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A STRUCTURAL WEIGHT ESTIMATION PROGRAM
(SWEEP) FOR AIRCRAFT. VOLUME XI - FLEXIBLE
AIRLOADS STAND-ALONE PROGRAM

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Rockwell International Corporation

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20. ABSTRACT (Continue on reverse side if necessary and identify by block number) Three computer programs were written with the objective of predicting the structural weight of aircraft through analytical methods. The first program, the structural weight estimation program (SWEEP), is a completely integrated program including routines for airloads, loads spectra, skin tem- peratures, material properties, flutter stiffness requirements, fatigue life, structural sizing, and for weight estimation of each of the major aircraft structural components. The program produces first-order weight estimates		

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and indicates trends when parameters are varied. Fighters, bombers, and cargo aircraft can be analyzed by the program. The program operates within 100,000 octal units on the Control Data Corporation 6600 computer. Two stand-alone programs operating within 100,000 octal units were also developed to provide optional data sources for SWEEP. These include (1) the flexible airloads program to assess the effects of flexibility on lifting surface airloads, and (2) the flutter optimization program to optimize the stiffness distribution required for lifting surface flutter prevention.

The final report is composed of 11 volumes. This volume (Volume XI) contains the methodology, program description, and user's information for the flexible loads stand-alone program.

PREFACE

This report was prepared by Rockwell International Corporation, Los Angeles Aircraft Division, Los Angeles, California, under Contract F33615-71-C-1922, No. FX2826-71-01876/C093. The work was performed for the Deputy for Development Planning, Air Force System Command, Wright-Patterson Air Force Base, Ohio, and extended from September 1971 to June 1974.

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The final report was published in 11 volumes; the complete list is as follows:

Volume

I	"Executive Summary"
II	"Program Integration and Data Management Module"
III	"Airloads Estimation Module"
IV	"Material Properties, Structure Temperature, Flutter, and Fatigue"
V	"Air Induction System and Landing Gear Modules"
VI	"Wing and Empennage Module"
VII	"Fuselage Module"
VIII	"Programmer's Manual"
IX	"User's Manual"
X	"Flutter Optimization Stand-Alone Program"
XI	"Flexible Airloads Stand-Alone Program"

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LIST OF SYMBOLS

A	Aspect ratio
A_W	Wing aspect ratio
AF(I)	Load on wing strips, I
AFW(I,J)	Matrix of rigid wingloads on strips, I, for load distributions, J
AFWCP(I,J)	Matrix of wing strip centers of pressure, X/C, on strips, I, for load distributions, J
AFWDF(I,J)	Matrix of incremental flexible wingloads on strips, I, for load distributions, J
AFWF(I,J)	Matrix of flexible wingloads on strips, I, for load distributions, J
A_{NMAX}	Maximum cross-sectional area of body nose, in. ²
B	Compressibility factor, $(1-M^2)^{1/2}$ or Cotangent of mach angle, $(M^2-1)^{1/2}$
b	Span of lifting surface, ft
b_{FI}	Spanwise distance from centerline of symmetry to inboard end of wing flap, in.
b_{FO}	Spanwise distance from centerline of symmetry to outboard end of wing flap, in.
BL_{BS}	Butt line station of interface of wing and body, in.
BL	Butt line station, in.
C	Lifting surface chord, in.
C_{AV}	Average lifting surface chord, b/S, in.

C_F	Wing flap chord, in.
C_L	Lifting surface lift coefficient
C_l	Section lift coefficient
$C_{L\omega WF}$	Flexible wing lift-curve slope, per radian
$C_{L\omega WO}$	Initial rigid wing lift-curve slope, per radian
$C_{L\omega WR}$	Rigid wing lift-curve slope, per radian
C_R	Root chord of theoretical wing, in.
C_W	Wing chord, in.
C_A	Chord length measure normal to load reference line, in.
CLA	Lift curve slope for wing or horizontal tail, per radian
CYB	Lift curve slope for vertical tail, per radian
DF or δ_F	Wing flap deflection, deg
DMDH	Incremental horizontal tail rolling moment to be applied to vee-type vertical tail only, in.-lb
DXB(W)N	X-distance from wing apex to center of pressure of wing unit carry-over load on body for distribution N, in.
DXH	X-distance from horizontal tail apex to center of pressure of horizontal tail unit airload, including carry-over load, in.

DXW(B)N	X-distance from wing apex to center of pressure of unit airload on exposed wing for distribution N, in.
DXWN	X-distance from wing apex to center of pressure of unit airload on wing, including carry-over load for distribution N, in.
DXW1	X-distance from wing apex to center of pressure of airload on wing, including carry-over load for flexible wing lift due to angle of attack, in.
DXW2	X-distance from wing apex to center of pressure of airload on wing, including carry-over load for rigid wing lift due to wing flap deflection, in.
DXW3	X-distance from wing apex to center of pressure of airload on wing, including carry-over load for incremental flexible wing lift due to wing flap deflection, in.
DXW4	X-distance from wing apex to center of pressure of airload on wing, including carry-over load for flexible wing lift due to vertical acceleration, in.
EI	Wing bending stiffness, lb-in. ²
F(J,1)	Summation of rigid wing unit loads on strips 1 through 10 for distribution J
F(J,2)	Summation of flexible wing unit loads on strips 1 through 10 for distribution J
F(J,3)	Summation of incremental flexible wing unit airloads on strips 1 through 10 for distribution J
F(J,4)	Ratio of flexible load to rigid load, $F(J,2) \div (F(J,1))$
FS	Fuselage station, in.
FS _{EA=0}	Fuselage station at intersection of wing elastic with plane of symmetry, in.

GJ	Wing torsional stiffness, lb-in. ²
I	Integer used to designate wing strip number
I _y	Airplane pitching moment of inertia, slug ft ²
I _z	Airplane yawing moment of inertia, slug ft ²
J	Integer used to designate wing-loading distribution, i.e., J=1, loading due to angle of attack J=2, loading due to flap deflection J=3, loading due to vertical acceleration
K _{BF}	Flap span normalizing parameter
K _{CF}	Flap lift effectiveness parameter, $(dC_L/d\delta_F) \div (dC_L/d\alpha)$
K _g	Gust alleviation factor
K _{uz}	Span-loading normalizing parameter
ℓ _N	Body nose length (x-distance from body nose to cross section of maximum area), in.
M	Mach number
m	Cotangent of leading edge sweep angle
M _{xA}	Bending moment along load reference line in swept reference system, in.-lb
M _{yA}	Torsional moment along load reference line about load reference line, in.-lb
M _{x(SOB)}	Exposed lifting surface panel rolling moment at body interface station (for wing, horizontal tail, or vertical tail), in.-lb

M_y (SOB)	Exposed lifting surface panel pitching moment at intersection of load reference line and body interface station (for wing or horizontal tail), in.-lb
M_z (SOB)	Exposed lifting surface panel yawing moment at intersection of load reference line and body interface station (for vertical tail), in.-lb
N	Integer used to designate type of wing airload distribution, i.e., N=1, flexible lift due to angle of attack N=2, rigid lift due to flap deflection N=3, incremental flexible lift due to flap deflection N=4, flexible lift due to vertical acceleration
N_y or NY	Airplane side load factor
N_z or NZ	Airplane vertical acceleration
N_{ZL}	Airplane design limit vertical load factor
N_{ZM}	Airplane maneuver vertical load factor
\dot{P}	Airplane pitching acceleration, rad/sec ²
$P_{\Delta FLEX}$	Incremental airload due to flexibility
P_{FLEX}	Flexible airload (rigid load plus incremental load due to flexibility)
P_{RIGID}	Rigid load
P_{WO}	Initial exposed wing panel load
P_{W1}	Initial wing panel load, including carry-over load on body

P_{YVT} or P_{YV}	Vertical tail airload, including carry-over load, lb
P_{YN} or P_{YN}	Side load on body nose, lb
P_{ZH} or P_{ZHB}	Total vertical load on horizontal tail, including carry-over load on body, lb
P_{ZN} OR P_{ZN}	Vertical load on body nose, lb
P_{ZW1} or P_{ZWB1}	Total wing airload, including carry-over load on body for flexible lift due to angle of attack, lb
P_{ZW2} or P_{ZWB2}	Total rigid wing airload due to wing flap deflection, lb
P_{ZW3} or P_{ZWB3}	Total incremental flexible wing airload due to wing flap deflection, lb
P_{ZW4} or P_{ZWB4}	Total flexibility wing airload due to vertical acceleration, lb
$\Delta P(11)$	Wing unit carry-over load on body, per side
$\Delta P_{R\alpha}(I)$	Unit airload on wing strip, I, for rigid wing airload due to angle of attack
ΔP_{RF}	Unit airload on wing strip, I, for rigid wing airload due to wing flap deflection
ΔP_{nZ}	Unit inertia load on wing strip, I, normalized to an exposed wing panel weight of -1.0 lb
ΔP_{ZH}	Increment horizontal tail airload due to gust or pitching acceleration, lb
ΔP_{ZW1}	Increment wing airload due to gust, lb
\dot{Q} or $QDOT$	Airplane pitching acceleration, rad/sec^2
q	Free-stream dynamic pressure, psf

\dot{R} or RDOT	Airplane yawing acceleration, rad/sec ²
RLOADS	Rigid loads at structural influence coefficient points
R_N	Body nose effective radius, in. $\left(= \sqrt{(A_{NMAX}/2 \pi)} \right)$
S_{HT} or S_H	Area of theoretical horizontal tail, ft ²
S_{VT} or S_V	Area of theoretical vertical tail, ft ²
S_W	Area of the theoretical wing, ft ²
$SIC(\bar{x}, \bar{y}; \bar{\xi}, \bar{\eta})$	Structural influence coefficient; i.e., deflection at point \bar{x}, \bar{y} due to a 1-pound load at point $\bar{\xi}, \bar{\eta}$, in./lb
[SIC]	Matrix of structural influence coefficients
[SIC]	Matrix of streamwise slopes
S_{Z_A}	Shear along load reference line, lb
$S_{Z(SOB)}$	Exposed lifting surface shear at intersection of load reference line and body interface station, lb
UL(I)	Average running unit normal loading for wing strip I
UL _{η}	Running unit normal load at η -station along load reference line
UT(I)	Average running unit torsional moment about load reference line for strip I
UT _{η}	Running unit torsional moment about load reference line at η -station along load reference line

ULN Same as UL_{η} or $UL(I)$, but is normalized for a 1-pound wing panel load, including body carry-over load for distribution N, lb-in.

UTN Same as UT_{η} or $UT(I)$, but is normalized for a 1-pound wing panel load, including body carry-over load for distribution N, in.-lb-in.

USZN Unit normalized shear at stations along load reference line for distribution N, lb

UMXTN Unit normalized bending moment at stations along load reference line for distribution N, in.-lb

UMYTN Unit normalized torsional moment about load reference line at stations along load reference line for distribution N, in.-lb

UPZWN (=1.0) Unit normalized wing panel load, including carry-over load on body for distribution N, lb

UMYWN Unit normalized wing panel total pitching moment (including carry-over load) at intersection of load reference line and plane of symmetry for distribution N, in.-lb

USZW(B)N Exposed wing panel unit normalized load for distribution N, lb

UMXW(B)N Exposed wing panel unit normalized rolling moment at body interface station for distribution N, in.-lb

UMYW(B)N Exposed wing panel unit normalized pitching moment at intersection of load reference line and body interface station for distribution N, in.-lb

UPZB(W)N Unit normalized carry-over load on body per side for distribution N, lb

UMYB(W)N Unit normalized pitching moment about intersection of load reference line and plane of symmetry for body carry-over load per side for distribution N, in.-lb

$USZW_{SOB}^2$	Unit normalized exposed wing rigid load due to flap deflection (= $USZW(B)N$ for $N=2$), lb
V_E	Equivalent airspeed, knots
V_N	Body nose volume (over length, l_N), in. ³
W	Airplane gross weight, lb
$W_S(I)$	Weight of wing strip, I, lb
W_{WOP}	Exposed wing panel weight, lb
X	Distance measured along a line parallel to airplane X-axis or fuselage reference line, in.
\bar{x}	Chordwise location of wing structure influence coefficient point where deflection is calculated (see Figure 3), in.
(X/C)	Center of pressure location in fraction of chord
$(X/C)_\alpha$	Center of pressure location in fraction of local chord for lift due to angle of attack
$(X/C)_F$	Center of pressure location in fraction of local chord for rigid lift due to wing flap deflection
$XBW(B)$	Fuselage station of center of pressure of exposed wing airload, in.
$XBB(W)$	Fuselage station of center of pressure of wing carry-over airload on body, in.
XBH	Fuselage station of center of pressure of horizontal tail airload, including carry-over load, in.
XBV	Fuselage station of center of pressure of vertical tail airload, including carry-over load, in.

