	236	THETA	(1)		
		237	INAF	(1)	238	YR	(1)	239	NPT	(1)		
		240	INPT	(1)	241	XC	(1)	242	CPS	(1)		
		243	CPR	(1)	244	CPL	(1)	245	XR	(1)		
		246	MRN	(2)	248	SB	(1)					

STATISTICS

PROGRAM LENGTH	323B	211
CM LABELED COMMON LENGTH	16553B	7531

***** C04 *****

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```
 5701 FORMAT(*+*,T72  ,-3P,3F12.3,0P,3F10.6)
   57 CONTINUE
C     CHECK FOR RIGHT SIDE LOAD RECYCLE
175   IF(RS.OR.SC(N).EQ.1)   GO TO 50
C     TEST FOR SYMMETRIC MOTION - ALL CASES
      DO 58 IC=1,NC
      IF(IMR(IC).NE.1)   GO TO 580
   58 CONTINUE
180   GO TO 590
C     RECYCLE FOR RIGHT SIDE - ASYMMETRIC CASES ONLY
  580 RS= .TRUE.
      PRINT 5800
 5800 FORMAT(///* RIGHT SIDE LOADS FOR ASYMMETRIC CASES*)
185   GO TO 560
C     MESSAGE FOR ALL CASES SYMMETRIC
  590 PRINT 5900
 5900 FORMAT(///* RIGHT SIDE LOADS = LEFT SIDE   *,
     1         *(SYMMETRIC MOTION FOR ALL CASES)*)
190 C     READY FOR NEXT SUMMARY PRINT DEFINITION
   50 CONTINUE
C     RETURN TO 6 LINES/INCH
      PRINT 5001
 5001 FORMAT(*S*)
195   999 STOP
      END
```

SUBROUTINE GOPSR 73/74 OPT=1 FTN 4.2+75060 07/29/81 16.31.29. PAGE 11

SYMBOLIC REFERENCE MAP (R=3)

ENTRY POINTS DEF LINE REFERENCES
1 GOPSR 1 523

VARIABLES SN TYPE RELOCATION

252	AC	INTEGER	ARRAY	GENCOM	REFS	13	20					
15106	AP	REAL	ARRAY		REFS	10	254	255	412	DEFINED	229	
3612	AR	REAL			REFS	254	258	DEFINED	251	254		
3613	AY	REAL			REFS	255	258	DEFINED	252	255		
1062	BARM	REAL		GOPCOM	REFS	19	22	46	211	213	215	416
						432	434	DEFINED	45	189	201	403	408
						413						
705	BREF	REAL	ARRAY	GOPCOM	REFS	18	22	37	91	100	130	133
						265	268	457	459	462	478	
					DEFINED	35	88	100	447	457		
456	BTC	INTEGER	ARRAY	GOPCOM	REFS	16	22	37	91	2*98	119	120
						121	130	133	144	145	146	147	265
						268	459	462	478	DEFINED	35	88	447
						452						
1072	C	REAL	ARRAY	GOPCOM	REFS	19	22	489	499	502	505	
					DEFINED	482						
1051	CAVG	REAL		GOPCOM	REFS	18	22	37	130	265		
					DEFINED	24	35					
15416	CB	REAL	ARRAY		REFS	10	DEFINED	229				
3614	CID	INTEGER	ARRAY		REFS	5	74	DEFINED	69			
1070	CL	INTEGER		GOPCOM	REFS	17	22	2*487	489	499	2*502	505
					DEFINED	482						
1067	CN	INTEGER		GOPCOM	REFS	17	22	485	2*486	489	498	499
					2*502	505	DEFINED	482				
767	CREF	REAL	ARRAY	GOPCOM	REFS	18	22	37	91	101	130	133
						265	268	458	459	462	478	
					DEFINED	35	88	101	447	458		
1056	CROW	REAL		GOPCOM	REFS	18	22	42	163	312		
					DEFINED	24	41					
1071	CT	INTEGER		GOPCOM	REFS	17	22	2*488	489	499	2*502	505
					DEFINED	482						
4262	DRDX	REAL	ARRAY		REFS	8	DEFINED	154				
3555	DUM	REAL			REFS	7	DEFINED	2*69	103			
3572	DX	REAL			REFS	8	178	179	199	DEFINED	176	177
						198						
4426	DYDX	REAL	ARRAY		REFS	8	DEFINED	154				
4572	DZDX	REAL	ARRAY		REFS	8	DEFINED	154				
1053	ETA	REAL		GOPCOM	REFS	18	22	42	163	312		
					DEFINED	24	41					
550	FAL	REAL	ARRAY	GENCOM	REFS	15	20					
5764	FCL	REAL	ARRAY	GENCOM	REFS	15	20					
0	GOP	INTEGER		GENCOM	REFS	13	20	27	57	61	132	164
						214	267	313	433	461	477	490	504
					DEFINED	521						
3605	I	INTEGER			REFS	71	DEFINED	34	65	446		
3547	IBN	INTEGER			REFS	6	DEFINED	103				
3543	IBTC	INTEGER			REFS	6	106	116	119	120	121	
					DEFINED	103						
16152	IC	INTEGER		GENCOM	REFS	20						
3546	ICBN	INTEGER			REFS	6	DEFINED	103				
3542	IFN	INTEGER			REFS	6	73	DEFINED	69			

```
                IF(.NOT.WGI(N))   GO TO 60
              C     PROCESS THIS LOAD
                    RS= .FALSE.
  175         C     RIGHT SIDE RECYCLE ENTRY POINT FOR NT .GT. 15
              C     SUPPRESS PRINTING IF IOP=2
                620 IF(IOP.EQ.2)   GO TO 640
                    PRINT 6200
               6200 FORMAT(*1*/* ADDITIONAL LOADS OPTION*)
  180           C     PRINT CASE DATA HEADER
                    CALL CHEAD
              C     PRINT SURFACE/AXIS DATA
                    JJ= SC(N)+1
                    PRINT 6250,   N,(SANAME(L,N),L=1,4),BTC(N),SCN(JJ),
  185                1             NT,SREF(N),BREF(N),CREF(N)
               6250 FORMAT(// * SAN= *,I2,2X,4A4,22X,*ITC=*,I1,3X,*SC=*,A3,3X,*NT=*,I3
                   1       ,T88,*SREF=*,F10.3,3X,*BREF=*,F8.2,3X,*CREF=*,F8.2)
                    IF(SC(N).EQ.0.AND..NOT.RS)   PRINT 6300
                    IF(SC(N).EQ.1)               PRINT 6301
  190           C     RIGHT SIDE RECYCLE ENTRY POINT FOR NT .LE. 15
                630 IF(IOP.EQ.2)   GO TO 640
                    IF(SC(N).EQ.0.AND.RS)        PRINT 6302
               6300 FORMAT(//* LEFT SIDE *)
               6301 FORMAT(//* CENTERLINE*)
  195          6302 FORMAT(//* RIGHT SIDE*)
              C     PRINT COLUMN HEADER
                    PRINT 6350
               6350 FORMAT(*0*,   7X,*COMPONENT DESCRIPTION     VALUE    V FACTOR  *,
                   1           *B FACTOR  T FACTOR      V KIPS   B IN-KIPS   *,
  200              2           *T IN-KIPS     CV         CB        CT*/)
              C     SET LOAD INDEX FOR LEFT OR RIGHT SIDE
                640 LR= 0
                    IF(RS.OR.SC(N).EQ.1)   LR= 3
                    REWIND 50
  205           C     PROCESS EACH COMPONENT TERM
                    DO 65 J=1,NT
              C     CHECK FOR NEW PAGE AND HEADER
                    IF(IOP.EQ.2)   GO TO 655
                    IF(J.EQ.041.OR.J.EQ.081.OR.J.EQ.121)   GO TO 650
  210               IF(J.EQ.161.OR.J.EQ.201.OR.J.EQ.241)   GO TO 650
                    GO TO 655
                650 PRINT 6200
                    PRINT 6500,   N,(SANAME(L,N),L=1,4)
               6500 FORMAT(// * SAN= *,I2,2X,4A4)
  215               IF(SC(N).EQ.0.AND..NOT.RS)   PRINT 6300
                    IF(SC(N).EQ.1)               PRINT 6301
                    IF(SC(N).EQ.0.AND.RS)        PRINT 6302
                    PRINT 6350
              C     READ NEXT COMPONENT DEFINITION
  220           655 READ(50)   CN,CL,CT,C
              C     SET UP COMPONENT INDICES
                    IF(CN.EQ.0)   GO TO 660
                    IF(CL.EQ.1.AND.RS)   CL=2
                    LC= CT
  225               IF(CL.GE.2)   LC= CT+3
                    CV= FAL(IC,CN,LC)
              C     SPECIAL CASE FOR CONSTANTS
                660 IF(CN.EQ.0)   CV= 1.0
```

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SUBROUTINE WOPSR      73/74   OPT=1                    FTN 4.2+75060      07/29/81  16.31.57.      PAGE     1

                      SUBROUTINE WOPSR
                C
                C     COMPUTES RIGID LOAD DATA FROM WIND TUNNEL AIRLOAD COEFFICIENTS
                C
 5                    INTEGER TIT3(18),WTN,WTNAME(4),NSEQ(15),DES(3,15)
                      REAL CPER(3,15),R(15),CTOT(3),LTOT(3)
                      LOGICAL WGR(50),WGS(50),WGI(50),WGW(14),RS
                      INTEGER GOP,POP,ROP,SOP,IOP,WOP,AC(2,2),NC,NSB,LRVL(4),SCN(2)
                      INTEGER LRC(3),VBT(3)
10                    REAL RD(20,9),FAL(9,50,6),FCL(9,50,6),WAL(9,14,6),WCL(9,14,6)
                      COMMON/GENCOM/GOP,POP,ROP,SOP,IOP,WOP,WGR,WGS,WGI,WGW,AC,NC,NSB,
                     1       RD,LRVL,FAL,FCL,WAL,WCL,SCN,IC,LRC,VBT,RS
                      REWIND 40
                      IF(NC.NE.0)   GO TO 300
15              C
                C     CREATE AIRLOAD COEFFICIENT FILE FROM CARDS
                C
                      READ(1,1000)  TIT3
                      WRITE(40)     TIT3
20               1000 FORMAT(18A4)
                  100 READ(1,1001)  WTN,WTNAME,SWT,BWT,CWT,XHT,YHT,XVT,ZVT
                 1001 FORMAT(I2,2X,4A4,3F10.0,2X,4F7.0)
                      IF(EOF(1).NE.0.0)   RETURN
                      WRITE(40)     WTN,WTNAME,SWT,BWT,CWT,XHT,YHT,XVT,ZVT
25                    DO 10 I=1,15
                      READ(1,1002)  NSEQ(I),(CPER(J,I),J=1,3),(DES(J,I),J=1,3)
                   10 WRITE(40)     NSEQ(I),(CPER(J,I),J=1,3),(DES(J,I),J=1,3)
                 1002 FORMAT(5X,I5,3E10.2,2X,3A7)
                      GO TO 100
30              C
                C     COMPUTE LOADS/COEFFICIENTS FOR ALL CASES
                C
                  300 DO 30 IC=1,NC
                      A  = RD(1,IC)
35                    B  = RD(2,IC)
                      Q  = RD(3,IC)
                      V  = RD(4,IC)
                      AB = RD(1,IC) * RD(2,IC)
                      DA = RD(13,IC)
40                    DE = RD(14,IC)
                      DRU= RD(15,IC)
                      DRL= RD(16,IC)
                      DSL= RD(17,IC)
                      DSR= RD(18,IC)
45                    IF(V.EQ.0.0)   V=1.0
                      REWIND 40
                      READ(40)      TIT3
                   400 READ(40)     WTN,WTNAME,SWT,BWT,CWT,XHT,YHT,XVT,ZVT
                      IF(EOF(40).NE.0.0)   GO TO 30
50                    DO 40 I=1,15
                    40 READ(40)     NSEQ(I),(CPER(J,I),J=1,3),(DES(J,I),J=1,3)
                      IF((WTN.EQ.1).AND.(.NOT.WGW(1)))   GO TO 400
                      IF((WTN.EQ.2).AND.(.NOT.WGW(3)))   GO TO 400
                      IF((WTN.EQ.3).AND.(.NOT.WGW(5)))   GO TO 400
55                    IF((WTN.EQ.4).AND.(.NOT.WGW(6)))   GO TO 400
                      IF((WTN.EQ.5).AND.(.NOT.WGW(7)))   GO TO 400
                      IF((WTN.EQ.6).AND.(.NOT.WGW(9)))   GO TO 400
```

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SYMBOLIC REFERENCE MAP (R=3)

ENTRY POINTS DEF LINE REFERENCES
16463 FLIP 22

VARIABLES SN TYPE RELOCATION

252	AC	INTEGER ARRAY	GENCOM	REFS	28	40						
304	A1	REAL ARRAY	POPCOM	REFS	38	44						
1062	BARM	REAL	GOPCOM	REFS	34	42						
705	BREF	REAL ARRAY	GOPCOM	REFS	33	42	135	DEFINED	48			
456	BTC	INTEGER ARRAY	GOPCOM	REFS	31	42	135	DEFINED	49			
315	B1	REAL ARRAY	POPCOM	REFS	38	44						
1072	C	REAL ARRAY	GOPCOM	REFS	34	42						
1051	CAVG	REAL	GOPCOM	REFS	33	42						
1070	CL	INTEGER	GOPCOM	REFS	32	42						
1067	CN	INTEGER	GOPCOM	REFS	32	42						
351	CPBODY	INTEGER ARRAY	POPCOM	REFS	36	44						
364	CPL	REAL	POPCOM	REFS	39	44						
363	CPR	REAL	POPCOM	REFS	39	44						
362	CPS	REAL	POPCOM	REFS	39	44						
767	CREF	REAL ARRAY	GOPCOM	REFS	33	42	135	DEFINED	48			
1056	CROW	REAL	GOPCOM	REFS	33	42						
1071	CT	INTEGER	GOPCOM	REFS	32	42						
0	DN	INTEGER	POPCOM	REFS	36	44						
1	DUMMY	INTEGER ARRAY	POPCOM	REFS	36	44						
1053	ETA	REAL	GOPCOM	REFS	33	42						
550	FAL	REAL ARRAY	GENCOM	REFS	30	40	167	DEFINED	46			
5764	FCL	REAL ARRAY	GENCOM	REFS	30	40	167	DEFINED	46			
0	GOP	INTEGER	GENCOM	REFS	28	40	78	80	DEFINED	61		
17367	I	INTEGER		REFS	2*70	72	74	89	92	93	94	
					116	119	DEFINED	69	89	114		
16152	IC	INTEGER	GENCOM	REFS	40	166	3*167	2*170	178			
				DEFINED	131	164	177					
340	IMR	INTEGER ARRAY	POPCOM	REFS	36	44	166	178				
355	INAF	INTEGER	POPCOM	REFS	37	44						
360	INPT	INTEGER	POPCOM	REFS	37	44						
337	INTB	INTEGER	POPCOM	REFS	36	44						
4	IOP	INTEGER	GENCOM	REFS	28	40	63	105	109			
				DEFINED	61							
17371	J	INTEGER		REFS	89	2*94	DEFINED	89				
17375	JJ	INTEGER		REFS	135	DEFINED	134					
17372	K	INTEGER		REFS	94	2*167	2*170	DEFINED	93	2*167	2*170	
17376	L	INTEGER		REFS	135	DEFINED	135					
17374	LR	INTEGER		REFS	2*167	2*170	DEFINED	127	162			
16153	LRC	INTEGER ARRAY	GENCOM	REFS	29	40	DEFINED	53				
544	LRVL	INTEGER ARRAY	GENCOM	REFS	28	40	DEFINED	51				
17373	M	INTEGER		REFS	120	122	2*139	145	151	153	169	
				2*170	DEFINED	119	124					
272	MR	REAL	POPCOM	REFS	38	44						
366	MRN	INTEGER ARRAY	POPCOM	REFS	37	44	DEFINED	54				
273	M1	REAL ARRAY	POPCOM	REFS	38	44						
1	N	INTEGER	GOPCOM	REFS	31	42	117	134	6*135	142	143	
				162	2*167	175	DEFINED	116				
353	NAF	REAL	POPCOM	REFS	38	44						
1065	NALD	INTEGER	GOPCOM	REFS	32	42						
256	NC	INTEGER	GENCOM	REFS	28	40	106	131	164	177		
				DEFINED	57	96						