ΔX_A	Distance aft of load reference line measured normal to load reference line (see Figure 3), in.
$(X/C)_{AFT}$	Location of aft influence coefficient points in fraction of chord (see Figure 3)
$(X/C)_{FWD}$	Location of forward influence coefficient points in fraction of chord (see Figure 3)
$(X/C)_{WS}$	Location of center of gravity at wing strip weight in fraction of wing strip mean chord (see Figure 2)
X_{LE}	Fuselage station of leading edge of wing local chord, in.
X_{CG}	Fuselage station of airplane center of gravity, in.
X_N or X_{BN}	Fuselage station of center of pressure of body nose load, in.
X_O	Fuselage station of body nose station, in.
X_{RW} or X_{WE}	Fuselage station of theoretical wing root chord leading edge, in.
X_{RH} or X_{HE}	Fuselage station of theoretical horizontal tail root chord leading edge, in.
X_{RV} or X_{VE}	Fuselage station of theoretical vertical tail root chord leading edge, in.
$XW1$	Fuselage station of center of pressure of flexible wing airload, including carry-over load, due to angle of attack, in.
$XW2$	Fuselage station of center of pressure of rigid wing airload, including carry-over load, due to flap deflection, in.
$XW3$	Fuselage station of center of pressure of incremental flexible wing airload, including carry-over load, due to flap deflection, in.

XW4	Fuselage station of center of pressure of flexible wing airload, including carry-over load, due to vertical acceleration, in.
\bar{y}	Spanwise location of wing structural influence coefficient point where deflection is calculated (see Figure 3), measured along elastic axis, in.
Y_{FI}	Spanwise station (butt line) of inboard end of wing flap, in.
Y_{FO}	Spanwise station (butt line) of outboard end of wing flap, in.
Y_{BI} , Y_{BS} , Y_{BW} or Y_{BH}	Spanwise station (butt line) of wing-body or horizontal tail-body interface station, in.
$Y_{W(B)N}$	Spanwise station (butt line) of center of pressure of exposed wing airload due to distribution N, in.
Y_{Λ}	Spanwise station along load reference line measured from intersection of load reference line and plane of symmetry, in.
$Y_{BW(B)}$	Spanwise station (butt line) of center of pressure of exposed wing airload, in.
Y_{BH} or Y_H	Spanwise station (butt line) of center of pressure of horizontal airload, including carry-over load, in.
Z_{BI}	Z-distance from vertical tail theoretical root chord to vertical tail-body interface station, in.
Z_{Λ}	Distance along vertical tail load reference line measure from intersection of load reference line and theoretical vertical tail root chord plane, in.
Z_{BV}	Z-distance from theoretical vertical tail root chord to center of pressure of vertical tail airload, in.

α	Angle of attack, radians
α LOAD	Load due to angle of attack
Γ	Vortex strength, $(C_{L1}) V/2$
η	Nondimensional span station, $Y(b/2)$
$\eta(I)$	Nondimensional span station at center of wing strip, I
$\bar{\eta}$	Distance along wing elastic axis from plane of symmetry to influence coefficient point at which unit load is applied (see Figure 3), in.
Λ_{EA}	Sweep angle of wing elastic axis (see Figure 3), deg
Λ_{LE}	Sweep angle of leading edge, deg
Λ_R	Sweep angle of load reference line, deg
λ	Taper ratio of theoretical lifting surface
$\bar{\lambda}$	Spanwise distance along wing elastic axis measured from plane of symmetry (see Figure 3), in.
μ	Airplane mass ratio, $2(W/S) \div (\rho S C_{AV} C_{L\alpha} WF)$
ρ	Air density, slug/ft ³
$\bar{\xi}$	Chordwise location of structural influence coefficient at which unit load is applied (see Figure 3), in.

Section I

INTRODUCTION

During accelerated flight conditions at high speeds, the deflections of the lifting surface structure tend to redistribute the airloads. The resulting airload distribution can be considerably different from that computed on the assumption of complete rigidity. The redistribution results from the change in streamwise angle-of-attack along the span caused by the torsional and bending deflections. For a given mach number, the greater the dynamic pressure, the greater will be the load redistribution.

The airloads module in the SWEEP program does not include the effects of aeroelasticity; i.e., the changes in airload distributions due to structural deflections. A significant refinement is obtained by including the added effects on loads caused by wing structural flexibility. This is accomplished by the use of the stand-alone flexible airloads program described herein. Methods and formulation employed in the stand-alone program are presented in Section II. The computer program description and program usage information are presented in Sections III and IV, respectively.

The stand-alone program requires a substantial amount of external input data. These data consist of (1) airplane geometry data identical to that used by the airloads module (BLCNTL) in the SWEEP program, (2) the wing EI and GJ distribution and elastic axis location, and (3) the specific flight condition case data. The specific flight condition case data include type of flight condition (balanced maneuver, vertical or lateral gust, and pitching or yawing acceleration), mach number and altitude combinations, limit maneuver load factors, pitching and yawing accelerations, airplane weight and CG location, and estimated wing weight distribution. The program calculates the airload and center-of-pressure location for each airplane component and the airload shear, bending moment, and torsion distribution on the wing and empennage surfaces, all for the specified flight condition case.

Section II

METHODS AND FORMULATION

FLEXIBLE AIRLOADS PROGRAM FUNCTIONS

The objective of the flexible airloads stand-alone program, BFCNTL, is to determine the airloads on the airplane components, including the effects of wing flexibility. These loads are determined for a specific flight condition case and are used as an optional external input to the SWEEP program. The methods employed are described in the order that the subroutines USPANF, BNLDSE, and SPAEMF are used in the stand-alone program.

Subroutine USPANF is used to determine the lifting surface unit airload shears, moments, centers of pressure, and lift curve slopes, all for a specified mach number and altitude. For the empennage (horizontal and vertical tail) surfaces, the methods described in Volume III, Section II are used. However, for the wing, the methods are revised to include the effects of wing flexibility.

Subroutine BNLDSE is used to determine gross limit airload and center of pressure on each of the airplane components and the airplane inertia factors for specified flight conditions. The methods are revised to include effects of wing flexibility.

Subroutine SPAEMF is used to determine limit airload shear, bending moment, and torsion distributions on the lifting surfaces for a specific flight condition. For the empennage surfaces, the methods described in Volume III, Section II, are used. However, for the wing, the methods are revised to include the effects of wing flexibility.

BASIC FLIGHT CONDITIONS

The flexible airload stand-alone program is designed to calculate airplane structural component airloads for a specific flight condition case. The specific flight condition case is defined by the types of condition (maneuver or gust), mach No., altitude, gross weight, cg position, and wing weight distribution. Cases from which a specific case can be selected are shown in Figure 1. It is noted that a specific case may consist of more than one type of condition and at more than one altitude. Cases available are similar to those in the SWEEP program (Volume III, Section II), except that additional altitudes are provided because effects of flexibility vary with dynamic pressure at a given mach number.

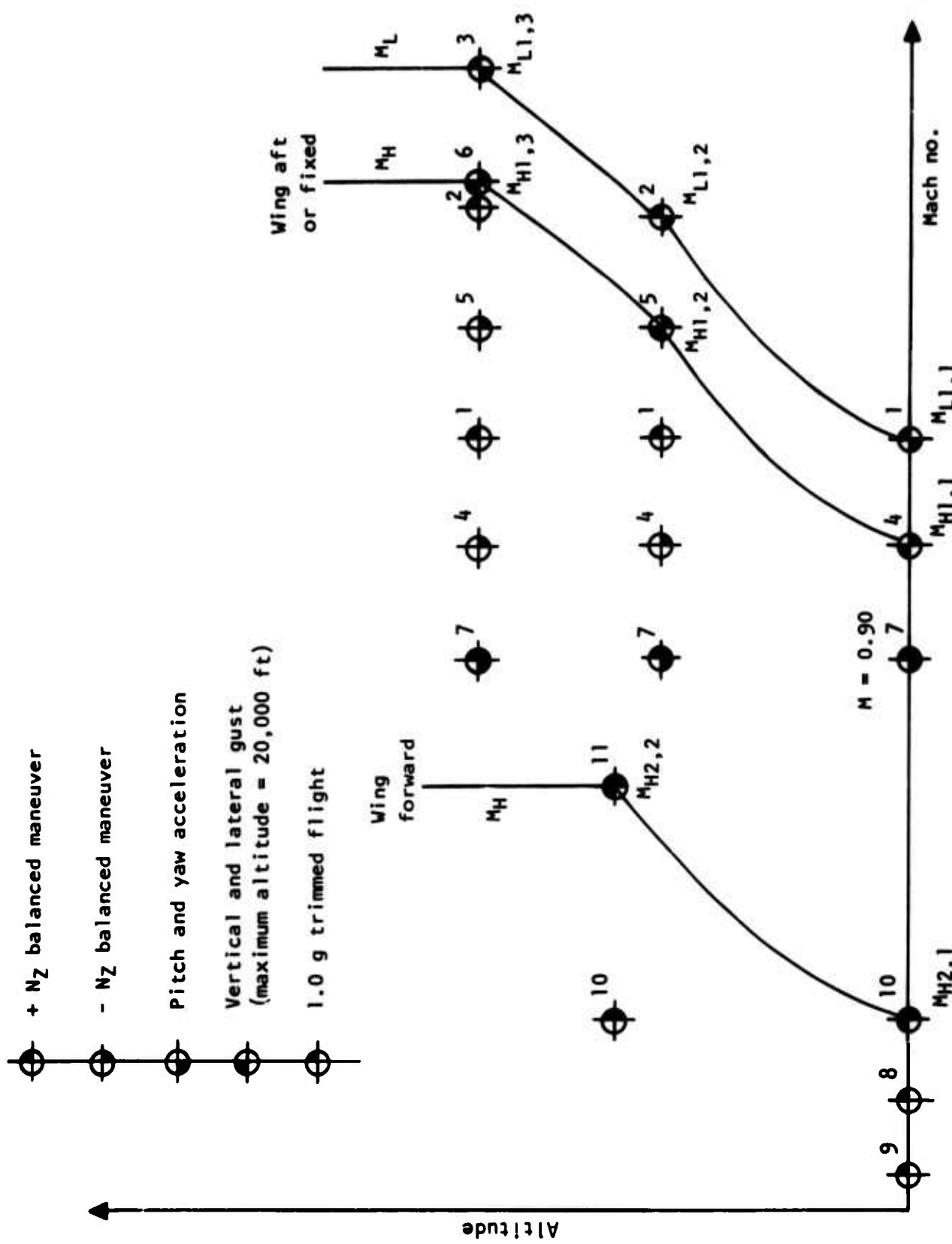


Figure 1. Basic flight condition cases.

Condition case No. 1 through 7 and 10 and 11 cover the basic flight conditions with wing flaps retracted. Condition case No. 8 is a limit load factor maneuver condition with wing flaps down. Condition case No. 9 is a 1.0 g flaps-down trimmed condition for use with landing conditions.

DETERMINATION OF LIFTING SURFACE UNIT AIRLOADS

Methods of analysis used to develop lifting surface unit airload distribution, surface lift curve slopes, and surface airload centers of pressure are presented in this section. Unit airloads are defined, and basic data used for the determination of the surface unit airloads are also presented.

Unit airload shears and moments are determined at 13 selected spanwise stations along the selected load reference line, including root and tip stations. Unit airload shear and moments at the surface-body interface station are determined in the unswept (body axes) system. Overall centers of pressure locations of the exposed panel and body carry-over loads are determined with respect to the theoretical surface apex.