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VARIABLES	SN	TYPE		RELOCATION								
4	IOP	INTEGER		GENCOM	REFS	13	20					
3607	J	INTEGER			REFS	174	3*176	3*177	178	179	199	2*203
					2*241	3*242	3*243	248	254	2*255	256	3*282
					3*283	3*289	300	4*318	4*321	332	334	335
					2*337	6*339	342	344	345	2*347	2*349	6*351
					354	356	357	2*359	6*361	2*364	366	368
					369	2*371	6*373	412	413	414	3*491	3*492
					499	502	DEFINED	40	173	240	247	281
					288	298	481					
3552	JJ	INTEGER			REFS	6	107	116	417	418	419	420
					421	422	423	464	DEFINED	106	115	316
					324	377	383	384	390	391	397	398
					454							
3610	K	INTEGER			REFS	2*235	2*236	2*237	2*238	2*241	3*242	3*243
					3*282	3*283	327	328	329	DEFINED	44	234
					280	326						
3606	L	INTEGER			REFS	2*35	2*37	2*88	2*91	2*130	2*133	5*154
					7*229	2*265	2*268	447	459	462	478	502
					DEFINED	2*35	2*37	2*88	2*91	2*130	2*133	2*154
					3*229	2*265	2*268	447	459	462	478	502
3603	LA	REAL			REFS	11	2*282	2*283	DEFINED	279		
3604	LAD	REAL			REFS	11	273	279	DEFINED	271		
16153	LRC	INTEGER	ARRAY	GENCOM	REFS	14	20	502				
544	LRVL	INTEGER	ARRAY	GENCOM	REFS	13	20					
3611	M	INTEGER			REFS	14*229	DEFINED	229				
3554	MN	REAL			REFS	7	DEFINED	69				
3571	MRC	REAL			REFS	8	144	145	146	147	201	
					DEFINED	137						
1	N	INTEGER		GOPCOM	REFS	16	22	7*35	8*37	6*88	7*91	2*97
					2*98	2*99	2*100	2*101	103	2*109	2*114	115
					119	120	121	8*130	8*133	144	145	146
					147	8*265	8*268	6*447	2*451	452	2*453	454
					2*456	2*457	2*458	7*459	6*462	470	471	7*478
					DEFINED	35	88	447				
1065	NALD	INTEGER		GOPCOM	REFS	17	22	32	56	64	85	445
					446	DEFINED	31	55				
3666	NB	INTEGER	ARRAY		REFS	5	2*109	DEFINED	103			
256	NC	INTEGER		GENCOM	REFS	13	20					
3545	NCP	INTEGER			REFS	6	106	153	154	159	229	234
					247	280	298	DEFINED	103			
3550	NIB	INTEGER			REFS	6	154	DEFINED	153			
3553	NLP	INTEGER			REFS	6	304	306	DEFINED	297	304	310
1055	NP	INTEGER		GOPCOM	REFS	17	22	42	44	161	163	16
					173	176	177	253	257	DEFINED	41	159
					250	253						
622	NR	INTEGER		GOPCOM	REFS	16	22	37	40	127	130	133
					262	265	268	288	297	DEFINED	35	126
					260							
3664	NRB	INTEGER	ARRAY		REFS	5	DEFINED	103				
0	NSAD	INTEGER		GOPCOM	REFS	16	22	32	34	56	59	64
					65	DEFINED	31	55				
257	NSB	INTEGER		GENCOM	REFS	13	20					
1066	NT	INTEGER		GOPCOM	REFS	17	22	455	459	464	478	481
					DEFINED	447						
3551	NV	INTEGER			REFS	6	333	334	335	338	339	340
					343	344	345	350	351	352	355	356
					357	360	361	362	367	368	369	372

```
      C     COMPUTE COMPONENT V,B,T,CV,CB,CT
230           PL(1)= CV*C(1)
              PL(2)= CV*C(2)
              PL(3)= CV*C(3)
              PL(4)= PL(1) / (Q1(IC)*SREF(N))
              PL(5)= PL(2) / (Q1(IC)*SREF(N)*BREF(N))
235           PL(6)= PL(3) / (Q1(IC)*SREF(N)*CREF(N))
      C     COMPUTE RUNNING TOTALS
              DO 67 K=1,3
              LN= LR+K
              FAL(IC,N,LN)= FAL(IC,N,LN) + PL(K)
240        67 FCL(IC,N,LN)= FCL(IC,N,LN) + PL(K+3)
      C     PRINT COMPONENTS
              IF(IOP.EQ.2)   GO TO 65
              IF(CN.NE.0)   PRINT 6700,   J,CN,(SANAME(L,CN),L=1,4),
             1                LRC(CL),VBT(CT),CV,C,PL
245           IF(CN.EQ.0)   PRINT 6701,   J,CN,CV,C,PL
         6700 FORMAT(* *,2I3,1X,4A4,1X,A2,1X,A1,-3PF12.3,0P,3F10.3,-3P,3F12.3,
             1          0P,3F10.6)
         6701 FORMAT(* *,2I3,* CONSTANTS*,12X,F12.3,3F10.3,3F12.3,3F10.6)
           65 CONTINUE
250   C     PRINT TOTAL LOADS AND COEFFICIENTS
              IF(IOP.EQ.2)   GO TO 680
              PRINT 6800,   (FAL(IC,N,K+LR),K=1,3),(FCL(IC,N,K+LR),K=1,3)
         6800 FORMAT(// T32,*TOTAL  LOADS  AND  COEFFICIENTS*,T72,-3P,3F12.3,
             1          0P,3F10.6//)
255   C     CHECK FOR RIGHT SIDE LOAD RECYCLE
          680 IF(RS.OR.SC(N).EQ.1)   GO TO 60
              IF(IMR(IC).EQ.1)       GO TO 690
      C     RECYCLE FOR RIGHT SIDE
              RS= .TRUE.
260           IF(NT.GT.15)   GO TO 620
              IF(NT.LE.15)   GO TO 630
      C     SYMM MOTION   SET RIGHT SIDE EQUAL TO LEFT
          690 DO 69 K=1,3
              FAL(IC,N,K+3)= FAL(IC,N,K)
265        69 FCL(IC,N,K+3)= FCL(IC,N,K)
              IF(IOP.EQ.2)   GO TO 60
              PRINT 6900
         6900 FORMAT(*++*,*RIGHT SIDE LOADS = LEFT SIDE (SYMMETRIC MOTION)*)
      C     GO TO NEXT ADDITIONAL LOAD DEFINITION
270        60 CONTINUE
      C     CLOSE OUT THIS CASE
          800 IF(IOP.EQ.2.AND.IC.NE.1)   GO TO 820
              PRINT 1000
              IF NALD.NE.0)   PRINT 8000
275       8000 FORMAT(*++*,23X,*AND    ADDITIONAL  LOADS  OPTION*//)
           820 PRINT 8200,   IC
          8200 FORMAT(*--*,*CASE *,I2,*  COMPLETE*)
      C     READY FOR NEXT CASE
            10 CONTINUE
280           RETURN
              END
```

```
      IF((WTN.EQ.4).AND.(   . WGW(5)))   GO TO 500
C
C     PRINT CASE DATA FOR DESIRED SURFACE
C
      PRINT 4000,   IC,TIT3,A,B,Q
 4000 FORMAT(*1*,T2*WIND  TUNNEL  OPTION*//T2*CASE  *,I1,5X,18A4,T91
     1       *ALPHA=*,F8.4,*   BETA=*,F8.4,*   QBAR=*,F7.2)
      PRINT 4001,   RD(7,IC),RD(8,IC),RD(9,IC),DSL,DSR,DRU,DRL,DE,DA,V
 4001 FORMAT(T14*P=*,F6.1,*  Q=*,F5.1,*  R=*,F5.1,*   DSL=*,F5.1,
     1       *  DSR=*,F5.1,*   DRU=*,F6.2,*  DRL=*,F6.2,6X,*DE=*,F8.4,
     2       5X,*DA=*,F8.4,*    TAS=*,F7.2)
  500 PRINT 5000,    WTN,WTNAME,SWT,BWT,CWT
 5000 FORMAT( //* WTN= *,I2,2X,4A4,4X,*SREF=*,F10.3,4X,*  BREF=*,F8.2,
     1       4X,*CREF=*,F8.2)
      IF(WTN.EQ.6)  PRINT 5001,   XHT,YHT,XVT,ZVT
 5001 FORMAT(*+*,T88*XHT=*,F6.2,*   YHT=*,F6.2,
     1          3X,*XVT=*,F6.2,*   ZVT=*,F6.2)
      IF(WTN.GE.1.AND.WTN.LE.6)   GO TO 600
      PRINT 5010,   WTN
 5010 FORMAT(////* WTN=*,I3,*  IS ILLEGAL....GOING TO NEXT SURFACE*)
      GO TO 400
  600 PD= (RD(7,IC)*BWT)/(V*12.0)
      QD= (RD(8,IC)*CWT)/(V*24.0)
      YD= (RD(9,IC)*BWT)/(V*12.0)
      AD= (RD(5,IC)*CWT)/(V*24.0)
C
C     SET UP CONTROL DATA FOR DIFFERENT SURFACES
C
      GO TO (610,620,630,630,650,660) WTN
C     WING - LEFT HAND
  610 NSA=1
      IS= 1
      JA= 0
      NF= 1
      NL=10
      R(1) = 1.0
      R(2) = A
      R(3) = AD
      R(4) = DSL
      R(5) = PD
      R(6) = QD
      R(7) = B
      R(8) = AB
      R(9) = B
      R(10)= AB
      DO 61 I=1,3
   61 CPER(I,4)=  -(CPER(I,4))
      GO TO 700
C     HORIZ TAIL - LEFT HAND
  620 NSA=3
      IS= 1
      JA= 0
      NF= 1
      NL=10
      R(1) = 1.0
      R(2) = A
      R(3) = DE
```

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VARIABLES	SN	TYPE		RELOCATION								
1055	NP	INTEGER		GOPCOM	REFS	32	42					
357	NPT	REAL		POPCOM	REFS	38	44					
622	NR	INTEGER		GOPCOM	REFS	31	42					
0	NSAD	INTEGER		GOPCOM	REFS	31	42					
257	NSB	INTEGER		GENCOM	REFS	28	40	DEFINED	96			
17370	NSP	INTEGER			REFS	108	114	DEFINED	74			
1066	NT	INTEGER		GOPCOM	REFS	32	42					
271	NTB	REAL		POPCOM	REFS	38	44					
1057	PN	INTEGER	ARRAY	GOPCOM	REFS	32	42					
1	POP	INTEGER		GENCOM	REFS	28	40	81	101	DEFINED	61	
326	Q1	REAL	ARRAY	POPCOM	REFS	38	44					
260	RD	REAL	ARRAY	GENCOM	REFS	30	40	94	DEFINED	55	89	94
1052	RN	INTEGER		GOPCOM	REFS	32	42					
2	ROP	INTEGER		GENCOM	REFS	28	40	DEFINED	61			
16161	RS	LOGICAL		GENCOM	REFS	27	40	142	162	166	175	
					DEFINED	126	182					
312	SABODY	INTEGER	ARRAY	GOPCOM	REFS	31	42	DEFINED	50			
2	SANAME	INTEGER	ARRAY	GOPCOM	REFS	31	42	135	DEFINED	50		
370	SB	LOGICAL		POPCOM	REFS	35	44					
540	SC	INTEGER	ARRAY	GOPCOM	REFS	31	42	134	142	143	162	175
					DEFINED	49						
16150	SCN	INTEGER	ARRAY	GENCOM	REFS	28	40	135	DEFINED	52		
3	SOP	INTEGER		GENCOM	REFS	28	40	DEFINED	61			
1061	SP	REAL		GOPCOM	REFS	34	42					
17377	SPI	INTEGER	ARRAY		REFS	26	72	116	DEFINED	70		
17462	SPW	INTEGER	ARRAY		REFS	26	119	DEFINED	70			
623	SREF	REAL	ARRAY	GOPCOM	REFS	33	42	135	DEFINED	48		
1063	TARM	REAL		GOPCOM	REFS	34	42					
354	THETA	REAL		POPCOM	REFS	38	44					
5	TIT1	INTEGER	ARRAY	POPCOM	REFS	36	44					
247	TIT2	INTEGER	ARRAY	POPCOM	REFS	36	44					
16156	VBT	INTEGER	ARRAY	GENCOM	REFS	29	40	DEFINED	53			
13200	WAL	REAL	ARRAY	GENCOM	REFS	30	40	170	DEFINED	47		
14564	WCL	REAL	ARRAY	GENCOM	REFS	30	40	170	DEFINED	47		
152	WGI	LOGICAL	ARRAY	GENCOM	REFS	27	40	117	DEFINED	56	63	
6	WGR	LOGICAL	ARRAY	GENCOM	REFS	27	40	DEFINED	56			
70	WGS	LOGICAL	ARRAY	GENCOM	REFS	27	40	DEFINED	56			
234	WGW	LOGICAL	ARRAY	GENCOM	REFS	27	40	122	DEFINED	56	64	
5	WOP	INTEGER		GENCOM	REFS	28	40	64	81	85	106	121
					DEFINED	61						
361	XC	REAL		POPCOM	REFS	39	44					
1064	XCN	REAL		GOPCOM	REFS	34	42					
365	XR	REAL		POPCOM	REFS	39	44					
1054	YL	REAL		GOPCOM	REFS	33	42					
356	YR	REAL		POPCOM	REFS	38	44					

FILE NAME		MODE									
0	INPUT										
142	OUTPUT	FMT	WRITES	111	128	135	139	142	143	144	145
			150	151	152	153	167	170	183	187	193
404	PUNCH										
0	TAPE1	FMT	READS	61	63	64	70	89	96		
545	TAPE11										
1610	TAPE12										
2452	TAPE13										
3214	TAPE14										
4756	TAPE15										

***** F01 *****

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VARIABLES	SN	TYPE		RELOCATION								
					373	374	2*376	385	392	423		
					DEFINED	325	333	338	343	350	355	360
					367	372						
3544	NW	INTEGER			REFS	6	106	153	DEFINED	103		
4736	PC	REAL	ARRAY		REFS	9	248	256	300	DEFINED	229	
1057	PN	INTEGER	ARRAY	GOPCOM	REFS	17	22	46	211	213	215	315
					416	432	434	DEFINED	45	168	174	302
					303	315						
1	OP	INTEGER		GENCOM	REFS	13	20					
4116	RCP	REAL	ARRAY		REFS	7	199	DEFINED	154			
260	RD	REAL	ARRAY	GENCOM	REFS	15	20					
1052	RN	INTEGER		GOPCOM	REFS	17	22	42	163	165	249	257
					258	260	301	302	304	310	3*312	3*314
					DEFINED	41	157	246	249	296	301	
2	ROP	INTEGER		GENCOM	REFS	13	20					
16161	RS	LOGICAL		GENCOM	REFS	12	20					
312	SABODY	INTEGER	ARRAY	GOPCOM	REFS	16	22	37	91	2*109	130	133
					265	268	DEFINED	35	88			
2	SANAME	INTEGER	ARRAY	GOPCOM	REFS	16	22	37	91	130	133	265
					268	459	462	478	502	DEFINED	35	88
					447							
540	SC	INTEGER	ARRAY	GOPCOM	REFS	16	22	37	114	115	130	133
					265	268	453	454	459	470	471	478
					DEFINED	35	103	114	447	453		
16150	SCN	INTEGER	ARRAY	GENCOM	REFS	13	20	116	464			
3	SOP	INTEGER		GENCOM	REFS	13	20					
1061	SP	REAL		GOPCOM	REFS	19	22	46	211	213	215	217
					402	403	404	416	432	434	435	
					DEFINED	45	188	199	401	402	407	412
623	SREF	REAL	ARRAY	GOPCOM	REFS	18	22	37	91	99	130	133
					265	268	456	459	462	478		
					DEFINED	35	88	99	447	456		
27310	ST	REAL	ARRAY		REFS	11	383	390	397	3*401	3*403	3*404
					DEFINED	327	380	387	394			
3574	TA	REAL			REFS	8	217	221	435	439		
					DEFINED	66	217	435				
1063	TARM	REAL		GOPCOM	REFS	19	22	46	211	213	215	416
					432	434	DEFINED	45	169	404	409	414
3565	TBL	REAL			REFS	7	DEFINED	154				
19726	TC	REAL	ARRAY		REFS	10	DEFINED	229				
3561	TN	REAL			REFS	7	2*242	2*243	261	DEFINED	103	229
3562	TND	REAL			REFS	7	262	DEFINED	261			
3670	TNP	INTEGER	ARRAY		REFS	6	289	304	310	312	314	
					DEFINED	257						
27226	TYL	REAL	ARRAY		REFS	11	289	312	314	DEFINED	258	
3640	UID	INTEGER	ARRAY		REFS	5	75	DEFINED	69			
1705	UON	INTEGER			REFS	5	81	DEFINED	25			
3541	UOPT	INTEGER			REFS	5	76	81	DEFINED	69		
16156	VBT	INTEGER	ARRAY	GENCOM	REFS	14	20	502				
13200	WAL	REAL	ARRAY	GENCOM	REFS	15	20					
14564	WCL	REAL	ARRAY	GENCOM	REFS	15	20					
152	WGI	LOGICAL	ARRAY	GENCOM	REFS	12	20					
6	WGR	LOGICAL	ARRAY	GENCOM	REFS	12	20					
70	WGS	LOGICAL	ARRAY	GENCOM	REFS	12	20					
234	WGW	LOGICAL	ARRAY	GENCOM	REFS	12	20					
5	WOP	INTEGER		GENCOM	REFS	13	20					
27321	X	REAL	ARRAY		REFS	11	3*380	3*381	3*387	3*388	3*394	3*395

***** F02 *****

NASA DFRC

SYMBOLIC REFERENCE MAP (R=3)

ENTRY POINTS DEF LINE REFERENCES
1 IOPSR 1 280

VARIABLES	SN	TYPE		RELOCATION								
252	AC	INTEGER	ARRAY	GENCOM	REFS	8	20					
304	A1	REAL	ARRAY	POPCOM	REFS	18	24					
1062	BARM	REAL		GOPCOM	REFS	14	22	104	105	112	114	
					DEFINED	82						
705	BREF	REAL	ARRAY	GOPCOM	REFS	13	22	46	144	145	184	234
					DEFINED	165						
456	BTC	INTEGER	ARRAY	GOPCOM	REFS	11	22	44	45	85	184	
					DEFINED	165						
315	B1	REAL	ARRAY	POPCOM	REFS	18	24					
1072	C	REAL	ARRAY	GOPCOM	REFS	14	22	170	230	231	232	243
					245	DEFINED	169	220				
1051	CAVG	REAL		GOPCOM	REFS	13	22					
1070	CL	INTEGER		GOPCOM	REFS	12	22	170	223	225	243	
					DEFINED	169	220	223				
1067	CN	INTEGER		GOPCOM	REFS	12	22	170	222	226	228	3*243
					2*245	DEFINED	169	220				
2075	CP	REAL	ARRAY		REFS	6	102	103	2*112	114		
					DEFINED	87	88	91	92	95	96	97
					98	100						
351	CPBODY	INTEGER	ARRAY	POPCOM	REFS	16	24	44				
364	CPL	REAL		POPCOM	REFS	19	24	91	97	100		
					DEFINED	83						
363	CPR	REAL		POPCOM	REFS	19	24	92	98	DEFINED	83	
362	CPS	REAL		POPCOM	REFS	19	24	87	88	95	96	
					DEFINED	83						
767	CREF	REAL	ARRAY	GOPCOM	REFS	13	22	46	146	147	184	235
					DEFINED	165						
1056	CROW	REAL		GOPCOM	REFS	13	22	DEFINED	66			
1071	CT	INTEGER		GOPCOM	REFS	12	22	170	224	225	243	
					DEFINED	169	220					
2073	CV	REAL			REFS	230	231	232	243	245		
					DEFINED	226	228					
0	DN	INTEGER		POPCOM	REFS	16	24	DEFINED	28	I/O REFS	67	83
1	DUMMY	INTEGER	ARRAY	POPCOM	REFS	16	24					
1053	ETA	REAL		GOPCOM	REFS	13	22	DEFINED	66			
550	FAL	REAL	ARRAY	GENCOM	REFS	10	20	110	135	136	137	142
					143	144	145	146	147	226	239	252
					264	DEFINED	110	239	264			
5764	FCL	REAL	ARRAY	GENCOM	REFS	10	20	136	137	149	150	240
					252	265	DEFINED	135	142	143	144	145
					146	147	240	265				
0	GOP	INTEGER		GENCOM	REFS	8	20					
2063	I	INTEGER			DEFINED	30	162					
16152	IC	INTEGER		GENCOM	REFS	20	28	102	103	2*110	3*135	2*136
					2*137	3*142	3*143	3*144	3*145	3*146	3*147	149
					150	226	233	234	235	2*239	2*240	2*252
					257	2*264	2*265	272	276	DEFINED	26	
340	IMR	INTEGER	ARRAY	POPCOM	REFS	16	24	257				
355	INAF	INTEGER		POPCOM	REFS	17	24					
360	INPT	INTEGER		POPCOM	REFS	17	24					
337	INTB	INTEGER		POPCOM	REFS	16	24					

```
      R(4) = AD
      R(5) = B
      R(6) = DA
      R(7) = DSL
      R(8) = DSR
      R(9) = PD
      R(10)= QD
      DO 62 I=1,3
   62 CPER(I,7)=  -(CPER(I,7))
      GO TO 700
C     VERT TAIL  (SG OR ROOT)
  630 NSA= WTN+2
      IS= 5
      JA= 3
      NF= 1
      NL= 8
      R(1) = B
      R(2) = AB
      R(3) = DA
      R(4) = DSR + DSL
      R(5) = DRU
      R(6) = DRL
      R(7) = PD
      R(8) = YD
      GO TO 700
C     FORWARD FUSELAGE - VERTICAL
  650 NSA=7
      IS= 3
      JA= 3
      NF= 1
      NL= 2
      R(1) = 1.0
      R(2) = A
      GO TO 700
C     AFT FUSELAGE - VERTICAL
  660 NSA=9
      IS= 3
      JA= 3
      NF= 1
      NL= 2
      R(1) = 1.0
      R(2) = A
  700 PRINT 7000
 7000 FORMAT(*0*)
      IF(IS.NE.5)   PRINT 7001,   LRVL(IS)
 7001 FORMAT(* *,A10/)
      PRINT 7002
 7002 FORMAT(*  NSEQ    AERODYNAMIC EFFECT*,7X,*VALUE    CV PER    *,
     1       *CB PER    CT PER      CV         CB        CT        *,
     2       *V KIPS    B IN-KIPS   T IN-KIPS*/)
C
C     COMPUTE COMPONENT COEFFICIENTS AND LOADS
C
      DO 70 I=NF,NL
      DO 72 J=1,3
   72 CTOT(J)= R(I) * CPER(J,I)
      LTOT(1) = CTOT(1) * Q * SWT
```

***** FO4 *****

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FILE NAMES MODE

6020	TAPE16
7062	TAPE17
10124	TAPE18
11166	TAPE19
12230	TAPE20
13272	TAPE30
14334	TAPE40
15376	TAPE50

EXTERNALS	TYPE	ARGS	REFERENCES		
CHEAD		0	132		
EOF	REAL	1	91		
GOPSR		0	78		
IOPSR		0	105		
POPSR		0	101		
WOPSR		0	85	106	

STATEMENT LABELS			DEF LINE	REFERENCES			
0	5		73	69			
0	10		94	93			
17016	50		191	114	117	175	
0	54		132	131			
16772	57		173	164	166	169	
0	58		179	177			
16510	100		74	72			
16526	200		89	92	95		
16551	300		96	91			
0	500	INACTIVE	108				
16601	510		124	121			
16602	520		126	120	122		
16665	560		162	185			
17010	580		182	178			
17014	590		187	180			
17022	999		195	80	81	108	109
17040	1000	FMT	62	61			
17054	1001	FMT	65	63	64		
17064	1003	FMT	71	70			
17076	2000	FMT	90	89			
17107	3000	FMT	97	96			
17114	5000	FMT	112	111			
17362	5001	FMT	194	193			
17121	5200	FMT	129	128			
17140	5400	FMT	137	135			
17160	5401	FMT	140	139			
17177	5500	FMT	146	142			
17203	5501	FMT	147	143			
17207	5502	FMT	148	144			
17216	5503	FMT	149	145			
17241	5510	FMT	154	150			
17253	5511	FMT	156	151			
17264	5520	FMT	158	152			
17273	5521	FMT	159	153			
17322	5700	FMT	171	167			
17326	5701	FMT	172	170			
17335	5800	FMT	184	183			
17346	5900	FMT	188	187			

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VARIABLES	SN	TYPE	RELOCATION							
				DEFINED	334	339	344	351	356	361	368
				373							
5246	XA	REAL	ARRAY	REFS	9	241	334	2*339	344	2*351	356
				2*361	368	2*373	414	DEFINED	6*229	282	
3567	XAFT	REAL		REFS	8	139	181	183	184	185	186
				191	196	DEFINED	137				
3601	XAZ	REAL		REFS	11	273	282	283	DEFINED	271	
1064	XCN	REAL	GOPCOM	REFS	19	22	46	213	432		
				DEFINED	24	45					
3752	XCP	REAL	ARRAY	REFS	7	2*176	2*177	178	179		
				DEFINED	154						
3573	XCT	REAL		REFS	8	201	DEFINED	200			
3566	XFWD	REAL		REFS	8	139	182	183	184	185	186
				193	195	DEFINED	137				
3563	XLE	REAL		REFS	7	181	183	184	185	186	198
				200	DEFINED	154	178	193	195		
3570	XMR	REAL		REFS	8	139	201	DEFINED	137		
20206	XN	REAL	ARRAY	REFS	10	282	283	2*347	2*366		
				DEFINED	241						
27313	XT	REAL	ARRAY	REFS	11	3*404	DEFINED	328	381	388	395
3564	XTE	REAL		REFS	7	182	183	184	185	186	198
				200	DEFINED	154	179	191	196		
3556	XZ	REAL		REFS	7	241	DEFINED	103			
27326	Y	REAL	ARRAY	REFS	11	6*380	3*382	6*387	3*389	6*394	3*396
				DEFINED	335	340	345	352	357	362	369
				374							
10346	YA	REAL	ARRAY	REFS	9	235	237	242	243	4*318	4*321
				332	335	2*337	4*339	342	345	2*349	4*351
				354	357	2*359	4*361	366	369	2*371	4*373
				413	DEFINED	2*229	235	237	283		
3602	YAZ	REAL		REFS	11	273	282	283	DEFINED	271	
3575	YIN	REAL		REFS	9	DEFINED	229				
1054	YL	REAL	GOPCOM	REFS	18	22	42	161	163	165	
				DEFINED	41	158					
22466	YN	REAL	ARRAY	REFS	10	255	282	283	DEFINED	242	
3577	YOUT	REAL		REFS	9	DEFINED	229				
27316	YT	REAL	ARRAY	REFS	11	384	391	398	3*403		
				DEFINED	329	382	389	396			
3557	YZ	REAL		REFS	7	158	242	243	DEFINED	103	154
12626	ZA	REAL	ARRAY	REFS	9	236	238	242	243		
				DEFINED	2*229	236	238				
3576	ZIN	REAL		REFS	9	DEFINED	229				
24746	ZN	REAL	ARRAY	REFS	10	DEFINED	243				
3600	ZOUT	REAL		REFS	9	DEFINED	229				
3560	ZZ	REAL		REFS	7	242	243	DEFINED	103	154	

FILE NAMES	MODE								
OUTPUT	FMT	WRITES	57	59	62	73	74	75	76	82
		85	91	116	127	139	144	145	146	147
		161	170	204	205	209	211	221	262	273
		286	289	292	293	307	308	309	311	416
		418	419	420	421	422	423	439	462	464
		470	471	474	495	496	499	502	512	514
		516								
PUNCH	FMT	WRITES	64	133	165	215	268	314	434	478
		505								
TAPE1	FMT	READS	31	35	41	45	55	88	137	271

***** G02 *****

NASA DFRC

VARIABLES	SN	TYPE		RELOCATION								
4	IOP	INTEGER		GENCOM	REFS	8	20	36	68	111	121	148
					177	191	208	242	251	266	272	
2067	J	INTEGER			REFS	3*209	3*210	243	245	DEFINED	65	168
					206							
2064	JJ	INTEGER			REFS	44	184	DEFINED	42	43	183	
2070	K	INTEGER			REFS	238	239	240	2*252	2*264	2*265	
					DEFINED	81	237	2*252	263			
2065	L	INTEGER			REFS	44	72	3*110	2*112	114	125	2*135
					2*136	2*137	149	150	2*155	165	184	213
					243	DEFINED	44	72	109	2*112	114	125
					134	2*136	2*137	149	150	2*155	165	184
					213	243						
2072	LC	INTEGER			REFS	226	DEFINED	224	225			
2074	LN	INTEGER			REFS	2*239	2*240	DEFINED	238			
2071	LR	INTEGER			REFS	238	2*252	DEFINED	202	203		
16153	LRC	INTEGER	ARRAY	GENCOM	REFS	9	20	243				
544	LRVL	INTEGER	ARRAY	GENCOM	REFS	8	20					
2066	LU	INTEGER			REFS	70	77	123	DEFINED	63	76	77
272	MR	REAL		POPCOM	REFS	18	24	95	96	97	98	100
366	MRN	INTEGER	ARRAY	POPCOM	REFS	17	24					
273	M1	REAL	ARRAY	POPCOM	REFS	18	24					
1	N	INTEGER		GOPCOM	REFS	11	22	42	43	3*44	45	3*46
					51	52	2*72	74	75	85	100	2*110
					112	114	2*125	126	127	2*135	3*136	3*137
					3*142	3*143	4*144	4*145	4*146	4*147	2*149	2*150
					3*155	6*165	172	183	6*184	188	189	192
					203	2*213	215	216	217	233	2*234	2*235
					2*239	2*240	2*252	256	2*264	2*265		
					DEFINED	165						
353	NAF	REAL		POPCOM	REFS	18	24					
1065	NALD	INTEGER		GOPCOM	REFS	12	22	161	162	274		
					DEFINED	29						
256	NC	INTEGER		GENCOM	REFS	8	20	26				
1055	NP	INTEGER		GOPCOM	REFS	12	22	70	77	81		
					DEFINED	66						
357	NPT	REAL		POPCOM	REFS	18	24	DEFINED	67			
622	NR	INTEGER		GOPCOM	REFS	11	22	65				
0	NSAD	INTEGER		GOPCOM	REFS	11	22	30	DEFINED	29		
257	NSB	INTEGER		GENCOM	REFS	8	20					
1066	NT	INTEGER		GOPCOM	REFS	12	22	168	184	206	260	261
					DEFINED	165						
271	NTB	REAL		POPCOM	REFS	18	24					
2077	PL	REAL	ARRAY		REFS	6	104	105	106	107	110	2*112
					114	233	234	235	239	240	243	245
					DEFINED	102	103	104	105	106	107	230
					231	232	233	234	235			
1057	PN	INTEGER	ARRAY	GOPCOM	REFS	12	22	112	114	DEFINED	82	
1	POP	INTEGER		GENCOM	REFS	8	20					
326	Q1	REAL	ARRAY	POPCOM	REFS	18	24	102	103	135	142	143
					144	145	146	147	233	234	235	
260	RD	REAL	ARRAY	GENCOM	REFS	10	20					
1052	RN	INTEGER		GOPCOM	REFS	12	22	DEFINED	66			
2	ROP	INTEGER		GENCOM	REFS	8	20					
16161	RS	LOGICAL		GENCOM	REFS	7	20	188	192	203	215	217
					223	256	DEFINED	174	259			
312	SABODY	INTEGER	ARRAY	GOPCOM	REFS	11	22	155				
2	SANAME	INTEGER	ARRAY	GOPCOM	REFS	11	22	44	72	125	155	184

```
                LTOT(2) = CTOT(2) * Q * SWT * BWT
                LTOT(3) = CTOT(3) * Q * SWT * CWT
                DO 75 J=1,3
175             WCL(IC,NSA,J+JA) = WCL(IC,NSA,J+JA) + CTOT(J)
             75 WAL(IC,NSA,J+JA) = WAL(IC,NSA,J+JA) + LTOT(J)
             70 PRINT 7500,   NSEQ(I),(DES(J,I),J=1,3),R(I),(CPER(J,I),J=1,3),
               1              CTOT,LTOT
           7500 FORMAT(* *,I5,3X,3A7,F10.2,6F10.6,-3P,F11.3,F13.3,F12.3)
                PRINT 7600,  NSA,(WCL(IC,NSA,J+JA),J=1,3),(WAL(IC,NSA,J+JA),J=1,3)
180        7600 FORMAT(*0*,*WLN= *,I2,6X,*TOTAL  LOADS  ON  SURFACE*,31X,
               1                          3F10.6,-3P,F11.3,F13.3,F12.3)
              C
              C     ALPHA=0 OPTION FOR WING AND HORIZ TAIL
185           C
                IF(WTN.GT.2)   GO TO 800
                IF(.NOT.WGW(NSA+1))   GO TO 800
                DO 77 J=1,3
             77 WCL(IC,NSA+1,J+JA) = WCL(IC,NSA,J+JA) - CPER(J,1)
190             WCL(IC,NSA+1,1+JA) = WCL(IC,NSA+1,1+JA)*Q*SWT
                WAL(IC,NSA+1,2+JA) = WCL(IC,NSA+1,2+JA)*Q*SWT*BWT
                WAL(IC,NSA+1,3+JA) = WCL(IC,NSA+1,3+JA)*Q*SWT*CWT
                PRINT 7700,   (NSA+1),(WCL(IC,NSA+1,J+JA),J=1,3),
               1                      (WAL(IC,NSA+1,J+JA),J=1,3)
195         7700 FORMAT(*0*,*WLN= *,I2,6X,*TOTAL  LOADS  ON  SURFACE  WITHOUT  *,
               1       *ALPHA=0  TERM*,7X, 3F10.6,-3P,F11.3,F13.3,F12.3)
              C
              C     RECYCLE CONTROL DATA
              C
200           800 GO TO (810,820,400,400,850,860) WTN
              C     WING - RIGHT HAND
              810 IF(JA.EQ.3)   GO TO 400
                  IS= 2
                  JA= 3
205               R(4)= DSR
                  DO 81 I=1,3
                  CPER(I,4) =  -(CPER(I,4))
                  CPER(I,5) =  -(CPER(I,5))
                  CPER(I,7) =  -(CPER(I,7))
210               CPER(I,8) =  -(CPER(I,8))
                  GO TO 700
              C     HORIZ TAIL - RIGHT HAND
              820 IF(JA.EQ.3)   GO TO 400
                  IS= 2
215               JA= 3
                  R(7)= DSR
                  R(8)= DSL
                  DO 82 I=1,3
                  CPER(I,5) =  -(CPER(I,5))
220               CPER(I,6) =  -(CPER(I,6))
                  CPER(I,7) =  -(CPER(I,7))
                  CPER(I,8) =  -(CPER(I,8))
               82 CPER(I,9) =  -(CPER(I,9))
                  GO TO 700
225           C     FORWARD FUSELAGE - LATERAL
              850 IF(NSA.EQ.8.OR..NOT.WGW(8))   GO TO 400
                  NSA=8
                  IS= 4
```

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PROGRAM FLIP 73/74 OPT=1 FTN 4.2+75060 07/29/81 16.31.26. PAGE 8

LOOPS	LABEL		INDEX	FROM-TO	LENGTH	PROPERTIES	
16476	5	*	I	69 73	12B		EXT REFS EXITS
16547	10		K	93 94	2B	INSTACK	
13572	50	*	I	114 191	2273		EXT REFS NOT INNER
16606	54	*	IC	131 132	4B		EXT REFS
16673	57	*	IC	164 173	102B		EXT REFS NOT INNER
16702		*	K	167	14B		EXT REFS
16717		*	K	167	14B		EXT REFS
16740		*	K	170	14B		EXT REFS
16755		*	K	170	14B		EXT REFS
17004	58	*	IC	177 179	3B	INSTACK	EXITS

COMMON BLOCKS	LENGTH	MEMBERS - BIAS NAME(LENGTH)								
GENCOM	7282	0	GOP	(1)	1	POP	(1)	2	ROP	(1)
		3	SOP	(1)	4	IOP	(1)	5	WOP	(1)
		6	WGR	(50)	56	WGS	(50)	106	WGI	(50)
		156	WGW	(14)	170	AC	(4)	174	NC	(1)
		175	NSB	(1)	176	RD	(180)	356	LRVL	(4)
		360	FAL	(2700)	3060	FCL	(2700)	5760	WAL	(756)
		6516	WCL	(756)	7272	SCN	(2)	7274	IC	(1)
		7275	LRC	(3)	7278	VBT	(3)	7281	RS	(1)
GOPCOM	573	0	NSAD	(1)	1	N	(1)	2	SANAME	(200)
		202	SABODY	(100)	302	BTC	(50)	352	SC	(50)
		402	NR	(1)	403	SREF	(50)	453	BREF	(50)
		503	CREF	(50)	553	CAVG	(1)	554	RN	(1)
		555	ETA	(1)	556	YL	(1)	557	NP	(1)
		558	CROW	(1)	559	PN	(2)	561	SP	(1)
		562	BARM	(1)	563	TARM	(1)	564	XCN	(1)
		565	NALD	(1)	566	NT	(1)	567	CN	(1)
		568	CL	(1)	569	CT	(1)	570	C	(3)
POPCOM	249	0	DN	(1)	1	DUMMY	(4)	5	TIT1	(162)
		167	TIT2	(18)	185	NTB	(1)	186	MR	(1)
		187	M1	(9)	196	A1	(9)	205	B1	(9)
		214	Q1	(9)	223	INTB	(1)	224	IMR	(9)
		233	CPBODY	(2)	235	NAF	(1)	236	THETA	(1)
		237	INAF	(1)	238	YR	(1)	239	NPT	(1)
		240	INPT	(1)	241	XC	(1)	242	CPS	(1)
		243	CPR	(1)	244	CPL	(1)	245	XR	(1)
		246	MRN	(2)	248	SB	(1)			