DEFINITION OF UNIT AIRLOADS

The wing unit airload distributions are defined in the following paragraphs.

Unit Rigid Lift Due to Angle of Attack

Unit rigid lift due to angle of attack is the airload distribution due to angle of attack for a rigid lifting surface load of 1 pound per side or panel at a specific mach number.

Unit Flexible Wing Lift Due to Angle of Attack

The unit flexible wing lift due to angle of attack is the net airload distribution due to angle of attack for the flexible wing surface, and is normalized to a wing load of 1.0 pound per side at a specific combination of mach number and dynamic pressure. The net airload distribution includes the combination of the rigid and the aeroelastic increment.

Unit Rigid Lift Due to Wing Flap Deflection

Unit rigid lift due to wing flap deflection is the airload distribution due to flap deflection for a rigid wing surface load of 1 pound per side.

Unit Incremental Flexible Lift Due to Wing Flap Deflection

Unit incremental flexible lift due to wing flap deflection is the incremental flexible airload distribution due to the application of the rigid airload distribution due to wing flap deflection, and is normalized to 1 pound per side at a specific combination of mach number and dynamic pressure.

Unit Rigid Load Due to Vertical Acceleration

Unit rigid load due to vertical acceleration is the wing weight distribution normalized to an exposed wingload of -1 pound per side.

Unit Flexible Wing Lift Due to Vertical Acceleration

Unit flexible wing lift due to vertical acceleration is the incremental flexible airload distribution due to the application of the wing weight distribution, and is normalized to 1 pound per side at a specific combination of mach number and dynamic pressure.

BASIC DATA FOR UNIT AIRLOAD DETERMINATION

The basic data required for unit airloads include all of the lifting surface aerodynamic and geometry data described in Volume III, Section II, and the following wing data:

1. Exposed wing panel weight distribution consisting of weight and CG for each of 10 equally spaced chordwise strips, as shown in Figure 2. CG is in terms of X/C of the strip mean chord.
2. Sweep angle of the wing elastic axis, Λ_{EA} , and the fuselage station of the wing elastic axis at the centerline of symmetry, $FS_{EA} = 0$, are shown in Figure 3.

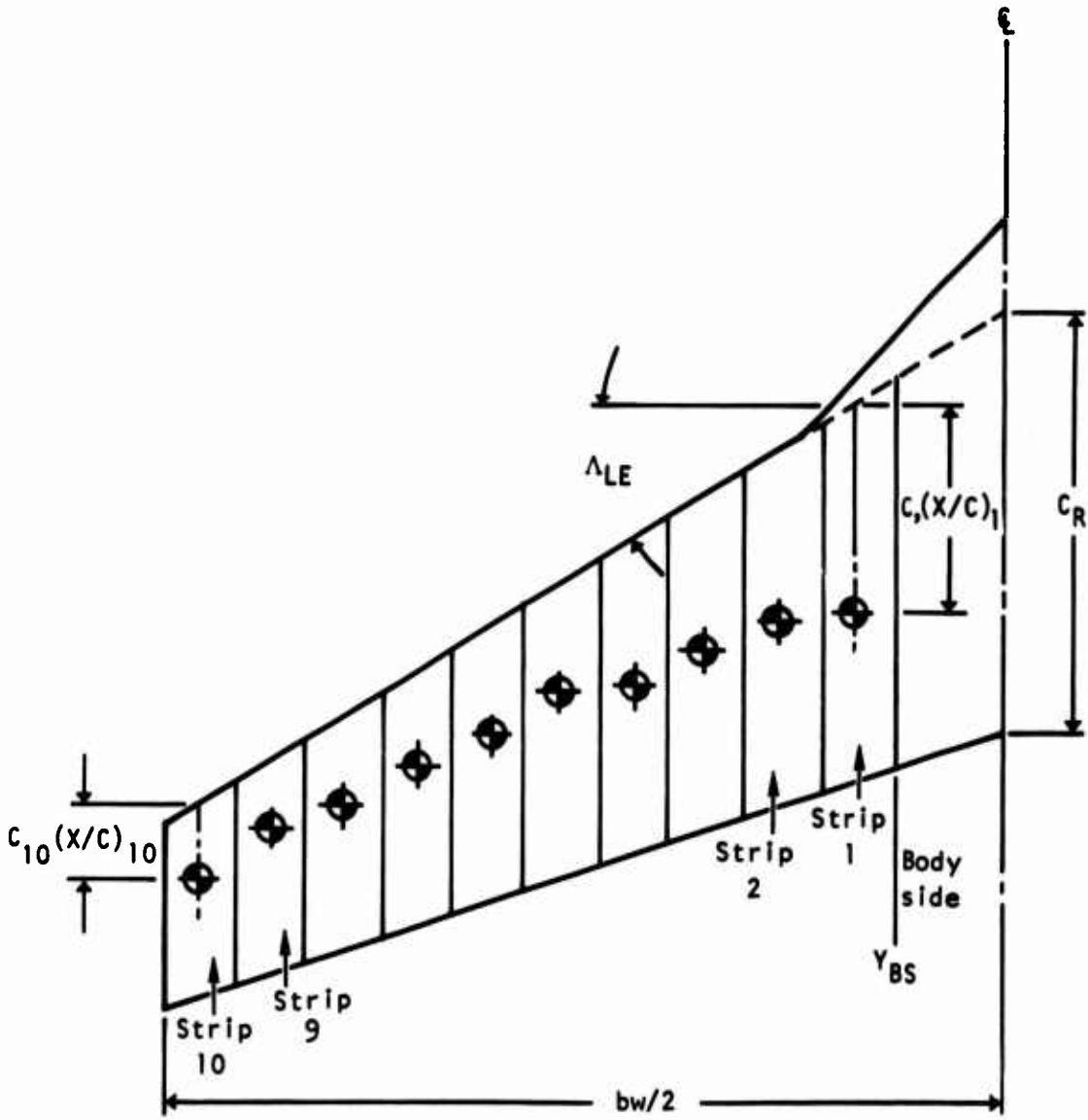


Figure 2. Wing chordwise strips and centers of pressure.

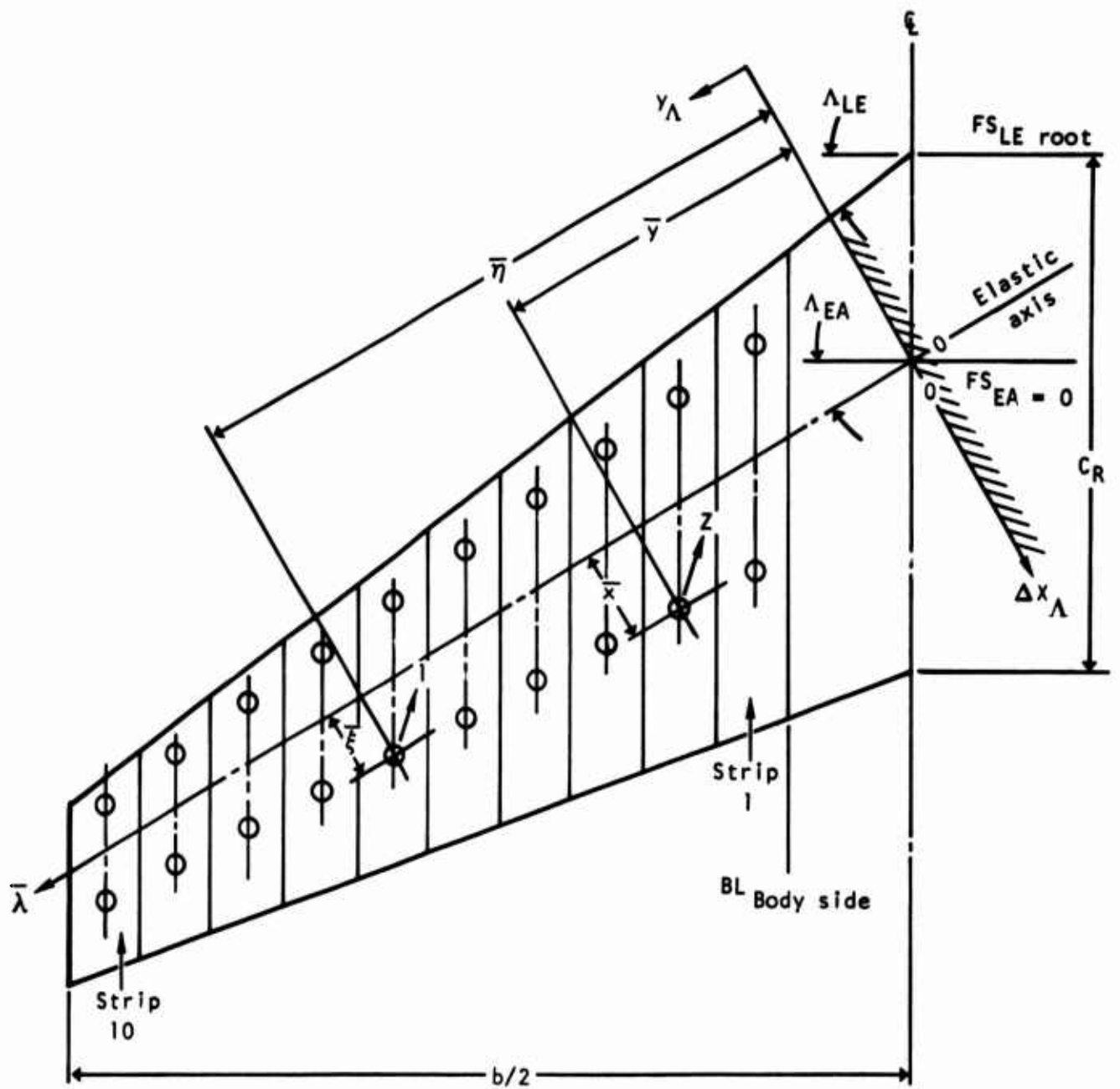


Figure 3. Wing diagram for flexible load analysis.

3. The variation of the exposed wing stiffness parameters, EI and GI, with span station, y_{Λ} , along the elastic axis.

WING UNIT AIRLOAD DISTRIBUTIONS

The general procedure for the calculation of unit flexible wingload data consists of the following steps:

1. Determination of unit rigid loads and centers of pressure (CP's) on 10 equal-span chordwise strips between the side of the body and wingtip, and on the strip between the side of the body and airplane centerline of symmetry.
2. Determination of wing rigid lift-curve slope.
3. Determination of unit flexible airloads, unit incremental flexible airloads, and CP's on each strip, and wing flexible-to-rigid load ratios.
4. Determination of wing flexible lift curve slope.
5. Determination of wing unit flexible shear, bending moment, and torsion along the reference line at the span stations specified for weight analysis.

Wing Unit Rigid Airload Due to Angle of Attack

Wing unit rigid loadings, rigid lift curve slope, and CP's are determined as follows.

The wing platform is divided into 10 equal-span chordwise strips between the side of the body station, η_{BS} , and wingtip station, $\eta = 1.0$, and one strip between η_{BS} and the airplane centerline station, $\eta = 0$, as shown in Figure 3.

For subsonic speeds ($M < 1.0$), calculate compressibility factor, B:

$$B = (1 - M^2)^{1/2} \quad (1)$$

and aspect ratio parameter, BA/K:

$$BA/K = A \cdot (B/K) \quad (2)$$

where B/K is obtained by interpolation of B/K versus M data in Figure 4 of Volume III, Section II.

Calculate compressible sweep parameter, Λ_B :

$$\Lambda_B = \text{Arctan} \left\{ \frac{1}{B} \left[\tan \Lambda_{LE} - \frac{1}{A} \left(\frac{1 - \lambda}{1 + \lambda} \right) \right] \right\} \quad (3)$$

Using parameters Λ_B , BA/K, and λ , interpolate C_l , C/C_L , C_{AV} data in Table 1 of Volume III, Section II, to obtain initial C_l , C/C_L , C_{AV} values at the selected η stations, and integrate to obtain initial unit load on each strip; i.e.,

$$\Delta P_0(I) = \int_{\eta(I) \text{ INBD}}^{\eta(I) \text{ OUTBD}} \left(\frac{C_l C}{C_L C_{AV}} \right) d\eta \quad (4)$$

Summate strip loads to obtain initial total wingload, P_{W0} .

$$P_{W0} = \sum_{I=1}^{11} \Delta P_0(I) \quad (5)$$

Arbitrarily change carry-over strip No. 11 load, $\Delta P_0(11)$, to one-half initial value to allow for lift loss due to body interference; i.e.,

$$\Delta P_1(11) = \Delta P_0(11)/2 \quad (6)$$

Sum strip loads to obtain a new total wing load:

$$P_{W1} = \Delta P_1(11) + \sum_{I=1}^{10} \Delta P_0(I) \quad (7)$$

The unit rigid strip loads are then obtained by normalizing a total wing rigid unit load of 1 per side:

For strip 11,

$$\Delta P_{R\alpha} (11) = \left(\frac{1.0}{P_{W1}} \right) (\Delta P_1 (11)) \quad (8)$$

and for strips 1 through 10,

$$\Delta P_{R\alpha} (I) = \left(\frac{1.0}{P_{W1}} \right) (\Delta P_0 (I)) \quad (9)$$

Using parameters Λ_B , BA/K , and λ , interpolate $BC_{L\alpha}/K$ data in Table 2 of Volume III, Section II, to obtain $BC_{L\alpha}/K$ value.

The initial lift curve slope, $C_{L\alpha W0}$, is then,

$$C_{L\alpha W0} = 57.3 (BC_{L\alpha}/K) / (B/K), \text{ per radian} \quad (10)$$

and the wing rigid lift curve slope is then,

$$C_{L\alpha WR} = \left(\frac{P_{W1}}{P_{W0}} \right) C_{L\alpha W0}, \text{ per radian} \quad (11)$$

For supersonic speeds ($M > 1.0$), calculate the compressibility factors:

$$B = (M^2 - 1)^{1/2} \quad (12)$$

$$B_m = B \cot \Lambda_{LE} \quad (13)$$

$$BA = B \cdot A_w \quad (14)$$

Using BA , B_m , and λ , interpolate $(2\Gamma/V\alpha b)$ in Table 3 of Volume III, Section II, at selected η stations, and integrate to obtain initial load on each strip; i.e.,

$$\Delta P_o(I) = \int_{\eta(I) \text{ INDB}}^{\eta(I) \text{ OUTBD}} (2\Gamma/V\alpha b) d\eta \quad (15)$$

Summate strip loads to obtain initial total wingload, P_{W0} ,

$$P_{W0} = \sum_{I=1}^{11} \Delta P_o(I) \left(= \frac{C_{L\alpha} W_0}{A} \right) \quad (16)$$

The initial value of wing lift curve slope is then:

$$C_{L\alpha W_0} = A \cdot P_{W0} \quad (17)$$

Arbitrarily change carry-over strip 11 load $\Delta P_o(11)$ to one-half initial value to allow for lift loss due to body interference; i.e.,

$$\Delta P_1(11) = \Delta P_o(11)/2 \quad (18)$$

Sum strip loads to obtain a new total wingload:

$$P_{W1} = \Delta P_1(11) + \sum_{I=1}^{10} \Delta P_o(I) \quad (19)$$

Wing unit rigid strip loads are then obtained by normalizing to give a total wing rigid unit load of 1 per side,

$$\Delta P_{R\alpha}(11) = \left(\frac{1.0}{P_{W1}} \right) (\Delta P_1(11)) \quad (20)$$

and for strips 1 through 10

$$\Delta P_{R\alpha}(I) = \left(\frac{1.0}{P_{W1}} \right) (\Delta P_o(I)) \quad (21)$$

Wing rigid lift curve slope is then:

$$C_{L\alpha NR} = \left(\frac{P_{WL}}{P_{WO}} \right) C_{L\alpha WO} \quad (22)$$

The column matrix of unit rigid strip loads due to angle of attack,

$$AFW(I,1) = \Delta P_{R\alpha(I)} \quad (23)$$

where

$$I = 1 \text{ through } 10$$

and $\Delta P_{R\alpha}$ is from equation 9 or 21.

CP's of unit rigid strip loads due to angle of attack are obtained as follows:

- For strips 1 through 10, the CP is at an X/C value based on the mean chord of the strip. The $(X/C)_\alpha$ value is obtained from the $(X/C)_{WING}$ versus mach number plot in Figure 5 of Volume III, Section II.
- For strip 11, the CP is assumed to be at the same fuselage station as the CP of strip 1.

The column matrix of the CP's, $AFWCP(I,1)$, for strip loads due to angle of attack is as follows:

$$AFWCP(I,1) = (X/C)_\alpha(I) \quad (24)$$

where

$$I = 1 \text{ through } 10$$

Wing Unit Rigid Airload Due to Wing Flap Deflection

Wing unit rigid strip loadings and CP's are determined as follows.

Calculate wing span ratios for outboard and inboard ends of flap,

$$b_{FO}/b = Y_{FO}/b/2 \quad (25)$$

$$b_{FI}/b = Y_{FI}/b/2 \quad (26)$$

Using parameters b_{FO}/b and b_{FI}/b , interpolate $C_l C/C_{L\alpha} C_{AV}$ data in Table 3 of Volume III, Section II, at selected η values for b_{FO}/b and b_{FI}/b flap span ratios.

Calculate initial span loading parameter due to flap deflection at selected η stations,

$$(\Delta C_l C/C_{L\alpha} C_{AV}) = (C_l C/C_{L\alpha} C_{AV})_{b_{FO}/b} - (C_l C/C_{L\alpha} C_{AV})_{b_{FI}/b} \quad (27)$$

and integrate to obtain initial load of each of the strips,

$$\Delta P_{FO} (I) = \int_{\eta(I) \text{ INBD}}^{\eta(I) \text{ OUTBD}} (\Delta C_l C/C_{L\alpha} C_{AV}) d\eta \quad (28)$$

Summate strip loads to obtain flap span normalizing parameter.

$$K_{BF} = \sum_{I=1}^{11} \Delta P_{FO} (I) \quad (29)$$

Unit rigid strip loads due to flap deflection are then,

$$\Delta P_{RF}(I) = \frac{1}{K_{BF}} \cdot \Delta P_{FO}(I) \quad (30)$$

The column matrix of unit rigid strip loads for the lift due to flap deflection, $AFW (I,2)$, is as follows:

$$AFW(I,2) = \Delta P_{RF}(I) \quad (31)$$

where

$$I = 1 \text{ through } 10$$

CP's of unit rigid strip loads due to flap deflection are obtained as follows:

- For strips 1 through 10, the CP is at an X/C value based on the mean chord of the strip. The $(X/C)_F$ value is obtained from the $(X/C)_F$ versus (C_f/C_w) data in Figure 6 of Volume III, Section II.
- For strip 11, the CP is assumed to be at the same fuselage station as for strip 1.

The column matrix of CP's for unit rigid strip loads due to flap deflection, $AFWCP(I,2)$, is then:

$$AFWCP(I,2) = (X/C)_F(I) \quad (32)$$

where

$$I = 1 \text{ through } 10$$

Wing Unit Rigid Load Due to Vertical Acceleration

Unit rigid strip loads due to vertical acceleration consist of the weight of the strip normalized to an exposed wing load of -1 pound per side; i.e.,

$$\Delta P_{nz}(I) = -\frac{1}{W_{WOP}} \cdot W_S(I) \quad (33)$$

where

$$W_S(I) = \text{strip weight}$$

and

$$W_{WOP} = \sum_{I=1}^{10} W_S(I) \quad (34)$$

The column matrix of the rigid strip loads due vertical acceleration, AFW (I,3) is then:

$$AFW (I,3) = \Delta P_{nz} (I) \quad (35)$$

where

$$I = 1 \text{ through } 10$$

CP's of rigid strip loads, $(X/C)_{WS}$, are based on the mean chord of the strip, as shown in Figure 2. The column matrix of the CP's, AFWCP (I,3), is then:

$$AFWCP (I,3) = (X/C)_{WS} (I) \quad (36)$$

where

$$I = 1 \text{ through } 10$$

Wing Flexible Airload Distributions

The methods used to calculate the redistributed wing airloads caused by the wing torsional and bending deflections are based on strip theory. Redistributed wing loads include the effects of the wing deflections resulting from (1) lift due to angle of attack, (2) lift due to flap deflection, and (3) inertia load due to vertical acceleration.

Wing Structural Influence Coefficients

For the static aeroelastic analysis, the exposed semispan of the wing is divided into 10 evenly spaced strips, as shown in Figure 3. Two structural influence coefficient points are placed on the centerline of each strip, one at X/C forward and one at X/C aft. The values of fuselage stations (FS) and the butt line (BL) for the points on strip I are formed as follows:

$$BL = BL_{BS} + (2I-1) \left(\frac{b/2 - BL_{BS}}{20} \right) \quad (37)$$

$$X_{LE} = FS_{LE \text{ ROOT}} + BL \cdot \tan \Lambda_{LE} \quad (38)$$

$$C = C_{ROOT} \left[1 - \frac{BL}{b/2} (1 - \lambda) \right] \quad (39)$$

$$FS_{FWD} = \left[(X/C)_{FWD} \cdot C \right] + X_{LE} \quad (40)$$

$$FS_{AFT} = \left[(X/C)_{AFT} \cdot C \right] + X_{LE} \quad (41)$$

where

$$(X/C)_{FWD} = 0.15$$

and

$$(X/C)_{AFT} = 0.65.$$

The coordinates are then converted into the swept elastic axis system (Figure 3).

$$\bar{x} = (FS - FS_{EA=0}) \cos \Lambda_{EA} - BL \cdot \sin \Lambda_{EA} \quad (42)$$

$$\bar{y} = (FS - FS_{EA=0}) \sin \Lambda_{EA} + BL \cdot \cos \Lambda_{EA} \quad (43)$$

NOTE The elastic axis does not have to be a constant-percent chord line.

Elements of the SIC matrix are formed using the following equation:

$$\bar{\eta} \geq \bar{y}$$

$$\text{SIC}(\bar{x}, \bar{y}; \bar{\xi}, \bar{\eta}) = \int_0^{\bar{y}} \frac{(\bar{\eta} - \bar{\lambda})(\bar{y} - \bar{\lambda})}{EI} d\bar{\lambda} +$$

$$\bar{x} \bar{\xi} \int_0^{\bar{y}} \frac{1}{GJ} d\bar{\lambda} \quad (44)$$

Each element of the SIC matrix represents the deflection at: \bar{x}, \bar{y} due to a 1-pound vertical load at $\bar{\xi}, \bar{\eta}$. The preceding equation is integrated to form the upper right triangle of the SIC matrix. In this process of integration, the value of \bar{y} sometimes exceeds $\bar{\eta}$. In that case, the upper limit of integration is changed to $\bar{\eta}$. The other half of the SIC matrix is formed by symmetry.

$$\text{SIC}_{ij} = \text{SIC}_{ji} \quad (45)$$

For the static aeroelastic analysis, a matrix of streamwise slopes, $\overline{\text{SIC}}$, is required. This matrix is formed by premultiplying the SIC matrix by a differential operator matrix called D_θ , which is formed from the structural influence point geometry. The elements of D_θ are formed as follows, where I goes from 1 through 10.

$$D_\theta(I, 2I-1) = \frac{1}{\text{FS}_{\text{AFT}}(I) - \text{FS}_{\text{FWD}}(I)} \quad (46)$$

$$D_\theta(I, 2I) = \frac{-1}{\text{FS}_{\text{AFT}}(I) - \text{FS}_{\text{FWD}}(I)} \quad (47)$$

The $\overline{\text{SIC}}$ matrix is then formed as:

$$\begin{bmatrix} \overline{\text{SIC}} \\ 10,20 \end{bmatrix} = \begin{bmatrix} D_\theta \\ 10,20 \end{bmatrix} \begin{bmatrix} \text{SIC} \\ 20,20 \end{bmatrix} \quad (48)$$

Wing Aerolastic Distributions

General Method. For each load effect, the total flexible wing load distribution is:

$$\left\{ P_{\text{FLEX}} \right\} = \left\{ P_{\text{RIGID}} \right\} + \left\{ P_{\Delta\text{FLEX}} \right\} \quad (49)$$