STATISTICS

PROGRAM LENGTH	1105B	581
BUFFER LENGTH	16440B	7456
CM LABELED COMMON LENGTH	17650B	8104

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FILE NAMES	MODE									
		447	482							
TAPE20	UNFMT	WRITES	32	37	42	46	56	130	163	213
		265	312	432	459	489	MOTION	26	522	
TAPE30	UNFMT	READS	69	103	111	154	229	MOTION	67	

EXTERNALS	TYPE	ARGS		REFERENCES				
COS	REAL	1	LIBRARY	242	243	282	283	
EOF	REAL	1		70	104			
SIN	REAL	1	LIBRARY	242	243	282	283	

STATEMENT LABELS			DEF LINE	REFERENCES		
0	10		49	34		
0	11		48	40		
0	12		46	44		
1440	20		441	65	224	
0	30		219	173		
0	40		244	234		
0	41		243	240		
722	45		259	247	256	
0	47		284	280		
0	48		283	281		
0	49		289	288		
0	50		437	298		
0	55		329	326		
0	80		507	446		
1660	85		506	481	490	504
76	200		55	27		
114	205		65	61		
142	207		85	81		
144	210		88	71		
222	220		103	112		
245	230		114	109		
272	300		126	119	120	
336	310		137	132		
437	320		168	164		
472	330		188	181	182	
474	331		191	183		
476	332		193	184		
500	333		195	185		
503	340		198	186	192	194
514	350		203	190		
526	360		211	203		
536	370		217	214		
545	400		229	121		
712	450		253	248		
771	460		271	267		
1116	495		315	300	313	
1076	497		311	306		
0	500	INACTIVE	324			
1150	510		337	332		
1161	520		342	337		
1167	530		347	342		
0	540	INACTIVE	349			
1203	550		354	349		
1211	560		359	347	354	
1222	570		364	359		
0	580	INACTIVE	366			

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VARIABLES	SN	TYPE		RELOCATION								
					213	243	DEFINED	165				
370	SB	LOGICAL		POPCOM	REFS	15	24					
540	SC	INTEGER	ARRAY	GOPCOM	REFS	11	22	42	43	51	52	74
					75	100	112	114	126	127	136	137
					149	150	183	188	189	192	203	215
					216	217	256	DEFINED	165			
16150	SCN	INTEGER	ARRAY	GENCOM	REFS	8	20	44	184			
3	SOP	INTEGER		GENCOM	REFS	8	20					
1061	SP	REAL		GOPCOM	REFS	14	22	102	103	112	114	
					DEFINED	82						
623	SREF	REAL	ARRAY	GOPCOM	REFS	13	22	46	142	143	144	145
					146	147	184	233	234	235		
					DEFINED	165						
1063	TARM	REAL		GOPCOM	REFS	14	22	106	107	112	114	
					DEFINED	82						
354	THETA	REAL		POPCOM	REFS	18	24	45	100			
5	TIT1	INTEGER	ARRAY	POPCOM	REFS	16	24					
247	TIT2	INTEGER	ARRAY	POPCOM	REFS	16	24					
16156	VBT	INTEGER	ARRAY	GENCOM	REFS	9	20	243				
13200	WAL	REAL	ARRAY	GENCOM	REFS	10	20					
14564	WCL	REAL	ARRAY	GENCOM	REFS	10	20					
152	WGI	LOGICAL	ARRAY	GENCOM	REFS	7	20	172				
6	WGR	LOGICAL	ARRAY	GENCOM	REFS	7	20					
70	WGS	LOGICAL	ARRAY	GENCOM	REFS	7	20					
234	WGW	LOGICAL	ARRAY	GENCOM	REFS	7	20					
5	WOP	INTEGER		GENCOM	REFS	8	20					
361	XC	REAL		POPCOM	REFS	19	24	DEFINED	83			
1064	XCN	REAL		GOPCOM	REFS	14	22	DEFINED	82			
365	XR	REAL		POPCOM	REFS	19	24	DEFINED	83			
1054	YL	REAL		GOPCOM	REFS	13	22	DEFINED	66			
356	YR	REAL		POPCOM	REFS	18	24	DEFINED	67			

FILE NAMES	MODE							
OUTPUT	FMT	WRITES	37	44	45	46	51	52	71	72
		74	75	78	112	114	124	125	126	127
		136	137	149	150	154	155	178	184	188
		189	192	197	212	213	215	216	217	218
		243	245	252	267	273	274	276		
TAPE20	UNFMT	READS	29	66	82	165	169	MOTION	27	
TAPE50	UNFMT	WRITES	170	READS	220	MOTION	163	204		

VARIABLES USED AS FILE NAMES, SEE ABOVE

EXTERNALS	TYPE	ARGS	REFERENCES			
CHEAD		0	40	181		
SYNC		1	31			

STATEMENT LABELS		DEF LINE	REFERENCES			
0	10	279	26			
437	20	159	30	31	148	153
0	30	119	65			
0	35	110	109			
225	40	118	81	111		
0	45	135	134			
1013	60	270	162	172	256	266
0	62	170	168			
725	65	249	206	242		
0	67	240	237			

***** H03 *****

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```
                JA= 3
230             NF= 3
                NL= 4
                R(3)= PD
                R(4)= B
                GO TO 700
235         C   AFT FUSELAGE
              860 IF(NSA.EQ.12)   GO TO 880
                IF(.NOT.WGW(10))   GO TO 870
            C   TOTAL TAIL LOADS - VERTICAL
                PRINT 8600
240             LTOT(1) = WAL(IC,3,1)
                LTOT(2) = WAL(IC,3,1) * XHT
                CTOT(1) = LTOT(1) / (Q*SWT)
                CTOT(2) = LTOT(2) / (Q*SWT*BWT)
                WAL(IC,10,4) = WAL(IC,10,4) + LTOT(1)
245             WAL(IC,10,5) = WAL(IC,10,5) + LTOT(2)
                PRINT 8601,   WAL(IC,3,1),XHT,CTOT(1),CTOT(2),LTOT(1),LTOT(2)
                LTOT(1) = WAL(IC,3,4)
                LTOT(2) = WAL(IC,3,4) * XHT
                CTOT(1) = LTOT(1) / (Q*SWT)
250             CTOT(2) = LTOT(2) / (Q*SWT*BWT)
                WAL(IC,10,4) = WAL(IC,10,4) + LTOT(1)
                WAL(IC,10,5) = WAL(IC,10,5) + LTOT(2)
                PRINT 8602,   WAL(IC,3,4),XHT,CTOT(1),CTOT(2),LTOT(1),LTOT(2)
                LTOT(2) = WAL(IC,3,3) * (-1.0)
255             CTOT(2) = LTOT(2) / (Q*SWT*BWT)
                WAL(IC,10,5) = WAL(IC,10,5) + LTOT(2)
                PRINT 8603,   WAL(IC,3,3),CTOT(2),LTOT(2)
                LTOT(2) = WAL(IC,3,6) * (-1.0)
                CTOT(2) = LTOT(2) / (Q*SWT*BWT)
260             WAL(IC,10,5) = WAL(IC,10,5) + LTOT(2)
                PRINT 8604,   WAL(IC,3,6),CTOT(2),LTOT(2)
                WCL(IC,10,4) = WAL(IC,10,4) / (Q*SWT)
                WCL(IC,10,5) = WAL(IC,10,5) / (Q*SWT*BWT)
                WCL(IC,11,4) = WCL(IC,10,4)+WCL(IC, 9,4)
265             WCL(IC,11,5) = WCL(IC,10,5)+WCL(IC, 9,5)
                WAL(IC,11,4) = WAL(IC,10,4)+WAL(IC, 9,4)
                WAL(IC,11,5) = WAL(IC,10,5)+WAL(IC, 9,5)
                PRINT 8605,   WCL(IC,10,4),WCL(IC,10,5),WAL(IC,10,4),WAL(IC,10,5)
                PRINT 8606,   WCL(IC,11,4),WCL(IC,11,5),WAL(IC,11,4),WAL(IC,11,5)
270          8600 FORMAT(*0*,T15,*TAIL  INDUCED  LOADS       V FACTOR  B FACTOR  *,
                1                *T FACTOR*/)
             8601 FORMAT(T15,*LHT V*,-3PF12.3,0P,*     KIPS*,5X,* 1.00*,4X,F6.2,5X,
                1       *  -  *,2F10.6,6X,*-   *,-3P,F11.3,F13.3,8X,*-*)
             8602 FORMAT(T15,*RHT V*,-3PF12.3,0P,*     KIPS*,5X,* 1.00*,4X,F6.2,5X,
275             1       *  -  *,2F10.6,6X,*-   *,-3P,F11.3,F13.3,8X,*-*)
             8603 FORMAT(T15,*LHT T*,-3PF12.3,0P,*  IN-KIPS*,5X,*  -  *,5X,*-1.00*,
                1   5X,*  -  *,6X,*-   *,F10.6,6X,*-   *,7X,*-   *,-3PF13.3,8X,*-*)
             8604 FORMAT(T15,*RHT T*,-3PF12.3,0P,*  IN-KIPS*,5X,*  -  *,5X,*-1.00*,
                1   5X,*  -  *,6X,*-   *,F10.6,6X,*-   *,7X,*-   *,-3PF13.3,8X,*-*)
280          8605 FORMAT(*0*,*WLN= 10* ,6X,*TOTAL  TAIL  LOADS  ADDING  TO  AFT  *,
                1          *FUSELAGE*,T71,2F10.6,6X,*-   *,-3P,F11.3,F13.3,8X,*-*)
             8606 FORMAT(*0*,*WLN= 11* ,6X,*TOTAL  LOADS  ON  AFT  FUSELAGE  -   *,
                1          *VERTICAL*,T71,2F10.6,6X,*-   *,-3P,F11.3,F13.3,8X,*-*)
            C   AFT FUSELAGE - LATERAL RECYCLE
285           870 IF(.NOT.WGW(12))   GO TO 400
```

***** NO4 *****

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SUBROUTINE GOPSR 73/74 OPT=1 FTN 4.2+75060 07/29/81 16.31.29. PAGE 1

```
      SUBROUTINE GOPSR
C
C     CREATES SURFACE/AXIS DEFINITION FILE
C
      INTEGER CID(20),UID(20),UOPT,UON,NRB(2),NB(2)
      INTEGER IFN,IBTC,NW,NCP,ICBN,IBN,NIB,NV,JJ,TNP(50),NLP
      REAL MN,DUM,X1,YZ,ZZ,TN,TND,XLE,XTE,TBL,XCP(100),RCP(100)
      REAL DRDX(100),DYDX(100),DZDX(100),XFWD,XAFT,XMR,MRC,DX,XCT,TA
      REAL YIN,ZIN,YOUT,ZOUT,PC(200),XA(8,200),YA(6,200),ZA(6,200)
      REAL AP(200),CB(200),TC(6,200),XN(6,200),YN(6,200),ZN(6,200)
      REAL XAZ,YAZ,LA,LAD,TYL(50),ST(3),XT(3),YT(3),X(5),Y(5)
      LOGICAL WGR(50),WGS(50),WGI(50),WGW(14),RS
      INTEGER GOP,POP,ROP,SOP,IOP,WOP,AC(2,2),NC,NSB,LRVL(4),SCN(2)
      INTEGER LRC(3),VBT(3)
      REAL RD(20,9),FAL(9,50,6),FCL(9,50,6),WAL(9,14,6),WCL(9,14,6)
      INTEGER NSAD,N,SANAME(4,50),SABODY(2,50),BTC(50),SC(50),NR
      INTEGER RN,NP,PN(2),NALD,NT,CN,CL,CT
      REAL SREF(50),BREF(50),CREF(50),CAVG,ETA,YL,CROW
      REAL SP,BARM,TARM,XCN,C(3)
      COMMON/GENCOM/GOP,POP,ROP,SOP,IOP,WOP,WGR,WGS,WGI,WGW,AC,NC,NSB,
     1      RD,LRVL,FAL,FCL,WAL,WCL,SCN,IC,LRC,VBT,RS
      COMMON/GOPCOM/NSAD,N,SANAME,SABODY,BTC,SC,NR,SREF,BREF,CREF,CAVG,
     1      RN,ETA,YL,NP,CROW,PN,SP,BARM,TARM,XCN,NALD,NT,CN,CL,CT,C
      DATA CAVG/1.0/,ETA/0.0/,CROW/0.0/,XCN/0.0/
      DATA UON/"INCH"/
      REWIND 20
      IF(GOP.GT.2)   GO TO 200
C
C     READ SURFACE/AXIS DATA IF ON CARDS
C
      READ(1,1000)   NSAD,NALD
      WRITE(20)      NSAD,NALD
 1000 FORMAT(I2,28X,I2)
      DO 10 I=1,NSAD
      READ(1,1001)   N,(SANAME(L,N),L=1,4),(SABODY(L,N),L=1,2),
     1               BTC(N),SC(N),NR,SREF(N),BREF(N),CREF(N),CAVG
      WRITE(20)      N,(SANAME(L,N),L=1,4),(SABODY(L,N),L=1,2),
     1               BTC(N),SC(N),NR,SREF(N),BREF(N),CREF(N),CAVG
 1001 FORMAT(I2,2X,4A4,2X,2A4,I3,I3,I4,4F10.0)
      DO 11 J=1,NR
      READ(1,1002)   RN,ETA,YL,NP,CROW
      WRITE(20)      RN,ETA,YL,NP,CROW
 1002 FORMAT(I2,F8.0,F10.0,8X,I2,F10.0)
      DO 12 K=1,NP
      READ(1,1003)   PN,SP,BARM,TARM,XCN
   12 WRITE(20)      PN,SP,BARM,TARM,XCN
 1003 FORMAT(215,4F10.0)
   11 CONTINUE
   10 CONTINUE
C     CHECK FOR ANY ADDITIONAL LOADS
      GO TO 800
C
C     CREATE DATA FROM GDTAPE
C
  200 READ(1,1000)   NSAD,NALD
      WRITE(20)      NSAD,NALD
      PRINT 2000,    GOP
```

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STATEMENT LABELS			DEF LINE	REFERENCES							
1233	590		371	366							
1244	600		376	364	371						
1252	610		380	376							
1341	650		401	385	392						
1361	660		407	318	378						
1364	670		412	321							
1372	700		416	405	410						
1424	710		432	417							
1432	720		435	433							
1443	800		445	51							
1575	850		481	461	477						
1612	855		489	485							
1632	860		495	491	492						
1636	870		498	493							
1643	875		502	498							
1654	880		504	501							
1666	990		512	70	104						
1671	991		514	97	98	122	451	455	486	487	488
1674	992		516	107							
1676	998		521	513	515						
1677	999		522	445	508						
1721	1000	FMT	33	31	55	64					
1756	1001	FMT	39	35							
2003	1002	FMT	43	41							
2027	1003	FMT	47	45							
2050	2000	FMT	58	57							
2061	2001	FMT	60	59							
2073	2002	FMT	63	62							
2137	2050	FMT	77	73							
2145	2051	FMT	78	74							
2151	2052	FMT	79	75							
2155	2053	FMT	80	76							
2165	2054	FMT	83	82							
2204	2070	FMT	86	85							
2226	2100	FMT	90	88							
2244	2101	FMT	93	91							
2320	2300	FMT	117	116							
2333	3000	FMT	128	127							
2367	3010	FMT	135	133	268						
2404	3100	FMT	138	137							
2414	3101	FMT	140	139							
2451	3102	FMT	148	144							
2456	3103	FMT	149	145							
2463	3104	FMT	150	146							
2470	3105	FMT	151	147							
2523	3110	FMT	162	161							
2547	3111	FMT	166	165	314						
2555	3200	FMT	171	170	209						
2574	3500	FMT	206	204	307	495					
2576	3501	FMT	207	205	308	311					
2600	3502	FMT	208	292							
2614	3600	FMT	212	211	416						
2636	3601	FMT	216	215	434						
2645	3700	FMT	222	221	439						
2712	4500	FMT	263	262							
2760	4600	FMT	272	271							
2770	4601	FMT	274	273							

***** I02 *****

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STATEMENT LABELS			DEF LINE	REFERENCES				
0	69		265	263				
60	200		65	36				
111	250		77	70				
115	300		81	68				
132	310		87	85				
135	320		91	85				
140	330		95	85				
171	400		102	89	93			
254	430		134	123				
347	450		142	121				
425	500		154	31				
500	620		177	260				
535	630		191	261				
546	640		202	177	191			
575	650		212	209	210			
627	655		220	208	211			
650	660		228	222				
766	680		256	251				
1000	690		263	257				
1016	800		272	161				
1030	820		276	272				
1053	1000	FMT	38	37	71	124	154	273
1102	1020	FMT	47	44				
1112	1021	FMT	49	45				
1116	1022	FMT	50	46				
1133	1030	FMT	53	51	74			
1171	1031	FMT	59	52	75			
1243	2000	FMT	73	72	125			
1260	2500	FMT	79	78				
1326	4000	FMT	115	112				
1336	4001	FMT	117	114				
1362	4100	FMT	128	126				
1402	4101	FMT	132	127				
1433	4300	FMT	138	136				
1450	4301	FMT	140	137				
1477	4500	FMT	151	149				
1506	4501	FMT	152	150				
1525	5000	FMT	156	155				
1572	6200	FMT	179	178	212			
1612	6250	FMT	186	184				
1640	6300	FMT	193	188	215			
1643	6301	FMT	194	189	216			
1646	6302	FMT	195	192	217			
1654	6350	FMT	198	197	218			
1705	6500	FMT	214	213				
1757	6700	FMT	246	243				
1767	6701	FMT	248	245				
2006	6800	FMT	253	252				
2021	6900	FMT	268	267				
2036	8000	FMT	275	274				
2050	8200	FMT	277	276				

LOOPS	LABEL	INDEX	FROM-TO	LENGTH	PROPERTIES
3	10	* IC	26 279	1032B	EXT REFS NOT INNER
12	20	* I	30 159	430B	EXT REFS NOT INNER
61	30	* J	65 119	151B	EXT REFS NOT INNER
116	40	* K	81 118	112B	EXT REFS NOT INNER

***** I03 *****

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```
                NSA=12
                IS= 4
                JA= 3
                NF= 3
290             NL= 8
                R(3)= B
                R(4)= AB
                R(5)= DA
                R(6)= DRL
295             R(7)= PD
                R(8)= B
                GO TO 700
          C     TOTAL TAIL LOADS - LATERAL
            880 IF(.NOT.WGW(13))   GO TO 400
300             PRINT 8600
                LTOT(1) = WAL(IC,6,4)
                LTOT(2) = WAL(IC,6,4) * XVT
                LTOT(3) = WAL(IC,6,4) * ZVT
                CTOT(1) = LTOT(1) / (Q*SWT)
305             CTOT(2) = LTOT(2) / (Q*SWT*BWT)
                CTOT(3) = LTOT(3) / (Q*SWT*CWT)
                WAL(IC,13,4) = WAL(IC,13,4) + LTOT(1)
                WAL(IC,13,5) = WAL(IC,13,5) + LTOT(2)
                WAL(IC,13,6) = WAL(IC,13,6) + LTOT(3)
310             PRINT 8801,   WAL(IC,6,4),XVT,ZVT,CTOT,LTOT
                LTOT(3) = WAL(IC,6,5)
                CTOT(3) = LTOT(3) / (Q*SWT*CWT)
                WAL(IC,13,6) = WAL(IC,13,6) + LTOT(3)
                PRINT 8802,   WAL(IC,6,5),CTOT(3),LTOT(3)
315             LTOT(2) = WAL(IC,6,6) * (-1.0)
                CTOT(2) = LTOT(2) / (Q*SWT*BWT)
                WAL(IC,13,5) = WAL(IC,13,5) + LTOT(2)
                PRINT 8803,   WAL(IC,6,6),CTOT(2),LTOT(2)
                LTOT(3) = WAL(IC,3,1) * YHT
320             CTOT(3) = LTOT(3) / (Q*SWT*CWT)
                WAL(IC,13,6) = WAL(IC,13,6) + LTOT(3)
                PRINT 8804,   WAL(IC,3,1),YHT,CTOT(3),LTOT(3)
                YHT = -(YHT)
                LTOT(3) = WAL(IC,3,4) * YHT
325             CTOT(3) = LTOT(3) / (Q*SWT*CWT)
                WAL(IC,13,6) = WAL(IC,13,6) + LTOT(3)
                PRINT 8805,   WAL(IC,3,4),YHT,CTOT(3),LTOT(3)
                LTOT(3) = WAL(IC,3,2)
                CTOT(3) = LTOT(3) / (Q*SWT*CWT)
330             WAL(IC,13,6) = WAL(IC,13,6) + LTOT(3)
                PRINT 8806,   WAL(IC,3,2),CTOT(3),LTOT(3)
                LTOT(3) = WAL(IC,3,5) * (-1.0)
                CTOT(3) = LTOT(3) / (Q*SWT*CWT)
                WAL(IC,13,6) = WAL(IC,13,6) + LTOT(3)
335             PRINT 8807,   WAL(IC,3,5),CTOT(3),LTOT(3)
                WCL(IC,13,4) = WAL(IC,13,4) / (Q*SWT)
                WCL(IC,13,5) = WAL(IC,13,5) / (Q*SWT*BWT)
                WCL(IC,13,6) = WAL(IC,13,6) / (Q*SWT*CWT)
                WCL(IC,14,4) = WCL(IC,13,4)+WCL(IC,12,4)
340             WCL(IC,14,5) = WCL(IC,13,5)+WCL(IC,12,5)
                WCL(IC,14,6) = WCL(IC,13,6)+WCL(IC,12,6)
                WAL(IC,14,4) = WAL(IC,13,4)+WAL(IC,12,4)
```