Where the incremental aeroelastic load distribution is related to the flexible load:

$$\left\{ P_{\Delta\text{FLEX}} \right\} = q \left[A \right] \left[\overline{SIC} \right] \left\{ P_{\text{FLEX}} \right\} \quad (50)$$

In this simplified solution, the aerodynamic load matrix, A, is defined as a diagonal matrix formed from the α distribution load on each chordwise strip.

$$\left[A \right] = \left[\alpha \text{ LOAD} \right] \quad (51)$$

The equation for the aeroelastic solution is then formed as:

$$\left\{ P_{\text{FLEX}} \right\} = \left\{ P_{\text{RIGID}} \right\} + q \left[\alpha \text{ LOAD} \right] \left[\overline{SIC} \right] \left\{ P_{\text{FLEX}} \right\} \quad (52)$$

Transpose and factor out P_{FLEX} :

$$\left[\left[I \right] - q \left[\alpha \text{ LOAD} \right] \left[\overline{SIC} \right] \right] \left\{ P_{\text{FLEX}} \right\} = \left\{ P_{\text{RIGID}} \right\} \quad (53)$$

Let

$$[D] = [I] - q [\alpha \text{LOAD}] [SIC] \quad (54)$$

then,

$$[D] \{ P_{\text{FLEX}} \} = \{ P_{\text{RIGID}} \} \quad (55)$$

Formulation for Flexible Airloads Program. The rigid loads distribution, AFW, for α , δ FLAP, and WEIGHT, are distributed to the SIC points by simply beaming the load on each strip, using the corresponding chordwise centers of pressure, AFWCP.

$$RLOADS(2I-1, J) = AFW(I, J) \frac{AFWCP(I, J) - (X/C)_{\text{AFT}}}{(X/C)_{\text{FWD}} - (X/C)_{\text{AFT}}} \quad (56)$$

$$RLOADS(2I, J) = AFW(I, J) \frac{-AFWCP(I, J) + (X/C)_{\text{FWD}}}{(X/C)_{\text{FWD}} - (X/C)_{\text{AFT}}} \quad (57)$$

where

$$I = 1 \text{ through } 10$$

and

$$J = 1 \text{ } \alpha \text{ load}$$

$$J = 2 \text{ } \delta F \text{ load}$$

$$J = 3 \text{ weight}$$

Define C as:

$$C = C_{L\alpha} q \frac{S_w}{2} \quad (58)$$

The D-matrix is then formed a column at a time, using column 1 of the RLOADS matrix; i.e., the α load distribution and the \overline{SIC} matrix. The column K goes 1 through 20.

$$D(2I-1,K) = -C \cdot RLOADS(2I-1,1) \cdot SICBAR(I,K) \quad (59)$$

$$D(2I,K) = -C \cdot RLOADS(2I,1) \cdot SICBAR(I,K) \quad (60)$$

where

$$I = 1 \text{ through } 10$$

The D-matrix is completed by adding 1.0 to each diagonal element.

$$D(K,K) = 1.0 + D(K,K)$$

The static aeroelastic equation to be solved is then:

$$\begin{bmatrix} D \end{bmatrix}_{20,20} \begin{bmatrix} \text{(FLEXIBLE)} \\ \text{FLOADS} \end{bmatrix}_{20,3} = \begin{bmatrix} \text{(RIGID)} \\ \text{RLOADS} \end{bmatrix}_{20,3} \quad (61)$$

This equation is solved for the flexible loads a column at a time, using a general least-squares technique. This technique is used because it is very fast and will work with even a poorly conditioned matrix. This method gives the solution to a system of linear equations $Bx = C$, where B is an $N \times M$ matrix with $N \geq M$, and C is a column vector of dimension N. In the over-determined case, a least-squares solution is obtained.

The method finds an $N \times N$ matrix R such that R is orthogonal (i.e., $R^T R = I$) and

$$R(B,C) = \begin{pmatrix} T & d \\ 0 & \alpha \\ 0 & 0 \end{pmatrix}$$

where T is an $M \times M$ triangular matrix and d is an M-dimensional column vector. The number α is the square root of the sum of the squares of the residuals. Solution of the problem is then the solution of $Tx=d$, and is found by back substitution.

Once flexible loads at the SIC points have been determined, flexible loads on the strips, AFWF, are formed by a simple summation; the delta flexible loads, AFWDF, are formed by subtracting rigid loads from flexible loads.

$$AFWF(I,J) = FLOADS(2I-1,J) + FLOADS(2I,J) \quad (62)$$

$$AFWDF(I,J) = AFWF(I,J) - AFW(I,J) \quad (63)$$

where

$$I = 1 \text{ through } 10$$

The total summed rigid loads, flexible loads, delta flexible loads, and flexible-to-rigid load ratios are:

$$\text{Rigid} \quad F(J,1) = \sum_{I=1}^{10} AFW(I,J) \quad (64)$$

$$\text{Flexible} \quad F(J,2) = \sum_{I=1}^{10} AFWF(I,J) \quad (65)$$

$$\Delta \text{Flexible} \quad F(J,3) = F(J,2) - F(J,1) \quad (66)$$

$$\frac{F}{R} \quad F(J,4) = \frac{F(J,2)}{F(J,1)} \quad (67)$$

Because the rigid load distribution on the strips is used for delta flexible loads, the chordwise CP on each load strip is the same for the delta flexible loads as it is for the rigid α load.

The wing flexible lift curve slope is determined as follows:

$$C_{L \alpha WF} = C_{L \alpha WR} \left[\frac{\Delta P_{\alpha} (11) + \sum_{I=1}^{10} AFWF (I,1)}{\Delta P_{\alpha} (11) + \sum_{I=1}^{10} AFW (I,1)} \right] \quad (68)$$

where $\Delta P_{\alpha} (11)$ is from equation 8 or 20, $AFWF (I,1)$ is the column matrix of flexible strip loads due to angle of attack, and $AFW(I,1)$ is the column matrix of rigid strip loads due to angle of attack from equation 23.

Wing Unit Shears and Moments

Wing unit airload shears and moments for the flexible wing are developed using the column matrices of strip loads and CP's. The average unit running normal loading on a strip is the strip load ($AF(I)$) divided by the strip width, and the running torsional moment is the running normal loading times the normal distance from strip CP to the selected load reference line for weight analysis. The average running normal loading and running torsional moment are applied at η station for the midspan at the strip.

Running loadings on the exposed wing along the load reference line are as follows (where $\eta(I)$ is the η station at the midspan of the strip I, $UL(I)$ is the unit running normal loading at station $\eta(I)$, and $UT(I)$ is the unit running torsional moment at station $\eta(I)$):

$$\begin{aligned} \eta(I) &= \eta_{BS} + 0.05 (1 - \eta_{BS}) + 0.1 (I - 1) (1 - \eta_{BS}) \\ &= -0.05 + 1.05 \eta_{BS} + (1 - \eta_{BS}) I/10 \end{aligned} \quad (69)$$

$$UL(I) = \frac{AF (I)}{0.1 (1 - \eta_{BS})} \quad (70)$$

$$UT(I) = - \Delta X_{\Lambda} (I) \cdot UL(I) \quad (71)$$

The term $\Delta X_{\Lambda}(I)$ is the normal distance from the load reference line to the local CP and is determined, using the methods of Volume III, Section II, as follows:

$$\Delta X_{\Lambda}(I) = C_{\Lambda}(I) \left[(X_{\Lambda}/C_{\Lambda})_{CP} - (X_{\Lambda}/C_{\Lambda})_R \right] \quad (72)$$

where

$$C_{\Lambda}(I) = \frac{[1 + \eta(I)(1 - \lambda)] C_R \cos \Lambda_R}{1 - K_{\Lambda} \left[1 - (X/C)_R - (X_{\Lambda}/C_{\Lambda})_R \right]} \quad (73)$$

$$K_{\Lambda} = \frac{4}{A} \left(\frac{1 - \lambda}{1 + \lambda} \right) (\sin \Lambda_R \cos \Lambda_R) \quad (74)$$

$$(X_{\Lambda}/C_{\Lambda})_R = (X/C)_R \left[1 - K_{\Lambda} \left(1 - (X/C)_R \right) \right] \quad (75)$$

$$(X_{\Lambda}/C_{\Lambda})_{CP} = (X/C)_{CP} \left[1 - K_{\Lambda} \left(1 - (X/C)_{CP} \right) \right] \quad (76)$$

Running unit normal loading inboard of the side of the body ($\eta < \eta_{BS}$) is assumed to be constant and is:

$$UL_{\eta} = \frac{\Delta P(11)}{\eta_{BS}} \quad (77)$$

where $\Delta P(11)$ is the unit airload on strip 11.

Unit running torsional moment inboard of the body side about the load reference line at station η is:

$$UT_{\eta} = - \Delta X_{\Lambda \eta} \cdot UL_{\eta} \quad (78)$$

where $\Delta X_{\Lambda \eta}$ is determined, as follows.

The CP is assumed to be at a constant fuselage station equal to the fuselage station of the CP at strip 1. Then, when $\eta < \eta_{BS}$,

$$\Delta X_{\Lambda \eta} = \Delta X_{\Lambda \eta (I=1)} + \left(\eta_{(I=1)} - \eta \right) \left(\frac{b}{2} \right) \left(\sin \Lambda_R \right) \quad (79)$$

where $\eta_{(I=1)}$ is from equation 69

and $\Delta X_{\Lambda \eta (I=1)}$ is from equation 72

Unit running normal and torsional loadings for the specific type of distributions are obtained using the following strip load data:

1. For flexible lift due to angle-of-attack distribution, use the following:
 - a. In equation (70): $AF(I) = AFWF(I,1)$ from equation 62
 - b. In equation (76): $(X/C)_{CP} = AFWCP(I,1)$ from equation 24
 - c. In equation (77): $\Delta P(11) = \Delta P_{\alpha R}(11)$ from equation 8 or 20, depending on mach number
2. For rigid lift due to flap deflection distribution, use the following:
 - a. In equation (70): $AF(I) = AFW(I,2)$ from equation 31
 - b. In equation (76): $(X/C)_{CP} = AFWCP(I,2)$ from equation 32
 - c. In equation (77): $\Delta P(11) = \Delta P_{FR}(11)$ from equation 30
3. For incremental flexible lift due to flap deflection distribution, use the following:
 - a. In equation (70): $AF(I) = AFWDF(I,2)$ from equation 63
 - b. In equation (76): $(X/C)_{CP} = AFWCP(I,1)$ from equation 24
 - c. In equation (77): $\Delta P(11) = 0$

4. For incremental flexible lift due to vertical acceleration distribution, use the following:

- a. In equation (70): $AF(I) = AFWDF(I,3)$ from equation 63
- b. In equation (76): $(X/C)_{CP} = AFWCP(I,1)$ from equation 24
- c. In equation (77): $\Delta P(11) = 0$

Wing unit shear and moments are calculated along the selected load reference line at the η stations selected for weight analysis and are normalized for a surface load of 1 pound per side.

Unit span normal loading, UL, from equations 70 and 77, is integrated to obtain the unit shear values, USZN, at the selected η stations; i.e.,

$$USZN = K_{UZ} \int_{\eta}^{1.0} (ULN)d_{\eta} \quad (80)$$

where

$$K_{UZ} = \left[\frac{1.0}{\int_0^{1.0} (ULN)d_{\eta}} \right] \quad (81)$$

Unit shear, USZ, is integrated to obtain the unit bending moment,

UMXTN:

$$UMXTN = \frac{b}{2 \cos \Lambda_R} \left[\int_{\eta}^{1.0} (USZN)d_{\eta} \right] \quad (82)$$

Unit running torsional moment, UT, from equations 71 and 78, is integrated to obtain the unit torsional moment, UMYTN:

$$UMYTN = K_{UZ} \int_{\eta}^{1.0} (UTN) d_{\eta} \quad (83)$$

In equations 80 through 83, the N in ULN, USZN, UMXTN, UMYTN, and UTN is used to designate the type of distribution; i.e.,

N = 1 for flexible lift due to angle of attack

N = 2 for rigid lift due to flap deflection

N = 3 for incremental flexible lift due to flap deflection

N = 4 for flexible lift due to vertical acceleration

Wing unit airloads and CP's for each of the four types of airload distribution are determined as follows.

Total wing unit airload per side, UPZWN; wing unit pitching moment per side, UMYWN, at the intersection of the wingload reference line and the A/P centerline; and CP of the wing unit airload, DXWN, measured aft from the theoretical wing apex, are as follows:

$$UPZWN = (USZN)_{\eta = 0} = 1.0 \quad (84)$$

$$UMYWN = (UMYTN)_{\eta = 0} \cos \Lambda_R - (UMXTN)_{\eta = 0} \sin \Lambda_R \quad (85)$$

$$DXWN = C_R(X/C)_R - (UMYWN)/(UPZWN) \quad (86)$$

Exposed wing unit loads of the intersection of the wingload reference line and the body side in the body reference system are as follows:

$$USZW(B)N = (USZN)_{\eta_{BS}} \quad (87)$$

$$UMXW(B)N = (UMXTN)_{\eta_{BS}} \cos \Lambda_R + (UMYTN)_{\eta_{BS}} \sin \Lambda_R \quad (88)$$

$$UMYW(B)N = (UMYTN)_{\eta_{BS}} \cos \Lambda_R - (UMXTN)_{\eta_{BS}} \sin \Lambda_R \quad (89)$$

NOTE Also

$$USZW(B)N = \left[\frac{(USZN)_{\eta_{BS}}}{(USZN)_{\eta=0}} \right] UPZWN \quad (90)$$

$$DXW(B)N = C_R(X/C)_R + Y_{BS} \tan \Lambda_R - \frac{UMYW(B)N}{USZW(B)N} \quad (91)$$

$$YW(B)N = Y_{BS} + \frac{UMDXW(B)N}{USZW(B)N} \quad (92)$$

Wing unit carry-over load on the body, $UPZB(W)N$, and its CP, $DXB(W)N$, are determined as follows:

$$UPZB(W)N = (USZN)_{\eta=0} - (USZN)_{\eta_{BS}} \quad (93)$$

$$UMYB(W)N = \left[UMYTN_{\eta=0} - UMYTN_{\eta_{BS}} \right] \cos \Lambda_R - \left[UMXTN_{\eta=0} - UMXTN_{\eta_{BS}} - (USZN)_{\eta_{BS}} \left(\frac{Y_{BS}}{\cos \Lambda_R} \right) \right] \sin \Lambda_R \quad (94)$$

$$DXB(W)N = C_R(X/C)_R - \frac{UMYB(W)N}{UPZB(W)N} \quad (95)$$

EMPENNAGE UNIT AIRLOAD DISTRIBUTIONS

The unit airload distributions on the horizontal and vertical tail surfaces are determined using the methods described in Volume III, Section II.

COMPONENT LIMIT AIRLOADS

Gross limit airloads on airplane components and airplane inertia factors are determined for specific types of flight conditions, using methods similar to those described in Volume III, Section II. Revisions are made to include the effects of wing flexibility, consisting of the following:

1. Wing airload is divided into four parts: (1) flexible load due to angle of attack, (2) rigid load due to flap deflection, (3) incremental flexible load due to flap deflection, and (4) incremental flexible load due to vertical acceleration.
2. Airplane balance equations are expanded to incorporate added wingload parts.
3. Flexible wing lift curve slope is used to determine wing incremental gust load.

BALANCED MANEUVER CONDITION

The balanced maneuver condition is a flight condition where the aircraft is trimmed (balanced) by a horizontal tail or canard load. Incremental loads due to flap deflection are determined only for low subsonic conditions.

Wing airloads consist of the following:

PZW1 = Flexible lift due to angle of attack

PZW2 = Rigid lift due to flap deflection

PZW3 = Incremental flexible lift due to flap deflection

PZW4 = Flexible lift due to vertical acceleration

Their corresponding CP's in terms of fuselage station, are:

$$XW1 = X_{RW} + DXW1 \quad (96)$$

$$XW2 = X_{RW} + DXW2 \quad (97)$$

$$XW3 = x_{RW} + DXW3 \quad (98)$$

$$XW4 = X_{RW} + DXW4 \quad (99)$$

DXWN values are obtained from equation (86) for each type of distribution.

For a given mach No., dynamic pressure, load factor and flap deflection, wingloads are determined as follows:

PZW1 is obtained from the balance equation (110)

$$PZW2 = \frac{\delta f}{57.3} K_{CF} K_{BF} C_{L\alpha WR} q S_W \quad (100)$$

Where

δ_f = flap deflection in degrees

$$K_{CF} = \frac{dC_L/d\delta_f}{dC_L/d\alpha}$$

and is obtained by interpolation of the

K_{CF} versus (C_F/C_W) data in Figure 6 of Volume III, Section II

K_{BF} is obtained from equation 29

$C_{L\alpha WR}$ is obtained from equation 11

q = dynamic pressure, psf

S_W = theoretical wing area

$$PZW3 = (PZW2) (USZW2)_{S\emptyset B} \left[\frac{F}{R} - 1.0 \right] \quad (101)$$

Where $(USZW2)_{S\emptyset B}$ is the unit rigid wingload at the body side due to flap deflection and is obtained from equation 87.

F/R = matrix element $F(2,4)$ from equation 67

$$PZW4 = 2.0 (N_2) (W_{W\emptyset P}) \left[\frac{F}{R} - 1.0 \right] \quad (102)$$

Where N_z is the specified load factor and

W_{WOP} = exposed wing weight per side

$\frac{F}{R}$ = matrix element F(3,4) from equation 67

Body nose load, P_{ZN} , is as defined as follows:

$$\begin{aligned} P_{ZN} &= \alpha 2 \pi R_N^2 q / 144 \\ &= 0.043633 \alpha R_N^2 q \end{aligned} \quad (103)$$

Where R_N is the maximum nose radius (inches), α is the angle of attack and

$$\alpha = \frac{PZW1/qS_W}{C_{L\alpha WF}} \quad (104)$$

Where $C_{L\alpha WF}$ is the flexible wing lift curve slope and is obtained from equation 68.

Substituting equation 104 in 103:

$$P_{ZN} = \frac{0.043633(PZW1) R_N^2}{S_W C_{L\alpha WF}} \quad (105)$$

CP of the body nose load is:

$$X_N = X_o + \left(\ell N - \frac{V_N}{\pi R_N^2} \right) \quad (106)$$

Horizontal tail load is P_{ZH} and is obtained from the balance equation 111. CP of the horizontal tail is:

$$X_H = X_{RH} + DXH \quad (107)$$

Where X_{PH} is the fuselage station of the leading edge of the horizontal tail theoretical root chord, DXH is the X-distance aft of the root chord leading edge to the CP and is obtained from equation 50 in Volume III, Section II.

Airplane balance equations, where $\dot{Q} = 0$, are as follows:

$$\begin{aligned} \Sigma M_y &= 0 \\ (PZW1) &\left[(XCG - XW1) + (XCG - XN) \left(\frac{0.043633 R_N^2}{S_W C_{L\alpha WF}} \right) \right] + \\ &PZW2 (XCG - XW2) + PZW3 (XCG - XW3) + \\ &PZW4 (XCG - XW4) + PZH (XCG - XH) = 0 \end{aligned} \quad (108)$$

$$\begin{aligned} \Sigma P_z &= 0 \\ PZW1 &\left(1 + \frac{0.043633 R_N^2}{S_W C_{L\alpha WF}} \right) + PZW2 + PZW3 + \\ &PZW4 + PZH - N_z W = 0 \end{aligned} \quad (109)$$

Solving equations 108 and 109 for PZW1 and PZH,

$$PZW1 = \frac{(N_z W)F - (PZW2)(C-F) - (PZW3)(D-F) - (PZW4)(E-F)}{B - AF} \quad (110)$$

$$PZH = N_z W - A(PZW1) - PZW2 - PZW3 - PZW4 \quad (111)$$

where

$$A = 1 + \frac{0.043633 R_N^2}{S_W C_{L\alpha WF}} \quad (112)$$

$$B = (XCG - XW1) + (XCG - XN) \left(\frac{0.043633 R_N^2}{S_W C_{L\alpha WF}} \right) \quad (113)$$

$$C = (XCG - XW2) \quad (114)$$

$$D = (XCG - XW3) \quad (115)$$

$$E = (XCG - XW4) \quad (116)$$

$$F = (XCG - XH) \quad (117)$$

$$PZN = (A-1) PZW1 \quad (118)$$

PITCHING ACCELERATION CONDITION

The pitching acceleration condition is an arbitrary condition where a specified value of pitching acceleration is caused by an incremental horizontal tailload and is superimposed on a balanced maneuver condition such that the resulting load factor is one-half the design limit positive maneuver load factor.

The incremental horizontal tailload required to produce the specified pitching acceleration, \dot{Q} , is:

$$\Delta PZH = -12 \frac{\dot{Q} I_y}{XH - XCG} \quad (119)$$

Where, I_y = airplane pitching moment of inertia, slug ft², and XH is obtained from equation 107.

The maneuver load factor, N_{ZM} , is determined as follows:

$$N_{ZM} = \frac{N_{ZL}}{2} - \frac{\Delta PZH}{W} \quad (120)$$

Where N_{ZL} is the design limit maneuver load factor

W = airplane weight

Equations 96 through 118, with the following exceptions, are then used to determine the component loads:

$$PZW4 = -2.0 \left(\frac{N_{ZL}}{2} \right) (W_{WOP}) \left[\frac{F}{R} - 1.0 \right] \quad (121)$$

$$PZW1 = \frac{N_{ZM} F - (PZW4)(E-F)}{B - AF} \quad (122)$$

$$PZH = N_{ZM} W - A(PZW1) - PZW4 + \Delta PZH \quad (123)$$

VERTICAL GUST CONDITION

The vertical gust condition consists of a ± 50 fps vertical gust encounter superimposed on a 1.0g trimmed condition.

Equivalent airspeed (V_E), airplane mass ratio (μ), and the gust alleviation factor (K_g) are determined using equations 115 through 119 of Volume III, Section II, at the specified mach number and altitude.

Component loads $PZW1_{N_Z = 1.0}$ and $PZH_{N_Z = 1.0}$, for the 1.0g trimmed condition are determined using equations (110) and (111), where $N_Z = 1.0$ and $\delta_f = 0$.

Airplane normal load factor, N_Z , is determined as follows:

$$N_Z W = A \left(PZW1_{N_Z = 1.0} + \Delta PZW1 \right) - 2.0 N_Z (W_{WOP}) \left(\frac{F}{R} - 1 \right) + PZH_{N_Z = 1.0} + \Delta PZH \quad (124)$$

or:

$$N_Z = \frac{A(PZW1_{N_Z = 1.0} + \Delta PZW1) + PZH_{N_Z = 1.0} + \Delta PZH}{W + 2.0 (W_{WOP}) \left(\frac{F}{R} - 1 \right)} \quad (125)$$

where $PZW1_{N_Z = 1.0}$ is obtained using equation (110), $PZH_{N_Z = 1.0}$ is obtained using equation (111), A is obtained using equation (112), F/R is the same as that used in equation (102), and incremental gust loads are:

$$\Delta PZW1 = 0.100354 \text{ Kg } C_{L\alpha W F} S_W V_E \quad (126)$$

$$\Delta PZH = 0.100354 \text{ Kg } C_{L\alpha H} S_H V_E$$

Where $C_{L_{\alpha WF}}$ is obtained using equation (68) and $C_{L_{\alpha H}}$ is obtained using equation 19 or 23 of Volume III, Section II.

Limit airload on the components are then determined as follows:

$$PZW1 - PZW1_{N_Z = 1.0} + \Delta PZW1 \quad (127)$$

$$PZW4 = - 2.0 N_Z (W_{WOP}) \left(\frac{F}{R} - 1 \right) \quad (128)$$

$$PZH = PZH_{N_Z = 1.0} + \Delta PZH \quad (129)$$

$$PZN = (A - 1) PZW1 \quad (130)$$

Airplane pitching acceleration, \dot{Q} , is determined as follows:

$$\dot{Q} = - [(XN - XCG) PZN + (XW1 - XCG) PZW1 + (XW4 - XCG) PZW4 + (XH - XCG) PZH] / 12 I_y \quad (131)$$

LATERAL GUST CONDITION

The lateral gust condition consist of a 50 fps lateral gust encounter superimposed on a 1.0 g trimmed condition.