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```
 2000 FORMAT(*1*//1X,*GEOMETRY OPTION =*,I2,//)
      PRINT 2001,    NSAD
 2001 FORMAT(* *,I2,*  SURFACE/AXIS DEFINITIONS TO BE COMPUTED*)
      IF(GOP.NE.4)   GO TO 205
      PRINT 2002
 2002 FORMAT(*** ,T47,*AND PUNCHED*/)
      PUNCH 1000,    NSAD,NALD
  205 DO 20 I=1,NSAD
      TA= 0.0
      REWIND 30
C     READ GDTAPE HEADER RECORD
      READ(30)   CID,UID,IFN,MN,DUM,UOPT,DUM
      IF(EOF(30).NE.0.0)   GO TO 990
      IF(I.NE.1)           GO TO 210
C     PRINT GDTAPE INFO AND CHECK UNITS
      PRINT 2050,   IFN
      PRINT 2051,   CID
      PRINT 2052,   UID
      PRINT 2053,   UOPT
 2050 FORMAT(*     USING FLEXSTAB GDTAPE ,   FILE*,I3//)
 2051 FORMAT(* CASE ID =   *,20A4/)
 2052 FORMAT(* USER ID =   *,20A4/)
 2053 FORMAT(* UNITS OPTION =   *,A4///////)
      IF(UOPT.EQ.UON)   GO TO 207
      PRINT 2054
 2054 FORMAT(30H ********** WARNING **********,
     1   ///*    UNITS OTHER THAN INCHES  -  PROCEED ANYWAY*///////)
  207 PRINT 2070,    NALD
 2070 FORMAT(* *,I2,*  ADDITIONAL LOADS TO BE DEFINED*)
C     READ NEXT SURFACE/AXIS DEFINITION
  210 READ(1,2100)   N,(SANAME(L,N),L=1,4),(SABODY(L,N),L=1,2),
     1               BTC(N),          SREF(N),BREF(N),CREF(N)
 2100 FORMAT(I2,2X,4A4,2X,2A4,I3,7X,   3F10.0)
      PRINT 2101,    N,(SANAME(L,N),L=1,4),(SABODY(L,N),L=1,2),
     1               BTC(N),          SREF(N),BREF(N),CREF(N)
 2101 FORMAT(*1*//1X,*SURFACE/AXIS NUMBER =*,I3,6X,*SURFACE/AXIS NAME =*
     1   ,1X,4A4,4X,*GD BODY NAME = *,2A4///* INTEGRATION TYPE CODE =*
     2   ,I3,4X,*SREF =*,F10.3,4X,*BREF =*,F10.3,4X,*CREF =*,F10.3/)
C     CHECK FOR INPUT ERROR
      IF(N.LT.1.OR.N.GT.50)      GO TO 991
      IF(BTC(N).LT.1.OR.BTC(N).GT.3)   GO TO 991
      IF(SREF(N).EQ.0.0)         SREF(N)=1.0
      IF(BREF(N).EQ.0.0)         BREF(N)=1.0
      IF(CREF(N).EQ.0.0)         CREF(N)=1.0
C     READ GDTAPE BODY ID RECORD
  220 READ(30)   IBTC,NW,NCP,DUM,ICBN,IBN,NRB,NB,XZ,YZ,ZZ,TN,SC(N)
      IF(EOF(30).NE.0.0)   GO TO 990
C     CHECK FOR TRAILER RECORD
      JJ = IBTC+NW+NCP
      IF(JJ.EQ.0)   GO TO 992
C     CHECK FOR MATCH WITH SABODY
      IF(NB(1).EQ.SABODY(1,N).A.NB(2).EQ.SABODY(2,N))   GO TO 230
C     SKIP GDTAPE BODY DATA RECORD
      READ(30)
      GO TO 220
C     MATCH FOUND
  230 IF(SC(N).NE.0)   SC(N)= 1
```

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STATEMENT LABELS

			DEF LINE	REFERENCES	
3012	4900	FMT	287	286	
3030	4901	FMT	290	289	
3042	4910	FMT	294	293	309
3136	7000	FMT	424	418	
3142	7001	FMT	425	419	
3152	7011	FMT	427	420	
3156	7012	FMT	428	421	
3162	7013	FMT	429	422	
3166	7019	FMT	430	423	
3231	8000	FMT	449	447	478
3265	8200	FMT	465	462	
3311	8201	FMT	468	464	
3331	8202	FMT	472	470	
3335	8203	FMT	473	471	
3344	8300	FMT	475	474	496
3402	8500	FMT	483	482	505
3431	8700	FMT	500	499	
3452	8750	FMT	503	502	
3477	9900	FMT	517	512	
3506	9910	FMT	518	514	
3515	9920	FMT	519	516	

LOOPS	LABEL	INDEX	FROM-TO	LENGTH	PROPERTIES	
13	10	* I	34 49	63B	EXT REFS	NOT INNER
55	11	* J	40 48	16B	EXT REFS	NOT INNER
62	12	* K	44 46	7B	EXT REFS	
115	20	* I	65 441	1326B	EXT REFS	EXITS NOT INNER
400		* L	154	4B	EXT REFS	
406		* L	154	14B	EXT REFS	
444	30	* J	173 219	77B	EXT REFS	
550		* M	229	61B	EXT REFS	NOT INNER
555		* L	229	14B	EXT REFS	
577		* L	229	14B	EXT REFS	
633	40	* K	234 244	46B	EXT REFS	NOT INNER
643	41	* J	240 243	33B	EXT REFS	
706	45	J	247 259	16B	OPT	
1000	47	* K	280 284	33B	EXT REFS	NOT INNER
1001	48	* J	281 283	27B	EXT REFS	
1035	49	* J	288 289	11B	EXT REFS	
1055	50	* J	298 437	362B	EXT REFS	NOT INNER
1140	55	K	326 329	2B	INSTACK	
1446	80	* I	446 507	217B	EXT REFS	EXITS NOT INNER
1576	85	* J	481 506	65B	EXT REFS	EXITS

COMMON BLOCKS	LENGTH	MEMBERS - BIAS	NAME	(LENGTH)							
GENCOM	7282	0	GOP	(1)	1	POP	(1)	2	ROP	(1)	
		3	SOP	(1)	4	IOP	(1)	5	WOP	(1)	
		6	WGR	(50)	56	WGS	(50)	106	WGI	(50)	
		156	WGW	(14)	170	AC	(4)	174	NC	(1)	
		175	NSB	(1)	176	RD	(180)	356	LRVL	(4)	
		360	FAL	(2700)	3060	FCL	(2700)	5760	WAL	(756)	
		6516	WCL	(756)	7272	SCN	(2)	7274	IC	(1)	
		7275	LRC	(3)	7278	VBT	(3)	7281	RS	(1)	
GOPCOM	573	0	NSAD	(1)	1	N	(1)	2	SANAME	(200)	
		202	SABODY	(100)	302	BTC	(50)	352	SC	(50)	
		402	NR	(1)	403	SREF	(50)	453	BREF	(50)	
		503	CREF	(50)	553	CAVG	(1)	554	RN	(1)	

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LOOPS	LABEL	INDEX	FROM-TO	LENGTH	PROPERTIES	
212	35	L	109 110	3B	INSTACK	
261	45	L	134 135	2B	INSTACK	
267		* L	136	12B	EXT REFS	
302		* L	136	12B	EXT REFS	
321		* L	137	12B	EXT REFS	
334		* L	137	12B	EXT REFS	
372		* L	149	12B	EXT REFS	
411		* L	150	12B	EXT REFS	
444	60	* I	162 270	352B	EXT REFS	NOT INNER
466	62	* J	168 170	7B	EXT REFS	
557	65	* J	206 249	151B	EXT REFS	NOT INNER
676	67	* K	237 240	11B	OPT	
734		* K	252	14B	EXT REFS	
751		* K	252	14B	EXT REFS	
1005	69	K	263 265	3B	INSTACK	

COMMON BLOCKS	LENGTH	MEMBERS - BIAS NAME(LENGTH)								
GENCOM	7282	0	GOP	(1)	1	POP	(1)	2	ROP	(1)
		3	SOP	(1)	4	IOP	(1)	5	WOP	(1)
		6	WGR	(50)	56	WGS	(50)	106	WGI	(50)
		156	WGW	(14)	170	AC	(4)	174	NC	(1)
		175	NSB	(1)	176	RD	(180)	356	LRVL	(4)
		360	FAL	(2700)	3060	FCL	(2700)	5760	WAL	(756)
		6516	WCL	(756)	7272	SCN	(2)	7274	IC	(1)
		7275	LRC	(3)	7278	VBT	(3)	7281	RS	(1)
GOPCOM	573	0	NSAD	(1)	1	N	(1)	2	SANAME	(200)
		202	SABODY	(100)	302	BTC	(50)	352	SC	(50)
		402	NR	(1)	403	SREF	(50)	453	BREF	(50)
		503	CREF	(50)	553	CAVG	(1)	554	RN	(1)
		555	ETA	(1)	556	YL	(1)	557	NP	(1)
		558	CROW	(1)	559	PN	(2)	561	SP	(1)
		562	BARM	(1)	563	TARM	(1)	564	XCN	(1)
		565	NALD	(1)	566	NT	(1)	567	CN	(1)
		568	CL	(1)	569	CT	(1)	570	C	(3)
POPCOM	249	0	DN	(1)	1	DUMMY	(4)	5	TIT1	(162)
		167	TIT2	(18)	185	NTB	(1)	186	MR	(1)
		187	M1	(9)	196	A1	(9)	205	B1	(9)
		214	Q1	(9)	223	INTB	(1)	224	IMR	(9)
		233	CPBODY	(2)	235	NAF	(1)	236	THETA	(1)
		237	INAF	(1)	238	YR	(1)	239	NPT	(1)
		240	INPT	(1)	241	XC	(1)	242	CPS	(1)
		243	CPR	(1)	244	CPL	(1)	245	XR	(1)
		246	MRN	(2)	248	SB	(1)			

STATISTICS

PROGRAM LENGTH	2105B	1093
CM LABELED COMMON LENGTH	17650B	8104

***** JOB *****

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```
                WAL(IC,14,5) = WAL(IC,13,5)+WAL(IC,12,5)
                WAL(IC,14,6) = WAL(IC,13,6)+WAL(IC,12,6)
345             PRINT 8808,   (WCL(IC,13,J),J=4,6),(WAL(IC,13,J),J=4,6)
                PRINT 8809,   (WCL(IC,14,J),J=4,6),(WAL(IC,14,J),J=4,6)
             8801 FORMAT(T15,*VTR V*,-3PF12.3,0P,*     KIPS*,5X,* 1.00*,4X,F6.2,4X,
               1       F6.2,3F10.6,-3P,F11.3,F13.3,F12.3)
             8802 FORMAT(T15,*VTR B*,-3PF12.3,0P,*  IN-KIPS*,2(5X,*  -  *),6X,*1.00*
350            1      ,2(6X,*-   *),F10.6,7X,*-   *,9X,*-   *,-3PF12.3)
             8803 FORMAT(T15,*VTR T*,-3PF12.3,0P,*  IN-KIPS*,5X,*  -  *,5X,*-1.00*,
               1   5X,*  -  *,6X,*-   *,F10.6,6X,*-   *,7X,*-   *,-3PF13.3,8X,*-*)
             8804 FORMAT(T15,*LHT V*,-3PF12.3,0P,*     KIPS*,2(5X,*  -  *),4X,F6.2,
               1       2(6X,*-   *),F10.6,7X,*-   *,9X,*-   *,-3PF12.3)
350          8805 FORMAT(T15,*RHT V*,-3PF12.3,0P,*     KIPS*,2(5X,*  -  *),4X,F6.2,
               1       2(6X,*-   *),F10.6,7X,*-   *,9X,*-   *,-3PF12.3)
             8806 FORMAT(T15,*LHT B*,-3PF12.3,0P,*  IN-KIPS*,2(7X,*-  *),5X,* 1.00*,
               1       2(6X,*-   *),F10.6,7X,*-   *,9X,*-   *,-3PF12.3)
             8807 FORMAT(T15,*RHT B*,-3PF12.3,0P,*  IN-KIPS*,2(7X,*-  *),5X,*-1.00*,
360            1       2(6X,*-   *),F10.6,7X,*-   *,9X,*-   *,-3PF12.3)
             8808 FORMAT(*0*,*WLN= 13* ,6X,*TOTAL  TAIL  LOADS  ADDING  TO AFT  *,
               1          *FUSELAGE*,T71,3F10.6,-3P,F11.3,F13.3,F12.3)
             8809 FORMAT(*0*,*WLN= 14* ,6X,*TOTAL  LOADS  ON  AFT  FUSELAGE  --  *,
               1          * LATERAL*,T71,3F10.6,-3P,F11.3,F13.3,F12.3)
365             GO TO 400
              30 CONTINUE
                RETURN
                END
```