Component limit airloads $PZW1$, $PZW4$, PZH , and PZN are determined using equations 110, 102, 111, and 118, respectively, with $N_Z = 1.0$ and $\delta_F = 0$.

Component limit airloads P_{YN} and P_{YVT} are determined using equations 138 and 139, respectively, from Volume III, Section II.

Airplane yawing acceleration, \dot{R} , and side load factor, N_y , are determined using equations 140 and 141, respectively, from Volume III, Section II.

YAWING ACCELERATION CONDITION

The yawing acceleration condition is an arbitrary condition where a specified value of yawing acceleration is caused by a load on the vertical tail and is superimposed on a 1.0 g trimmed condition.

Component limit airloads PZW1, PZW4, PZH, and PZN are determined using equations 110, 102, 111, and 118, respectively, with $N_z = 1.0$ and $\delta_F = 0$.

Equations 142 and 143, of Volume III, Section II, are used to determine vertical tail limit airload, P_{yVT} , and airplane side load factor, N_y , respectively.

LIFTING SURFACE LIMIT AIRLOAD SHEARS AND MOMENTS

Lifting surface unit airload shears and moments have been determined (for each type of distribution) such that the panel load (per side including the carry-over load on the body) is equal to unity. Therefore, limit airload shears and moments are obtained by multiplying the unit values by the limit panel loads.

WING LIMIT AIRLOAD SHEARS AND MOMENTS

Wing airload shears, bending moments, and torsional moments at the selected η stations for weight analysis along the load reference line are determined for a specific flight condition, as follows:

$$Y_{\Lambda} = (b/2)/\cos \Lambda_R = Y/\cos \Lambda_R \quad (132)$$

$$S_{Z_{\Lambda}} = [PZW1(USZ1) + PZW2(USZ2) + PZW3(USZ3) + PZW4(USZ4)] + 2 \quad (133)$$

$$M_{X_{\Lambda}} = [PZW1(UMXT1) + PZW2(UMXT2) + PZW3(UMXT3) + PZW4(UMXT4)] + 2 \quad (134)$$

$$M_{Y_{\Lambda}} = [PZW1(UMYT1) + PZW2(UMYT2) + PZW3(UMYT3) + PZW4(UMYT4)] + 2 \quad (135)$$

where the unit shears and the unit bending and torsional moments are obtained from equations 80, 82, and 83, respectively, for each type of distribution.

Limit airload shear and moments of the side of the body stations, Y_{BS} , in the body reference system are obtained using unit values from equations 87, 88, and 89 for each type of distribution.

$$S_{Z(SOB)} = [PZW1 (USZW(B)1) + PZW2 (USZW(B)2) + PZW3 (USZW(B)3) + PZW4 (USZW(B)4)] + 2 \quad (136)$$

$$M_{X(SOB)} = [PZW1 (UMXW(B)1) + PZW2 (UMXW(B)2) + PZW3 (UMXW(B)3) + PZW4 (UMXW(B)4)] + 2 \quad (137)$$

$$M_{Y(SOB)} = [PZW1 (UMYW(B)1) + PZW2 (UMYW(B)2) + PZW3 (UMYW(B)3) + PZW4 (UMYW(B)4)] + 2 \quad (138)$$

The total limit carry over airload on the body, $PZB(W)$, and its CP, $XBB(W)$, are determined as follows using unit values from equations 93 and 95:

$$PZB(W) = PZW1 (UPZB(W)1) + PZW2 (UPZB(W)2) + PZW3 (UPZB(W)3) + PZW4 (UPZB(W)4) \quad (139)$$

$$XBB(W) = X_{RW} + [PZW1 (UPZB(W)1) DXB(W)1 + PZW2 (UPZB(W)2) DXB(W)2 + PZW3 (UPZB(W)3) DXB(W)3 + PZW4 (UPZB(W)4) DXB(W)4] + PZB(W) \quad (140)$$

EMPENNAGE LIMIT AIRLOAD SHEARS AND MOMENTS

Limit airload shears and bending and torsional moments are determined using equations 153 through 182, in Volume III, Section II.

Section III

COMPUTER PROGRAM DESCRIPTION

GENERAL DESCRIPTION

The flexible airloads stand-alone program BFCNTL, has been developed to determine airplane component limit airloads, including effects of wing flexibility for specific flight case conditions. The limit airloads consist of the airload and center of pressure (CP) for each airplane component and airload shear, bending moment, and torsion distributions on wing and empennage surfaces.

Punched card output data are in a format that is compatible for use as an optional external input to the SWEEP program. Input data are generated by the SWEEP data generation program as punched card data such that the operation of the stand-alone program requires no further effort other than setting up the program decks and the preparation of a control data card.

PROGRAM FUNCTIONS

The flexible airloads main program, BFCNTL, utilizes three main subroutines and nine other subordinate subroutines. The main subroutines are USPANF, BNLD SF, and SPABMF.

Subroutine USPANF is used to determine lifting surface unit airload shears, moments, CP's and lift curve slopes for a specified mach number and altitude. For the empennage (horizontal and vertical tail) surfaces, the methods used are described in Volume III, Section II. For the wing, methods used are described Section II herein.

Subroutine BNLD SF is used to determine the gross limit airload and CP on each of the airplane components and the airplane inertia factors for the specified case conditions. Methods employed are described in Section II.

Subroutine SPABMF is used to determine limit airload shear, bending moment, and torsion distributions on lifting surfaces for a specific flight condition. For empennage surfaces, the methods described in Volume III, Section II, are used. For the wing, methods used are described in Section II herein.

The purposes of other subordinate subroutines are as follows:

- DECRD - Reads and stores input data in assigned dimension region
- RERDAT - Rearranges and stores input data in assigned locations
- CØDIM2 - Curve fitting interpolation routine for determination of a value on a single curve
- FCØDIM2 - Curve-fitting interpolation routine for the determination of a value from a family of curves.
- ATMØS - Determines the standard atmosphere density and the speed of sound for a given altitude
- WFLEX - Determines the flexible wing airload distribution data for given types of rigid wing and load data
- FLXSIC - Determines wing structural influence coefficient data required by WFLEX
- GLSQ - Gives the solution to a system of linear equations.
- MATRIT - Routine for printing matrices by rows or columns

The calling-called matrix for the program, showing the interdependence of the subroutines, is shown in Figure 4.

MAIN PROGRAM - BFCNTL

The main program, BFCNTL, performs the following functions:

1. Reads in input ND, BC, and BF data arrays of which BC and BF are the punched card outputs from the SWEEP II data generation program.
2. Rearranges BC input array and sets up flight condition data for subroutine usage.
3. Calls subroutines and transfers data required to perform the airload calculations.
4. Punches card output (and prints) data containing component limit airloads and CP's and the wing and empennage limit airload shear and moment distributions.

Calling \ Called	RERDAT	DECRD	USPANF	BNLDSF	SPABMF	CØDIM2	FCØDM2	ATMØS	WFLEX	FLXSIC	GLSQ	MATRIT
BFCNTL (MAIN)	x	x	x	x	x							
USPANF	x					x	x	x	x			
WFLEX										x	x	x
FLXSIC						x						
BNLDSF						x						
RERDAT		x										
FCØDM2						x						

Figure 4. Calling-called matrix for flexible airloads stand-alone program.

Methods described in Section II are used in the coding of the program. The logical flow chart for the main program, BFCNTL, is shown in Figure 5, and detail flow charts and program listing are presented in Appendix A.

PROGRAM DECK SETUP

The program deck setup is illustrated in Figures 6 and 7. The total deck setup must follow the blocked order shown. Twelve subordinate subroutines may be arranged in any order, but the total subroutine block must be immediately behind the main program deck. When only one case is to be run, the execute card must follow the last card of DP data set.

When multiple cases are to be run, subsequent-case data must be arranged as shown in Figure 7 and placed immediately behind the first case. The execute card must then follow the last-case DP data termination card.

INPUT DATA

Input data for the program consist of a user-prepared ND array and the BC and BF arrays produced by SWEEP data generation option.

The input ND data array is an integer array on one card containing control factors shown in Table 1. The flexible loads program uses some coding procedures which are identical to those contained in the airloads estimation program in Volume III. Consequently, some of the control factors listed in Table 1 are identical to those in Volume III. To simplify the coding procedures, identical control factors are located in the same card columns; some columns are left blank; and some columns contain relocated and new control data.

Figure 1 and Table 2 show basic conditions produced for each of the various case numbers. Any basic condition not specifically defined by the chosen case number will not be produced, even if the type factor ND(28) through ND(36) is entered as yes. These type factors are used for selection or rejection of only those basic flight conditions described by the chosen case number.

BC data array contains (1) airplane design weights, centers of gravity locations, and moments of inertia, (2) design limit load factors, (3) design speed-altitude points, (4) airplane dimensional and geometric data, and (5) span stations on the lifting surfaces selected for weight analysis. These data are on punched cards in the E-format that is compatible with decimal read subroutine DECRD. Input BC array is shown in Table 3.

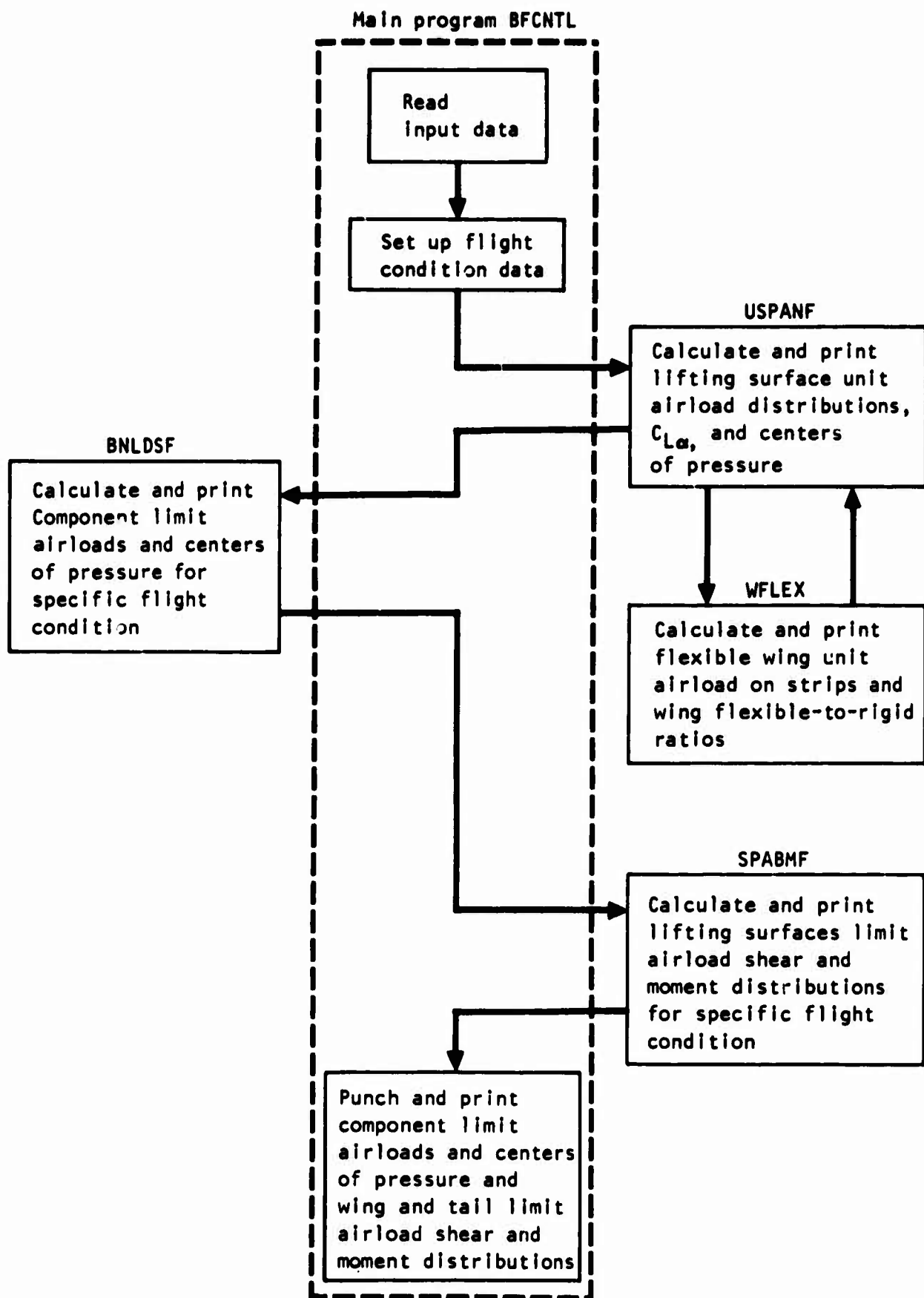


Figure 5. Logical flow chart for flexible airloads stand-alone program.