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```
      JJ = SC(N) + 1
      PRINT 2300,   IBTC,SC(JJ)
 2300 FORMAT(* BODY TYPE CODE =*,I3,11X,*SYMMETRY CODE = *,A3/)
C     TEST FOR BODY/INTEGRATION TYPE
      IF(IBTC.EQ.1.A.BTC(N).EQ.1)   GO TO 300
      IF(IBTC.EQ.1.A.BTC(N).EQ.2)   GO TO 300
      IF(IBTC.EQ.3.A.BTC(N).EQ.3)   GO TO 400
      GO TO 991
C
C     SLENDER BODY TYPE
C
  300 NR = 1
      PRINT 3000,   NR
 3000 FORMAT(* NUMBER OF ROWS =*,I3//)
C     WRITE AND PUNCH SURFACE/AXIS DATA
      WRITE(20)       N,(SANAME(L,N),L=1,4),(SABODY(L,N),L=1,2),
     1                BTC(N),SC(N),NR,SREF(N),BREF(N),CREF(N),CAVG
      IF(GOP.NE.4)   GO TO 310
      PUNCH 3010,    N,(SANAME(L,N),L=1,4),(SABODY(L,N),L=1,2),
     1               BTC(N),SC(N),NR,SREF(N),BREF(N),CREF(N)
 3010 FORMAT(I2,2X,4A4,2X,2A4,I3,I3,I4,3F10.3)
C     READ AND PRINT INTEGRATION AXIS DATA
  310 READ(1,3100)   XFWD,XAFT,XMR,MRC
 3100 FORMAT(6F10.0)
      PRINT 3101,    XFWD,XAFT,XMR
 3101 FORMAT(* INTEGRATION AXIS DEFINITION*,
     1   T31,*    FORWARD LIMIT AT   XR =*,F10.3/
     2   T31,*        AFT LIMIT AT   XR =*,F10.3/
     3   T31,*MOMENTS SUMMED ABOUT   XR =*,F10.3)
      IF(MRC.GT.0.0.A.BTC(N).EQ.1)   PRINT 3102
      IF(MRC.LT.0.0.A.BTC(N).EQ.1)   PRINT 3103
      IF(MRC.GT.0.0.A.BTC(N).EQ.2)   PRINT 3104
      IF(MRC.LT.0.0.A.BTC(N).EQ.2)   PRINT 3105
 3102 FORMAT(*++*,T73,*POSITIVE - NOSE UP*//)
 3103 FORMAT(*++*,T73,*POSITIVE - TAIL UP*//)
 3104 FORMAT(*++*,T73,*POSITIVE - NOSE RIGHT*//)
 3105 FORMAT(*++*,T73,*POSITIVE - TAIL RIGHT*//)
C     READ SLENDER BODY DATA RECORD
      NIB = (NW-3-5*NCP)/2
      READ(30)   (XLE,XTE,L=1,NIB),YZ,ZZ,TBL,
     1           (XCP(L),RCP(L),DRDX(L),DYDX(L),DZDX(L),L=1,NCP)
C     COMPUTE ROW DATA
      RN = 1
      YL = YZ
      NP = NCP
C     PRINT,WRITE,PUNCH ROW DATA
      PRINT 3110,      YL,NP
 3110 FORMAT(* ROW DATA*,7X,*Y =*,F10.3,6X,*NUMBER OF PANELS =*,I3//)
      WRITE(20)      RN,ETA,YL,NP,CROW
      IF(GOP.NE.4)   GO TO 320
      PUNCH 3111,    RN,YL,NP
 3111 FORMAT(I2,8X,F10.3,8X,I2)
C     COMPUTE PANEL DATA
  320 PN(1) = 1
      TARM = 0.0
      PRINT 3200
 3200 FORMAT(* PANEL DATA*//*   INDEX*,7X,*AREA-IN2*,8X,*BARM-IN*,8X,
```

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COMMON BLOCKS LENGTH MEMBERS - BIAS NAME(LENGTH)

	555	ETA	(1)	556	YL	(1)	557	NP (1)
	558	CROW	(1)	559	PN	(2)	561	SP (1)
	562	BARM	(1)	563	TARM	(1)	564	XCN (1)
	565	NALD	(1)	566	NT	(1)	567	CN (1)
	568	CL	(1)	569	CT	(1)	570	C (3)

STATISTICS

PROGRAM LENGTH	27333B	11995
CM LABELED COMMON LENGTH	17257B	7855

SUBROUTINE SYNC 73/74 OPT=1 FTN 4.2+75060 07/29/81 16.31.53. PAGE 1

```
      SUBROUTINE SYNC(M),RETURNS(R1,R2)
C
C     MATCHES PROPER CPBODY WITH DESIRED SURFACE/AXIS
C
 5    LOGICAL WGR(50),WGS(50),WGI(50),WGW(14),RS
      INTEGER GOP,POP,ROP,SOP,IOP,WOP,AC(2,2),NC,NSB,LRVL(4),SCN(2)
      INTEGER LRC(3),VBT(3)
      REAL RD(20,9),FAL(9,50,6),FCL(9,50,6),WAL(9,14,6),WCL(9,14,6)
      INTEGER NSAD,N,SANAME(4,50),SABODY(2,50),BTC(50),SC(50),NR
10    INTEGER RN,NP,PN(2),NALD,NT,CN,CL,CT
      REAL SREF(50),BREF(50),CREF(50),CAVG,ETA,YL,CROW
      REAL SP,BARM,TARM,XCN,C(3)
      LOGICAL SB
      INTEGER DN,DUMMY(4),TIT1(18,9),TIT2(18),INTB,IMR(9),CPBODY(2)
15    INTEGER INAF,INPT,MRN(2)
      REAL NTB,MR,M1(9),A1(9),B1(9),Q1(9),NAF,THETA,YR,NPT
      REAL XC,CPS,CPR,CPL,XR
      COMMON/GENCOM/GOP,POP,ROP,SOP,IOP,WOP,WGR,WGS,WGI,WGW,AC,NC,NSB,
     1      RD,LRVL,FAL,FCL,WAL,WCL,SCN,IC,LRC,VBT,RS
20    COMMON/GOPCOM/NSAD,N,SANAME,SABODY,BTC,SC,NR,SREF,BREF,CREF,CAVG,
     1      RN,ETA,YL,NP,CROW,PN,SP,BARM,TARM,XCN,NALD,NT,CN,CL,CT,C
      COMMON/POPCOM/DN,DUMMY,TIT1,TIT2,NTB,MR,M1,A1,B1,Q1,INTB,IMR,
     1      CPBODY,NAF,THETA,INAF,YR,NPT,INPT,XC,CPS,CPR,CPL,XR,MRN,SB
      READ(20)      N,(SANAME(L,N),L=1,4),(SABODY(L,N),L=1,2),
25   1              BTC(N),SC(N),NR,SREF(N),BREF(N),CREF(N),CAVG
      IF(M.EQ.1.AND.WGR(N))   GO TO 200
      IF(M.EQ.2.AND.WGS(N))   GO TO 200
      IF(M.EQ.3.AND.WGI(N))   GO TO 200
C     SKIP THIS SURFACE/AXIS DEFINITION
30    DO 10 I=1,NR
      READ(20)      RN,ETA,YL,NP,CROW
      DO 20 J=1,NP
   20 READ(20)      PN,SP,BARM,TARM,XCN
   10 CONTINUE
35    RETURN R1
C     WANT SURFACE - SEARCH FOR MATCHING CPBODY
  200 REWIND DN
      READ(DN)      (TIT1(J,IC),J=1,18)
      READ(DN)      TIT2
40    READ(DN)      NTB,MR,M1(IC),A1(IC),B1(IC),Q1(IC)
      IMR(IC)= MR
  300 READ(DN)      CPBODY,NAF,THETA
      IF(EOF(DN).EQ.0.0)   GO TO 400
C     MATCHING CPBODY NOT FOUND - SKIP SURFACE/AXIS DATA
45    DO 30 I=1,NR
      READ(20)      RN,ETA,YL,NP,CROW
      DO 40 J=1,NP
   40 READ(20)      PN,SP,BARM,TARM,XCN
   30 CONTINUE
50    RETURN R2
  400 IF(CPBODY(1).EQ.SABODY(1,N).AND.CPBODY(2).EQ.SABODY(2,N))  RETURN
C     SKIP CPBODY
      INAF= NAF
      DO 50 I=1,INAF
55    READ(DN)      YR,NPT
      INPT= NPT
      DO 60 J=1,INPT
```

***** K03 *****

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SYMBOLIC REFERENCE MAP (R=3)

ENTRY POINTS DEF LINE REFERENCES
1 WOPSR 1 23 367

VARIABLES	SN	TYPE		RELOCATION								
2354	A	REAL			REFS	62	94	113	147	156		
					DEFINED	34						
2360	AB	REAL			REFS	100	102	132	292	DEFINED	38	
252	AC	INTEGER	ARRAY	GENCOM	REFS	8	11					
2372	AD	REAL			REFS	95	115	DEFINED	82			
2355	B	REAL			REFS	62	99	101	116	131	233	291
					296	DEFINED	35					
2344	BWT	REAL			REFS	24	69	79	81	172	191	243
					250	255	259	263	305	316	337	
					DEFINED	21	48					
2522	CPER	REAL	ARRAY		REFS	6	27	104	123	170	177	189
					207	208	209	210	219	220	221	222
					223	DEFINED	26	51	104	123	207	208
					209	210	219	220	221	222	223	
2616	CTOT	REAL	ARRAY		REFS	6	171	172	173	175	177	2*246
					2*253	257	261	310	314	318	322	327
					331	335	DEFINED	170	242	243	249	250
					255	259	304	305	306	312	316	320
					325	329	333					
2345	CWT	REAL			REFS	24	69	80	82	173	192	306
					312	320	325	329	333	338		
					DEFINED	21	48					
2361	DA	REAL			REFS	65	117	133	293	DEFINED	39	
2362	DE	REAL			REFS	65	114	DEFINED	40			
2445	DES	INTEGER	ARRAY		REFS	5	27	177	DEFINED	26	51	
2364	DRL	REAL			REFS	65	136	294	DEFINED	42		
2363	DRU	REAL			REFS	65	135	DEFINED	41			
2365	DSL	REAL			REFS	65	96	118	134	217		
					DEFINED	43						
2366	DSR	REAL			REFS	65	119	134	205	216		
					DEFINED	44						
550	FAL	REAL	ARRAY	GENCOM	REFS	10	11					
5764	FCL	REAL	ARRAY	GENCOM	REFS	10	11					
0	GOP	INTEGER		GENCOM	REFS	8	11					
2352	I	INTEGER			REFS	3*26	3*27	3*51	2*104	2*123	2*170	4*177
					2*207	2*208	2*209	2*210	2*219	2*220	2*221	2*222
					2*223	DEFINED	25	50	103	122	168	206
					218							
16152	IC	INTEGER		GENCOM	REFS	11	34	35	36	37	2*38	39
					40	41	42	43	44	62	3*65	79
					80	81	82	2*175	2*176	2*180	2*189	2*190
					2*191	2*192	2*193	240	241	2*244	2*245	246
					247	248	2*251	2*252	253	254	2*256	257
					258	2*260	261	2*262	2*263	3*264	3*265	3*266
					3*267	4*268	4*269	301	302	303	2*307	2*308
					2*309	310	311	2*313	314	315	2*317	318
					319	2*321	322	324	2*326	327	328	2*330
					331	332	2*334	335	2*336	2*337	2*338	3*339
					3*340	3*341	3*342	3*343	3*344	2*345	2*346	
					DEFINED	33						
4	IOP	INTEGER		GENCOM	REFS	8	11					

***** K04 *****

NASA DFRC

NASA DFRC


```
                1       *TARM-IN*/)
                  DO 30 J=1,NP
                  PN(2) = J
175         C     COMPUTE PANEL EDGES
                  IF(J.LT.NP)   DX= XCP(J+1)-XCP(J)
                  IF(J.EQ.NP)   DX= XCP(J)-XCP(J-1)
                  XLE = XCP(J)-(DX/2.0)
                  XTE = XCP(J)+(DX/2.0)
180         C     DETERMINE PANEL/AXIS INTERSECTION TYPE
                  IF(XLE.GE.XAFT)                  GO TO 330
                  IF(XTE.LE.XFWD)                  GO TO 330
                  IF(XLE.GE.XFWD.A.XTE.GT.XAFT)    GO TO 331
                  IF(XLE.LT.XFWD.A.XTE.LE.XAFT)    GO TO 332
185               IF(XLE.LT.XFWD.A.XTE.GT.XAFT)    GO TO 333
                  IF(XLE.GE.XFWD.A.XTE.LE.XAFT)    GO TO 340
            C     COMPUTE NEW EFFECTIVE PANEL EDGES
              330 SP= 0.0
                  BARM= 0.0
190               GO TO 350
              331 XTE= XAFT
                  GO TO 340
              332 XLE= XFWD
                  GO TO 340
195           333 XLE= XFWD
                  XTE= XAFT
            C     COMPUTE EFFECTIVE AREA AND BARM
              340 DX= XTE-XLE
                  SP= 2.0*RCP(J)*DX
200               XCT= (XLE+XTE)/2.0
                  BARM= MRC*(XMR-XCT)
            C     CHECK FOR NEW PAGE
              350 IF(J.NE.31.A.J.NE.81)   GO TO 360
                  PRINT 3500
205               PRINT 3501
             3500 FORMAT(*1*)
             3501 FORMAT(* *)
             3502 FORMAT(*0*)
                  PRINT 3200
210         C     PRINT,WRITE,PUNCH PANEL DATA
              360 PRINT 3600,   PN,SP,BARM,TARM
             3600 FORMAT(* *,I3,I4,3(5X,F10.3))
                  WRITE(20)     PN,SP,BARM,TARM,XCN
                  IF(GOP.NE.4)   GO TO 370
215               PUNCH 3601,   PN,SP,BARM,TARM
             3601 FORMAT(2I5,3F10.3)
              370 TA= TA+SP
            C     GO TO NEXT PANEL
               30 CONTINUE
220         C     PRINT TOTAL EFFECTIVE AREA OF ALL PANELS
                  PRINT 3700,   TA
             3700 FORMAT(///* TOTAL AREA*,F12.3)
            C     SLENDER BODY COMPLETED - GO TO NEXT SURFACE/AXIS DEFINITION
                  GO TO 20
225         C
            C     THIN BODY TYPE
            C
            C     READ THIN BODY DATA RECORD
```

NASA DFRC

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SUBROUTINE POPSR      73/74   OPT=1                    FTN 4.2+75060      07/29/81  16.31.42.      PAGE     1

                      SUBROUTINE POPSR
                C
                C     CREATES PRESSURE FILES FROM CARDS
                C
                      LOGICAL WGR(50),WGS(50),WGI(50),WGW(14),RS
                      INTEGER GOP,POP,ROP,SOP,IOP,WOP,AC(2,2),NC,NSB,LRVL(4),SCN(2)
                      INTEGER LRC(3),VBT(3)
                      REAL RD(20,9),FAL(9,50,6),FCL(9,50,6),WAL(9,14,6),WCL(9,14,6)
                      LOGICAL SB
                      INTEGER DN,DUMMY(4),TIT1(18,9),TIT2(18),INTB,IMR(9),CPBODY(2)
                      INTEGER INAF,INPT,MRN(2)
                      REAL NTB,MR,M1(9),A1(9),B1(9),Q1(9),NAF,THETA,YR,NPT
                      REAL XC,CPS,CPR,CPL,XR
                      COMMON/GENCOM/GOP,POP,ROP,SOP,IOP,WOP,WGR,WGS,WGI,WGW,AC,NC,NSB,
                     1       RD,LRVL,FAL,FCL,WAL,WCL,SCN,IC,LRC,VBT,RS
                      COMMON/POPCOM/DN,DUMMY,TIT1,TIT2,NTB,MR,M1,A1,B1,Q1,INTB,IMR,
                     1       CPBODY,NAF,THETA,INAF,YR,NPT,INPT,XC,CPS,CPR,CPL,XR,MRN,SB
                      SB=.FALSE.
                C
                C     READ THIN BODY CPS, ALL CASES
                C
                  100 DO 10 I=1,NC
                      DN= I+10
                      IF(SB)   GO TO 200
                      REWIND DN
                      READ(1,1001)    (TIT1(M,I),M=1,18)
                      WRITE(DN)       (TIT1(M,I),M=1,18)
                 1001 FORMAT(18A4)
                      READ(1,1001)    TIT2
                      WRITE(DN)       TIT2
                      READ(1,1002)    NTB,MR,M1(I),A1(I),B1(I),Q1(I)
                      WRITE(DN)       NTB,MR,M1(I),A1(I),B1(I),Q1(I)
                 1002 FORMAT(6F10.4)
                      INTB= NTB
                      IMR(I)= MR
                  200 IF(SB)   INTB= NSB
                      DO 20 J=1,INTB
                      READ(1,1003)    CPBODY,NAF,THETA
                      WRITE(DN)       CPBODY,NAF,THETA
                 1003 FORMAT(2A4,2X,2F10.4)
                      INAF= NAF
                      DO 30 K=1,INAF
                      READ(1,1004)    YR,NPT
                      WRITE(DN)       YR,NPT
                 1004 FORMAT(2F10.4)
                      INPT= NPT
                      DO 40 L=1,INPT
                      READ(1,1005)    XC,CPS,CPR,CPL,XR
                   40 WRITE(DN)       XC,CPS,CPR,CPL,XR
                 1005 FORMAT(5F10.4)
                   30 CONTINUE
                   20 CONTINUE
                   10 CONTINUE
                C
                C     READ ANY SLENDER BODY CPS ADDED TO END OF ALL THIN BODIES
                C
                      IF(NSB.EQ.0)   GO TO 999
```

```
                60 READ(DN)       XC,CPS,CPR,CPL,XR
                50 CONTINUE
60                 GO TO 300
                   END
```

***** L03 *****

SUBROUTINE WOPSR 73/74 OPT=1 FTN 4.2*75060 07/29/81 16.31.57. PAGE 9

VARIABLES	SN	TYPE		RELOCATION							
2374	IS	INTEGER			REFS	2*159	DEFINED	89	108	127	142	151
					203	214	228	287				
2353	J	INTEGER			REFS	2*26	2*27	2*51	2*170	3*175	3*176	2*177
					2*180	3*189	2*193	2*345	2*346	DEFINED	2*26	2*27
					2*51	169	174	2*177	2*180	188	2*193	2*345
					2*346							
2375	JA	INTEGER			REFS	2*175	2*176	2*180	2*189	2*190	2*191	2*192
					2*193	202	213	DEFINED	90	109	128	143
					152	204	215	229	288			
16153	LRC	INTEGER	ARRAY	GENCOM	REFS	9	11					
544	LRVL	INTEGER	ARRAY	GENCOM	REFS	8	11	159				
2621	LTOT	REAL	ARRAY		REFS	6	176	177	242	243	244	245
					2*246	249	250	251	252	2*253	255	256
					257	259	260	261	304	305	306	307
					308	309	310	312	313	314	316	317
					318	320	321	322	325	326	327	329
					330	331	333	334	335	DEFINED	171	172
					173	240	241	247	248	254	258	301
					302	303	311	315	319	324	328	332
256	NC	INTEGER		GENCOM	REFS	8	11	14	33			
2376	NF	INTEGER			REFS	168	DEFINED	91	110	129	144	153
					230	289						
2377	NL	INTEGER			REFS	168	DEFINED	92	111	130	145	154
					231	290						
2373	NSA	INTEGER			REFS	2*175	2*176	3*180	187	2*189	2*190	2*191
					2*192	3*193	226	236	DEFINED	88	107	126
					141	150	227	286				
257	NSB	INTEGER		GENCOM	REFS	8	11					
2426	NSEQ	INTEGER	ARRAY		REFS	5	27	177	DEFINED	26	51	
2367	PD	REAL			REFS	97	120	137	232	295		
					DEFINED	79						
1	POP	INTEGER		GENCOM	REFS	8	11					
2356	Q	REAL			REFS	62	171	172	173	190	191	192
					242	243	249	250	255	259	262	263
					304	305	306	312	316	320	325	329
					333	336	337	338	DEFINED	36		
2370	QD	REAL			REFS	98	121	DEFINED	80			
2577	R	REAL	ARRAY		REFS	6	170	177	DEFINED	93	94	95
					96	97	98	99	100	101	102	112
					113	114	115	116	117	118	119	120
					121	131	132	133	134	135	136	137
					138	146	147	155	156	205	216	217
					232	233	291	292	293	294	295	296
260	RD	REAL	ARRAY	GENCOM	REFS	10	11	34	35	36	37	2*38
					39	40	41	42	43	44	3*65	79
					80	81	82					
2	ROP	INTEGER		GENCOM	REFS	8	11					
16161	RS	LOGICAL		GENCOM	REFS	7	11					
16150	SCN	INTEGER	ARRAY	GENCOM	REFS	8	11					
3	SOP	INTEGER		GENCOM	REFS	8	11					
2343	SWT	REAL			REFS	24	69	171	172	173	190	191
					192	242	243	249	250	255	259	262
					263	304	305	306	312	316	320	325
					329	333	336	337	338	DEFINED	21	48
2400	TIT3	INTEGER	ARRAY		REFS	5	19	62	DEFINED	18	47	
2357	V	REAL			REFS	45	65	79	80	81	82	
					DEFINED	37	45					

***** L04 *****

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```
      400 READ(30)   YIN,ZIN,YOUT,ZOUT,TN,
230         1    (PC(M),(XA(L,M),YA(L,M),ZA(L,M),L=1,2),XA(3,M),XA(4,M),
            2          (XA(L,M),YA(L,M),ZA(L,M),L=5,6),XA(7,M),XA(8,M),
            3     AP(M),CB(M),(TC(L,M),L=1,6),M=1,NCP)
          C  SET UP MISSING REFERENCE SYSTEM COORDINATES
            DO 40 K=1,NCP
235         YA(3,K) = YA(1,K)
            ZA(3,K) = ZA(1,K)
            YA(4,K) = YA(2,K)
            ZA(4,K) = ZA(2,K)
          C     TRANSFORM REFERENCE COORDINATES TO LOCAL SYSTEM
240         DO 41 J=1,6
            XN(J,K) =  XA(J,K)-XZ
            YN(J,K) = (YA(J,K)-YZ)*COS(TN) + (ZA(J,K)-ZZ)*SIN(TN)
           41 ZN(J,K) = (ZA(J,K)-ZZ)*COS(TN) - (YA(J,K)-YZ)*SIN(TN)
           40 CONTINUE
245       C     GENERATE MISSING ROW DATA
            RN= 0
            DO 45 J=1,NCP
            IF(PC(J).NE.1.0)   GO TO 450
            RN= RN+1
250         NP= 0
            AR= 0.0
            AY= 0.0
          450 NP= NP+1
            AR= AR+AP(J)
255         AY= AY+AP(J)*YN(5,J)
            IF(PC(J).NE.-1.0)   GO TO 45
            TNP(RN)= NP
            TYL(RN)= AY/AR
           45 CONTINUE
260         NR= RN
            TND= TN*57.2958
            PRINT 4500,   NR,TND
         4500 FORMAT(* NUMBER OF ROWS =*,I3,11X,*THETA =*,F7.2,*  DEG*//)
          C     WRITE, PUNCH SURFACE/AXIS DATA
265         WRITE(20)      N,(SANAME(L,N),L=1,4),(SABODY(L,N),L=1,2),
           1               BTC(N),SC(N),NR,SREF(N),BREF(N),CREF(N),CAVG
            IF(GOP.NE.4)   GO TO 460
            PUNCH 3010,    N,(SANAME(L,N),L=1,4),(SABODY(L,N),L=1,2),
           1               BTC(N),SC(N),NR,SREF(N),BREF(N),CREF(N)
270       C     READ AND PRINT INTEGRATION AXIS DATA
          450 READ(1,4600)   XAZ,YAZ,LAD
         4600 FORMAT(3F10.0)
            PRINT 4601,    XAZ,YAZ,LAD
         4601 FORMAT(* INTEGRATION AXIS DEFINITION*,
275        1   T42,*ORIGIN AT   XN =*,F10.3/
            2   T42,*           YN =*,F10.3/
            3   T42,*SWEEP ANGLE    =*,F10.3,*  DEG*//)
          C     TRANSFORM LOCAL COORDINATES TO AXIS SYSTEM
            LA= -LAD/57.2958
280         DO 47 K=1,NCP
            DO 48 J=1,6
            XA(J,K) = (XN(J,K)-XAZ)*COS(LA) + (YN(J,K)-YAZ)*SIN(LA)
           48 YA(J,K) = (YN(J,K)-YAZ)*COS(LA) - (XN(J,K)-XAZ)*SIN(LA)
           47 CONTINUE
285       C     PRINT ROW DATA
```

NASA DFRC


```
                IF(SB)          GO TO 999
                SB=.TRUE.
60              GO TO 100
            999 RETURN
                END
```

SUBROUTINE SYNC 73/74 OPT=1 FTN 4.2+75060 07/29/81 16.31.53. PAGE 3

SYMBOLIC REFERENCE MAP (R=3)

ENTRY POINTS DEF LINE REFERENCES
3 SYNC 1 51

VARIABLES	SN	TYPE		RELOCATION								
252	AC	INTEGER	ARRAY	GENCOM	REFS	6	18					
304	A1	REAL	ARRAY	POPCOM	REFS	16	22	DEFINED	40			
1062	BARM	REAL		GOPCOM	REFS	12	20	DEFINED	33	48		
705	BREF	REAL	ARRAY	GOPCOM	REFS	11	20	DEFINED	24			
456	BTC	INTEGER	ARRAY	GOPCOM	REFS	9	20	DEFINED	24			
315	B1	REAL	ARRAY	POPCOM	REFS	16	22	DEFINED	40			
1072	C	REAL	ARRAY	GOPCOM	REFS	12	20					
1051	CAVG	REAL		GOPCOM	REFS	11	20	DEFINED	24			
1070	CL	INTEGER		GOPCOM	REFS	10	20					
1067	CN	INTEGER		GOPCOM	REFS	10	20					
351	CPBODY	INTEGER	ARRAY	POPCOM	REFS	14	22	2*51	DEFINED	42		
364	CPL	REAL		POPCOM	REFS	17	22	DEFINED	58			
363	CPR	REAL		POPCOM	REFS	17	22	DEFINED	58			
362	CPS	REAL		POPCOM	REFS	17	22	DEFINED	58			
767	CREF	REAL	ARRAY	GOPCOM	REFS	11	20	DEFINED	24			
1056	CROW	REAL		GOPCOM	REFS	11	20	DEFINED	31	46		
1071	CT	INTEGER		GOPCOM	REFS	10	20					
0	DN	INTEGER		POPCOM	REFS	14	22	43	I/O REFS	37	38	39
						40	42	55	58			
1	DUMMY	INTEGER	ARRAY	POPCOM	REFS	14	22					
1053	ETA	REAL		GOPCOM	REFS	11	20	DEFINED	31	46		
550	FAL	REAL	ARRAY	GENCOM	REFS	8	18					
5764	FCL	REAL	ARRAY	GENCOM	REFS	8	18					
0	GOP	INTEGER		GENCOM	REFS	6	18					
300	I	INTEGER			DEFINED	30	45	54				
16152	IC	INTEGER		GENCOM	REFS	18	38	4*40	41			
340	IMR	INTEGER	ARRAY	POPCOM	REFS	14	22	DEFINED	41			
355	INAF	INTEGER		POPCOM	REFS	15	22	54	DEFINED	53		
360	INPT	INTEGER		POPCOM	REFS	15	22	57	DEFINED	56		
337	INTB	INTEGER		POPCOM	REFS	14	22					
4	IOP	INTEGER		GENCOM	REFS	6	18					
301	J	INTEGER			REFS	38	DEFINED	32	38	47	57	
277	L	INTEGER			REFS	2*24	DEFINED	2*24				
16153	LRC	INTEGER	ARRAY	GENCOM	REFS	7	18					
544	LRVL	INTEGER	ARRAY	GENCOM	REFS	6	18					
0	M	INTEGER		F.P.	REFS	26	27	28	DEFINED	1		
272	MR	REAL		POPCOM	REFS	16	22	41	DEFINED	40		
366	MRN	INTEGER	ARRAY	POPCOM	REFS	15	22					
273	M1	REAL	ARRAY	POPCOM	REFS	16	22	DEFINED	40			
1	N	INTEGER		GOPCOM	REFS	9	20	7*24	26	27	28	2*51
					DEFINED	24						
353	NAF	REAL		POPCOM	REFS	16	22	53	DEFINED	42		
1065	NALD	INTEGER		GOPCOM	REFS	10	20					
256	NC	INTEGER		GENCOM	REFS	6	18					
1055	NP	INTEGER		GOPCOM	REFS	10	20	32	47	DEFINED	31	46
357	NPT	REAL		POPCOM	REFS	16	22	56	DEFINED	55		
622	NR	INTEGER		GOPCOM	REFS	9	20	30	45	DEFINED	24	
0	NSAD	INTEGER		GOPCOM	REFS	9	20					
257	NSB	INTEGER		GENCOM	REFS	6	18					
1066	NT	INTEGER		GOPCOM	REFS	10	20					
271	NTB	REAL		POPCOM	REFS	16	22	DEFINED	40			

***** M03 *****

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VARIABLES	SN	TYPE		RELOCATION								
16156	VBT	INTEGER	ARRAY	GENCOM	REFS	9	11					
13200	WAL	REAL	ARRAY	GENCOM	REFS	10	11	176	180	193	240	241
						244	245	246	247	248	251	252	253
						254	256	257	258	260	261	262	263
						2*266	2*267	2*268	2*269	301	302	303	307
						308	309	310	311	313	314	315	317
						318	319	321	322	324	326	327	328
						330	331	332	334	335	336	337	338
						2*342	2*343	2*344	345	346	DEFINED	176	190
						191	192	244	245	251	252	256	260
						266	267	307	308	309	313	317	321
						326	330	334	342	343	344		
14564	WCL	REAL	ARRAY	GENCOM	REFS	10	11	175	180	189	190	191	
						192	193	2*264	2*265	2*268	2*269	2*339	2*340
						2*341	345	346	DEFINED	175	189	262	263
						264	265	336	337	338	339	340	341
152	WGI	LOGICAL	ARRAY	GENCOM	REFS	7	11						
6	WGR	LOGICAL	ARRAY	GENCOM	REFS	7	11						
70	WGS	LOGICAL	ARRAY	GENCOM	REFS	7	11						
234	WGW	LOGICAL	ARRAY	GENCOM	REFS	7	11	52	53	54	55	56	
						57	58	187	226	237	285	299	
5	WOP	INTEGER		GENCOM	REFS	8	11						
2342	WTN	INTEGER			REFS	5	24	52	53	54	55	56	
						57	58	69	72	2*75	76	86	126
						186	200	DEFINED	21	48			
2422	WTNAME	INTEGER	ARRAY		REFS	5	24	69	DEFINED	21	48		
2346	XHT	REAL			REFS	24	72	241	246	248	253		
					DEFINED	21	48						
2350	XVT	REAL			REFS	24	72	302	310	DEFINED	21	48	
2371	YD	REAL			REFS	138	DEFINED	81					
2347	YHT	REAL			REFS	24	72	319	322	323	324	327	
					DEFINED	21	48	323					
2351	ZVT	REAL			REFS	24	72	303	310	DEFINED	21	48	

FILE NAMES	MODE							
OUTPUT	FMT	WRITES	62	65	69	72	76	157	159	161
		177	180	193	239	246	253	257	261	268
		269	300	310	314	318	322	327	331	335
		345	346							
TAPE1	FMT	READS	18	21	26					
TAPE40	UNFMT	WRITES	19	24	27	READS	47	48	51	
		MOTION	13	46						

EXTERNALS	TYPE	ARGS	REFERENCES	
EOF	REAL	1	23	49

STATEMENT LABELS		DEF LINE	REFERENCES	
0	10	27	25	
1242	30	366	33	49
0	40	51	50	
0	61	104	103	
0	62	123	122	
0	70	177	168	
0	72	170	169	
0	75	176	174	
0	77	189	188	
0	81	210	206	

***** MO4 *****

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```
      PRINT 4900
 4900 FORMAT(* ROW DATA*//*   NUMBER*,7X,*YN*,9X,*NUMBER OF PANELS*/)
      DO 49 J=1,NR
   49 PRINT 4901,   J,TYL(J),TNP(J)
 4901 FORMAT(* *,I5,5X,F10.3,I10)
C     GENERATE PANEL DATA
      PRINT 3502
      PRINT 4910
 4910 FORMAT(* PANEL DATA*//*   INDEX*,7X,*AREA-IN2*,8X,*BARM-IN*,8X,
     1      *1AM-IN*)
      RN= 0
      NLP= 28+NR
      DO 50 J=1,NCP
C     SET INDEXES AND WRITE,PUNCH ROW DATA IF LEADING EDGE PANEL
      IF(PC(J).NE.1.0)   GO TO 495
      RN= RN+1
      PN(1)= RN
      PN(2)= 0
      NLP= NLP+TNP(RN)+1
C     CHECK FOR NEW PAGE
      IF(NLP.LE.60)   GO TO 497
      PRINT 3500
      PRINT 3501
      PRINT 4910
      NLP= 8+TNP(RN)
  497 PRINT 3501
      WRITE(20)     RN,ETA,TYL(RN),TNP(RN),CROW
      IF(GOP.NE.4)   GO TO 495
      PUNCH 3111,   RN,TYL(RN),TNP(RN)
  495 PN(2)= PN(2)+1
      JJ= 0
C     CHECK FOR ENTIRE PANEL INBOARD OF BENDING AXIS
      IF(YA(1,J).LE.0.0.A.YA(2,J).LE.0.0.A.
     1   YA(3,J).LE.0.0.A.YA(4,J).LE.0.0)   GO TO 660
C     CHECK FOR ENTIRE PANEL OUTBOARD OF BENDING AXIS
      IF(YA(1,J).GE.0.0.A.YA(2,J).GE.0.0.A.
     1   YA(3,J).GE.0.0.A.YA(4,J).GE.0.0)   GO TO 670
C     PANEL CUT BY BENDING AXIS
  500 JJ= 90
      NV= 0
      DO 55 K=1,3
      ST(K)= 0.0
      XT(K)= 0.0
   55 YT(K)= 0.0
C     GENERATE NEW PANEL CORNER POINTS
C     TEST CORNER POINT 1
      IF(YA(1,J).LT.0.0)   GO TO 510
      NV= NV+1
      X(NV)= XA(1,J)
      Y(NV)= YA(1,J)
C     TEST CORNER POINT 1 TO 2
  510 IF((YA(1,J)*YA(2,J)).GE.0.0)   GO TO 520
      NV= NV+1
      X(NV)= (XA(1,J)*YA(2,J)-XA(2,J)*YA(1,J))/(YA(2,J)-YA(1,J))
      Y(NV)= 0.0
C     TEST CORNER POINT 2
  520 IF(YA(2,J).LT.0.0)   GO TO 530
```

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SYMBOLIC REFERENCE MAP (R=3)

ENTRY POINTS DEF LINE REFERENCES
1 POPSR 1 6,1

VARIABLES	SN	TYPE		RELOCATION								
252	AC	INTEGER	ARRAY	GENCOM	REFS	6	14					
304	A1	REAL	ARRAY	POPCOM	REFS	12	16	32	DEFINED	31		
315	B1	REAL	ARRAY	POPCOM	REFS	12	16	32	DEFINED	31		
351	CPBODY	INTEGER	ARRAY	POPCOM	REFS	10	16	39	DEFINED	38		
364	CPL	REAL		POPCOM	REFS	13	16	49	DEFINED	48		
363	CPR	REAL		POPCOM	REFS	13	16	49	DEFINED	48		
362	CPS	REAL		POPCOM	REFS	13	16	49	DEFINED	48		
0	DN	INTEGER		POPCOM	REFS	10	16	DEFINED	23	I/O REFS	25	27
						30	32	39	44	49		
1	DUMMY	INTEGER	ARRAY	POPCOM	REFS	10	16					
550	FAL	REAL	ARRAY	GENCOM	REFS	8	14					
5764	FCL	REAL	ARRAY	GENCOM	REFS	8	14					
0	GOP	INTEGER		GENCOM	REFS	6	14					
251	I	INTEGER			REFS	23	26	27	4*31	4*32	35	
					DEFINED	22						
16152	IC	INTEGER		GENCOM	REFS	14						
340	IMR	INTEGER	ARRAY	POPCOM	REFS	10	16	DEFINED	35			
355	INAF	INTEGER		POPCOM	REFS	11	16	42	DEFINED	41		
360	INPT	INTEGER		POPCOM	REFS	11	16	47	DEFINED	46		
337	INTP	INTEGER		POPCOM	REFS	10	16	37	DEFINED	34	36	
4	IOP	INTEGER		GENCOM	REFS	6	14					
253	J	* INTEGER			DEFINED	37						
254	K	* INTEGER			DEFINED	42						
255	L	* INTEGER			DEFINED	47						
16153	LRC	INTEGER	ARRAY	GENCOM	REFS	7	14					
544	LRVL	INTEGER	ARRAY	GENCOM	REFS	6	14					
252	M	INTEGER			REFS	26	27	DEFINED	26	27		
272	MR	REAL		POPCOM	REFS	12	16	32	35	DEFINED	31	
366	MRN	INTEGER	ARRAY	POPCOM	REFS	11	16					
273	M1	REAL	ARRAY	POPCOM	REFS	12	16	32	DEFINED	31		
353	NAF	REAL		POPCOM	REFS	12	16	39	41	DEFINED	38	
256	NC	INTEGER		GENCOM	REFS	6	14	22				
357	NPT	REAL		POPCOM	REFS	12	16	44	46	DEFINED	43	
257	NSB	INTEGER		GENCOM	REFS	6	14	36	57			
271	NTB	REAL		POPCOM	REFS	12	16	32	34	DEFINED	31	
1	POP	INTEGER		GENCOM	REFS	6	14					
326	Q1	REAL	ARRAY	POPCOM	REFS	12	16	32	DEFINED	31		
260	RD	REAL	ARRAY	GENCOM	REFS	8	14					
2	ROP	INTEGER		GENCOM	REFS	6	14					
16161	RS	LOGICAL		GENCOM	REFS	5	14					
370	SB	LOGICAL		POPCOM	REFS	9	16	24	36	58		
					DEFINED	18	59					
16150	SCN	INTEGER	ARRAY	GENCOM	REFS	6	14					
3	SOP	INTEGER		GENCOM	REFS	6	14					
354	THETA	REAL		POPCOM	REFS	12	16	39	DEFINED	38		
5	TIT1	INTEGER	ARRAY	POPCOM	REFS	10	16	27	DEFINED	26		
247	TIT2	INTEGER	ARRAY	POPCOM	REFS	10	16	30	DEFINED	29		
16156	VBT	INTEGER	ARRAY	GENCOM	REFS	7	14					
13200	WAL	REAL	ARRAY	GENCOM	REFS	8	14					
14564	WCL	REAL	ARRAY	GENCOM	REFS	8	14					
152	WGI	LOGICAL	ARRAY	GENCOM	REFS	5	14					

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VARIABLES	SN	TYPE		RELOCATION						
1057	PN	INTEGER	ARRAY	GOPCOM	REFS	10	20	DEFINED	33	48
1	POP	INTEGER		GENCOM	REFS	6	18			
326	Q1	REAL	ARRAY	POPCOM	REFS	16	22	DEFINED	40	
260	RD	REAL	ARRAY	GENCOM	REFS	8	18			
1052	RN	INTEGER		GOPCOM	REFS	10	20	DEFINED	31	46
2	ROP	INTEGER		GENCOM	REFS	6	18			
16161	RS	LOGICAL		GENCOM	REFS	5	18			
0	R1	RETURNS			REFS	35	DEFINED	1		
0	R2	RETURNS			REFS	50	DEFINED	1		
312	SABODY	INTEGER	ARRAY	GOPCOM	REFS	9	20	2*51	DEFINED	24
2	SANAME	INTEGER	ARRAY	GOPCOM	REFS	9	20	DEFINED	24	
370	SB	LOGICAL		POPCOM	REFS	13	22			
540	SC	INTEGER	ARRAY	GOPCOM	REFS	9	20	DEFINED	24	
16150	SCN	INTEGER	ARRAY	GENCOM	REFS	6	18			
3	SOP	INTEGER		GENCOM	REFS	6	18			
1061	SP	REAL		GOPCOM	REFS	12	20	DEFINED	33	48
623	SREF	REAL	ARRAY	GOPCOM	REFS	11	20	DEFINED	24	
1063	TARM	REAL		GOPCOM	REFS	12	20	DEFINED	33	48
354	THETA	REAL		POPCOM	REFS	16	22	DEFINED	42	
5	TIT1	INTEGER	ARRAY	POPCOM	REFS	14	22	DEFINED	38	
247	TIT2	INTEGER	ARRAY	POPCOM	REFS	14	22	DEFINED	39	
16156	VBT	INTEGER	ARRAY	GENCOM	REFS	7	18			
13200	WAL	REAL	ARRAY	GENCOM	REFS	8	18			
14564	WCL	REAL	ARRAY	GENCOM	REFS	8	18			
152	WGI	LOGICAL	ARRAY	GENCOM	REFS	5	18	28		
6	WGR	LOGICAL	ARRAY	GENCOM	REFS	5	18	26		
70	WGS	LOGICAL	ARRAY	GENCOM	REFS	5	18	27		
234	WGW	LOGICAL	ARRAY	GENCOM	REFS	5	18			
5	WOP	INTEGER		GENCOM	REFS	6	18			
361	XC	REAL		POPCOM	REFS	17	22	DEFINED	58	
1064	XCN	REAL		GOPCOM	REFS	12	20	DEFINED	33	48
365	XR	REAL		POPCOM	REFS	17	22	DEFINED	58	
1054	YL	REAL		GOPCOM	REFS	11	20	DEFINED	31	46
356	YR	REAL		POPCOM	REFS	16	22	DEFINED	55	

FILE NAMES	MODE					
TAPE20	UNFMT	READS	24	31	33	46	48
VARIABLES USED AS FILE NAMES, SEE ABOVE						

EXTERNALS	TYPE	ARGS	REFERENCES
EOF	REAL	1	43

STATEMENT LABELS		DEF LINE	REFERENCES		
0	10	34	30		
0	20	33	32		
0	30	49	45		
0	40	48	47		
0	50	59	54		
0	60	58	57		
55	200	37	26	27	28
102	300	42	60		
124	400	51	43		

LOOPS	LABEL	INDEX	FROM-TO	LENGTH	PROPERTIES
41	10	* I	30 34	12B	EXT REFS NOT INNER
44	20	* J	32 33	5B	EXT REFS
110	30	* I	45 49	12B	EXT REFS NOT INNER

***** NO3 *****

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STATEMENT	LABELS		DEF LINE	REFERENCES								
0	82		223	218								
11	100		21	29								
45	300		33	14								
75	400		48	52	53	54	55	56	57	78	2*200	202
				213	226	285	299	365				
153	500		69	58								
170	600		79	75								
222	610		88	86								
246	620		107	86								
273	630		126	2*86								
315	650		141	86								
325	660		150	86								
334	700		157	105	124	139	148	211	224	234	297	
562	800		200	186	187							
574	810		202	200								
611	820		213	200								
630	850		226	200								
643	860		236	200								
770	870		285	237								
1006	880		299	236								
1263	1000	FMT	20	18								
1302	1001	FMT	22	21								
1335	1002	FMT	28	26								
1377	4000	FMT	63	62								
1430	4001	FMT	66	65								
1460	5000	FMT	70	69								
1500	5001	FMT	73	72								
1514	5010	FMT	77	76								
1526	7000	FMT	158	157								
1534	7001	FMT	160	159								
1542	7002	FMT	162	161								
1573	7500	FMT	179	177								
1612	7600	FMT	181	180								
1634	7700	FMT	195	193								
1727	8600	FMT	270	239	300							
1740	8601	FMT	272	246								
1754	8602	FMT	274	253								
1770	8603	FMT	276	257								
2006	8604	FMT	278	261								
2024	8605	FMT	280	268								
2041	8606	FMT	282	269								
2157	8801	FMT	347	310								
2172	8802	FMT	349	314								
2206	8803	FMT	351	318								
2224	8804	FMT	353	322								
2240	8805	FMT	355	327								
2254	8806	FMT	357	331								
2270	8807	FMT	359	335								
2304	8808	FMT	361	345								
2320	8809	FMT	363	346								

LOOPS	LABEL	INDEX	FROM-TO	LENGTH	PROPERTIES		
20	10	* I	25 27	25B		EXT REFS	
46	30	* IC	33 366	1177B		EXT REFS	NOT INNER
103	40	* I	50 51	14B		EXT REFS	
244	61	I	103 104	2B	INSTACK		
271	62	I	122 123	2B	INSTACK		

***** NO4 *****

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```
                NV= NV+1
                X(NV)= XA(2,J)
                Y(NV)= YA(2,J)
      C         TEST CORNER POINT 2 = 4
        530   IF(XN(2,J).EQ.XN(4,J))   GO TO 560
      C         TEST CORNER POINT 2 TO 4
        540   IF((YA(2,J)*YA(4,J)).GE.0.0)   GO TO 550
                NV= NV+1
                X(NV)= (XA(2,J)*YA(4,J)-XA(4,J)*YA(2,J))/(YA(4,J)-YA(2,J))
                Y(NV)= 0.0
      C         TEST CORNER POINT 4
        550   IF(YA(4,J).LT.0.0)   GO TO 560
                NV= NV+1
                X(NV)= XA(4,J)
                Y(NV)= YA(4,J)
      C         TEST CORNER POINT 4 TO 3
        560   IF((YA(4,J)*YA(3,J)).GE.0.0)   GO TO 570
                NV= NV+1
                X(NV)= (XA(4,J)*YA(3,J)-XA(3,J)*YA(4,J))/(YA(3,J)-YA(4,J))
                Y(NV)= 0.0
      C         TEST CORNER POINT 3 = 1
        570   IF(XN(3,J).EQ.XN(1,J))   GO TO 600
      C         TEST CORNER POINT 3
        580   IF(YA(3,J).LT.0.0)   GO TO 590
                NV= NV+1
                X(NV)= XA(3,J)
                Y(NV)= YA(3,J)
      C         TEST CORNER POINT 3 TO 1
        590   IF((YA(3,J)*YA(1,J)).GE.0.0)   GO TO 600
                NV= NV+1
                X(NV)= (XA(3,J)*YA(1,J)-XA(1,J)*YA(3,J))/(YA(1,J)-YA(3,J))
                Y(NV)= 0.0
      C         CHECK NUMBER OF TRIANGLES IN POLYGON
        600   IF(NV.GE.3.A.NV.LE.5)   GO TO 610
                JJ= 99
                GO TO 660
      C         COMPUTE AREA AND CENTROID - FIRST TRIANGLE
        610   ST(1)=-(X(1)*(Y(2)-Y(3))+X(2)*(Y(3)-Y(1))+X(3)*(Y(1)-Y(2)))/2.0
                XT(1)= (X(1)+X(2)+X(3))/3.0
                YT(1)= (Y(1)+Y(2)+Y(3))/3.0
                IF(ST(1).LE.0.0)   JJ=91
                IF(YT(1).LE.0.0)   JJ=91
                IF(NV.EQ.3)   GO TO 650
      C         COMPUTE AREA AND CENTROID - SECOND TRIANGLE
                ST(2)=-(X(1)*(Y(3)-Y(4))+X(3)*(Y(4)-Y(1))+X(4)*(Y(1)-Y(3)))/2.0
                XT(2)= (X(1)+X(3)+X(4))/3.0
                YT(2)= (Y(1)+Y(3)+Y(4))/3.0
                IF(ST(2).LE.0.0)   JJ=92
                IF(YT(2).LE.0.0)   JJ=92
                IF(NV.EQ.4)   GO TO 650
      C         COMPUTE AREA AND CENTROID - THIRD TRIANGLE
                ST(3)=-(X(1)*(Y(4)-Y(5))+X(4)*(Y(5)-Y(1))+X(5)*(Y(1)-Y(4)))/2.0
                XT(3)= (X(1)+X(4)+X(5))/3.0
                YT(3)= (Y(1)+Y(4)+Y(5))/3.0
                IF(ST(3).LE.0.0)   JJ=93
                IF(YT(3).LE.0.0)   JJ=93
      C         COMPUTE TOTAL EFFECTIVE PANEL AREA AND ARMS
```

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VARIABLES	SN	TYPE	RELOCATION								
6	WGR	LOGICAL	ARRAY	GENCOM	REFS	5	14				
70	WGS	LOGICAL	ARRAY	GENCOM	REFS	5	14				
234	WGW	LOGICAL	ARRAY	GENCOM	REFS	5	14				
5	WOP	INTEGER		GENCOM	REFS	6	14				
361	XC	REAL		POPCOM	REFS	13	16	49	DEFINED	48	
365	XR	REAL		POPCOM	REFS	13	16	49	DEFINED	48	
356	YR	REAL		POPCOM	REFS	12	16	44	DEFINED	43	

FILE NAMES	MODE						
TAPE1	FMT	READS	26	29	31	38	43	48

VARIABLES USED AS FILE NAMES, SEE ABOVE

STATEMENT LABELS			DEF LINE	REFERENCES	
0	10		53	22	
0	20		52	37	
0	30		51	42	
0	40		49	47	
3	100		22	60	
57	200		36	24	
123	999		61	57	58
135	1001	FMT	28	26	29
171	1002	FMT	33	31	
207	1003	FMT	43	38	
224	1004	FMT	45	43	
246	1005	FMT	50	48	

LOOPS	LABEL	INDEX	FROM-TO	LENGTH	PROPERTIES
4	10	* I	22 53	113B	EXT REFS NOT INNER
63	20	* J	37 52	32B	EXT REFS NOT INNER
72	30	* K	42 51	20B	EXT REFS NOT INNER
101	40	* L	47 49	7B	EXT REFS

COMMON BLOCKS	LENGTH	MEMBERS - BIAS NAME(LENGTH)								
GENCOM	7282	0	GOP	(1)	1	POP	(1)	2	ROP	(1)
		3	SOP	(1)	4	IOP	(1)	5	WOP	(1)
		6	WGR	(50)	56	WGS	(50)	106	WGI	(50)
		156	WGW	(14)	170	AC	(4)	174	NC	(1)
		175	NSB	(1)	176	RU	(180)	356	LRVL	(4)
		360	FAL	(2700)	3060	FCL	(2700)	5760	WAL	(756)
		6516	WCL	(756)	7272	SCN	(2)	7274	IC	(1)
		7275	LRC	(3)	7278	VBT	(3)	7281	RS	(1)
POPCOM	249	0	DN	(1)	1	DUMMY	(4)	5	TIT1	(162)
		167	TIT2	(18)	185	NTB	(1)	186	MR	(1)
		187	M1	(9)	196	A1	(9)	205	B1	(9)
		214	Q1	(9)	223	INTB	(1)	224	IMR	(9)
		233	CPBODY	(2)	235	NAF	(1)	236	THETA	(1)
		237	INAF	(1)	238	YR	(1)	239	NPT	(1)
		240	INPT	(1)	241	XC	(1)	242	CPS	(1)
		243	CPR	(1)	244	CPL	(1)	245	XR	(1)
		246	MRN	(2)	248	SB	(1)			

STATISTICS

PROGRAM LENGTH	236B	174
CM LABELED COMMON LENGTH	16553B	7531

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SUBROUTINE SYNC 73/74 OPT=1 FTN 4.2+75060 07/29/81 16.31.53. PAGE 5

LOOPS	LABEL		INDEX	FROM-TO	LENGTH	PROPERTIES
113	40	*	J	47 48	5B	EXT REFS
135	50	*	I	54 59	14B	EXT REFS NOT INNER
142	60	*	J	57 58	5B	EXT REFS

COMMON BLOCKS	LENGTH	MEMBERS - BIAS	NAME	(LENGTH)							
GENCOM	7282	0	GOP	(1)	1	POP	(1)	2	ROP	(1)	
		3	SOP	(1)	4	IOP	(1)	5	WOP	(1)	
		6	WGR	(50)	56	WGS	(50)	106	WGI	(50)	
		156	WGW	(14)	170	AC	(4)	174	NC	(1)	
		175	NSB	(1)	176	RD	(180)	356	LRVL	(4)	
		360	FAL	(2700)	3060	FCL	(2700)	5760	WAL	(756)	
		6516	WCL	(756)	7272	SCN	(2)	7274	IC	(1)	
		7275	LRC	(3)	7278	VBT	(3)	7281	RS	(1)	
GOPCOM	573	0	NSAD	(1)	1	N	(1)	2	SANAME	(200)	
		202	SABODY	(100)	302	BTC	(50)	352	SC	(50)	
		402	NR	(1)	403	SREF	(50)	453	BREF	(50)	
		503	CREF	(50)	553	CAVG	(1)	554	RN	(1)	
		555	ETA	(1)	556	YL	(1)	557	NP	(1)	
		558	CROW	(1)	559	PN	(2)	561	SP	(1)	
		562	BARM	(1)	563	TARM	(1)	564	XCN	(1)	
		565	NALD	(1)	566	NT	(1)	567	CN	(1)	
		568	CL	(1)	569	CT	(1)	570	C	(3)	
POPCOM	249	0	DN	(1)	1	DUMMY	(4)	5	TIT1	(162)	
		167	TIT2	(18)	185	NTB	(1)	186	MR	(1)	
		187	M1	(9)	196	A1	(9)	205	B1	(9)	
		214	Q1	(9)	223	INTB	(1)	224	IMR	(9)	
		233	CPBODY	(2)	235	NAF	(1)	236	THETA	(1)	
		237	INAF	(1)	238	YR	(1)	239	NPT	(1)	
		240	INPT	(1)	241	XC	(1)	242	CPS	(1)	
		243	CPR	(1)	244	CPL	(1)	245	XR	(1)	
		246	MRN	(2)	248	SB	(1)				

STATISTICS

PROGRAM LENGTH	302B	194
CM LABELED COMMON LENGTH	17650B	8104

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LOOPS	LABEL		INDEX	FROM-TO	LENGTH	PROPERTIES
350	70	*	I	168 177	50B	EXT REFS NOT INNER
354	72		J	169 170	2B	INSTACK
372	75	*	J	174 176	11B	OPT
422		*	J	180	14B	EXT REFS
437		*	J	180	14B	EXT REFS
465	77	*	J	188 189	11B	OPT
530		*	J	193	14B	EXT REFS
545		*	J	193	14B	EXT REFS
604	81		I	206 210	4B	INSTACK
623	82		I	218 223	5B	INSTACK
1166		*	J	345	11B	EXT REFS
1200		*	J	345	11B	EXT REFS
1215		*	J	346	11B	EXT REFS
1227		*	J	346	11B	EXT REFS

COMMON BLOCKS	LENGTH	MEMBERS - BIAS	NAME	(LENGTH)							
GENCOM	7282	0	GOP	(1)	1	POP	(1)	2	ROP	(1)	
		3	SOP	(1)	4	IOP	(1)	5	WOP	(1)	
		6	WGR	(50)	56	WGS	(50)	106	WGI	(50)	
		156	WGW	(14)	170	AC	(4)	174	NC	(1)	
		175	NSB	(1)	176	RD	(180)	356	LRVL	(4)	
		360	FAL	(2700)	3060	FCL	(2700)	5760	WAL	(756)	
		6516	WCL	(756)	7272	SCN	(2)	7274	IC	(1)	
		7275	LRC	(3)	7278	VBT	(3)	7281	RS	(1)	

STATISTICS

PROGRAM LENGTH	2624B	1428
CM LABELED COMMON LENGTH	16162B	7282