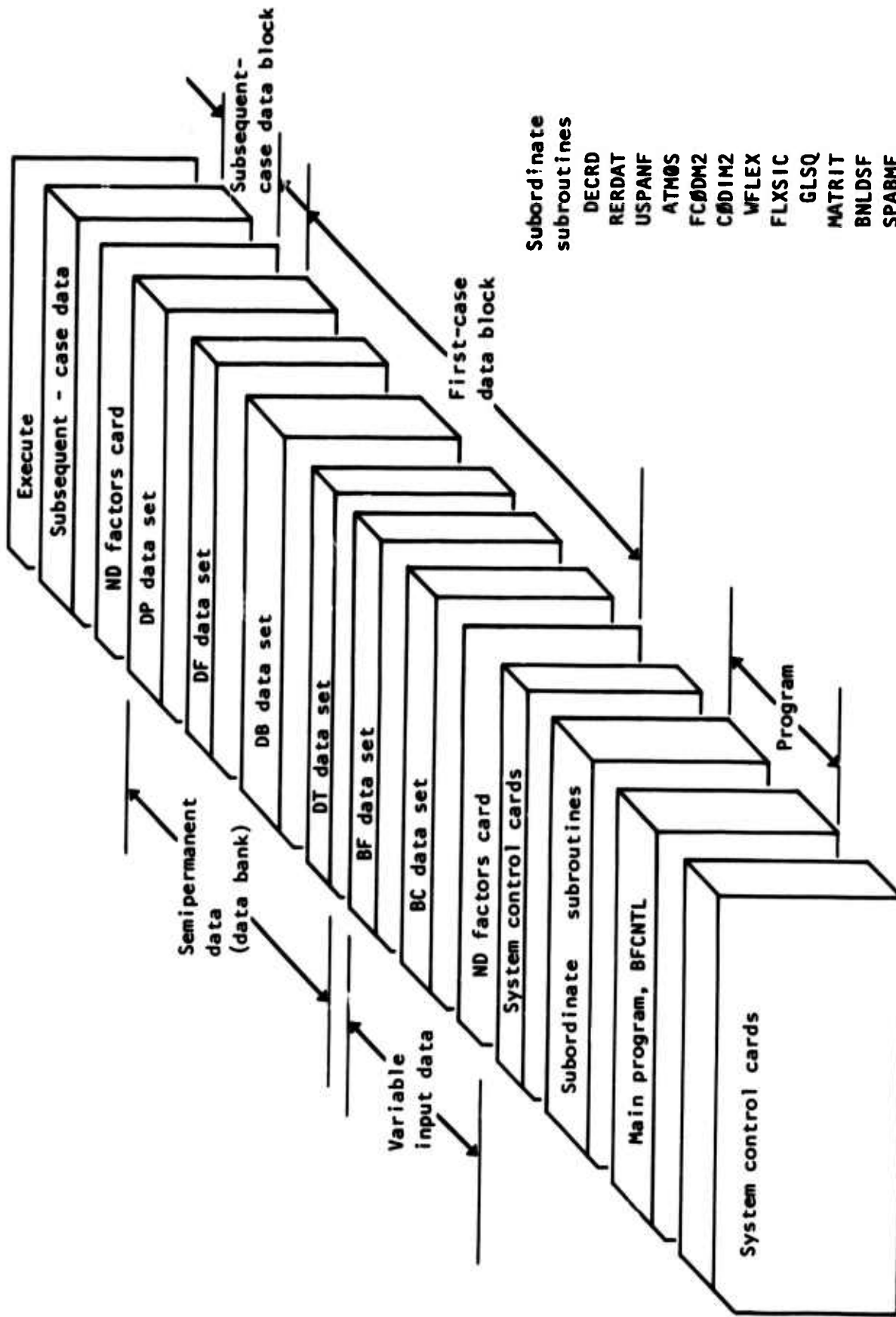


Figure 6. Flexible airloads program deck setup.

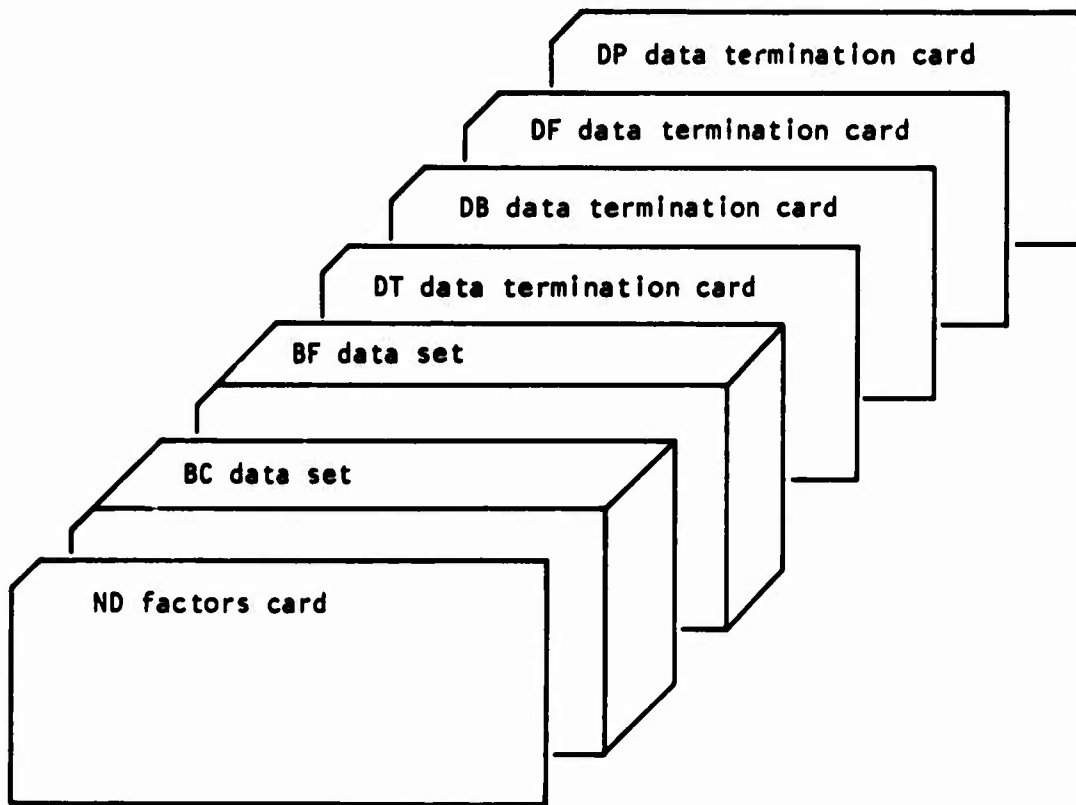


Figure 7. A subsequent-case data block setup.

BF data array contains (1) design speeds at 20,000 feet, (2) wing elastic axis location, (3) exposed wing strip weights and center of gravity (X/C) locations, and (4) wing spanwise variation of the stiffness parameters EI and GJ. These data are shown in Table 4, locations 1 through 106, and are on punched cards in the same format as the BC data.

SEMIPERMANENT DATA

The program deck setup contains data sets DT, DB, DF, and DP, which comprise semipermanent (fixed) data. These data sets contain aerodynamic data used by subroutine USPANF in the determination of lifting surface unit airload distributions. These data sets are the same as that contained in the SWEEP airloads module data bank.

DT data set array is shown in Table 5. This data set contains η -span stations and taper ratios applicable to spanwise loading parameters of DB and DP data sets, and contains the variation with mach number of compressible section lift-curve slope parameter, B/K , and section CP, X/C, for the wing and empennage.

DB data set array is shown in Table 6. This data set contains subsonic span loading parameter ($C_l C/C_L C_{AV}$), variation of compressible lifting surface lift-curve slope parameter ($BC_{L\alpha}/K$) versus compressible sweep parameter (λ_B) and aspect ratio parameter (BA/K_1) for 16 combinations of span station (η) and taper ratio (λ).

The DF data set array is shown in Table 7. This data set contains section CP (X/C) and flap lift effectiveness parameter (K_{CF}) variation with flap chord ratio (C_F/C_W) and flap lift spanwise loading parameter ($C_l C/C_L C_{AV}$) variation with span station (η) for 10 flap span ratios (b_F/b_W).

DP data set array is shown in Table 8. This data set contains supersonic span loading parameter ($2\Gamma/V\alpha b$) variation with sweep parameter (B_m) and aspect ratio parameter (BA) for 16 combinations of span station (η) and taper ratio (λ).

Numeric values of DT, DB, DF, and DP data contained in the program data bank are presented in Volume III, Section II.

SUBROUTINE DESCRIPTIONS

SUBROUTINE RERDAT

Subroutine RERDAT reads in and rearranges the input BC data set described in Table 3 to data locations shown in Table 9. The subroutine also interpolates EI and GJ data BF(47) through BF(106) to obtain EI and GJ data for subroutine WFLEX, as shown in data locations BF(114) through BF(173) of Table 4. BF data items BF(107) through BF(113), BF(174), and BF(175) are added to the input data list. The rearranged BC data locations and the complete BF data sets are then used in the main program and the subprogram.

Subroutine RERDAT logical flow chart and its program listing are shown in Appendix A.

SUBROUTINE DECRD

Entry Name

DECRD provides the facility for reading a variable number of pieces of real data from the input device and storing them in specified elements (either sequential or nonconsecutive) or an array.

Usage

CALL DECRD (APR)

APR - The name of the real array to be read.

This routine is particularly helpful in programs in which the number of input elements varies from case to case. Only information specified is actually read into storage; remaining elements of the array are unchanged.

Data are usually written on the form Fortran Fixed 10 Digit Decimal Data. Each card must contain an index: an integer written in columns 2 through 12. The five data fields of 12 columns each (columns 13 through 72) contain input data of the real type. However, any data field may be left blank to indicate that the corresponding location in core is not to be changed. Columns 73 through 80 contain the identification.

The index defines the location of the first piece of data on the card within the array specified as the argument. This integer must be written to the extreme right of the field. If the name of the array is not subscripted in the CALL statement, the index can be considered equivalent to the subscript of a one-dimensional array. For example, if the argument in the CALL is the

nonsubscripted array name, ARR, and the index is 10, the first piece of data on the card (columns 13 through 24) will be read into ARR (10); the third piece of data (columns 37 through 48) will be read into ARR (12).

For an array with multiple subscripts, the index should be computed so that the particular element can be defined by a single number. The index may not be zero or blank.

All data items must be of the real type; they are written following the rules for input with E-type format specification. If an exponent is written, it must be at the extreme right of the field.

1. If the number is written without either an exponent or a decimal point, the point is assumed to be at the extreme right of the field (as if read with an E12.0 format).
2. If the decimal point is explicitly written, the number may be positioned anywhere in the field.
3. If no decimal point is written but an exponent is furnished, the point is assumed to be immediately to the left of the exponent.

When a field is left blank, no information is read into the location corresponding to this field; the information already in this location is unaltered. A negative zero is read as zero.

Reading is terminated by putting a negative sign in column 1 of the last card to be read.

Error

If card columns 2 to 12 are blank or zero, the comment, "DECRD ER. CARD = (bad card image)" is printed and execution of the job is terminated. If a field contained in columns 13 through 72 cannot be converted by the specified format, an error code is printed and execution of the job is terminated.

Method

Data fields of each card are converted twice, using two formats, SF12.0 and 10A6. The A-type conversion is used to check for blank fields. If the field is not blank, the result of the E-type conversion is stored in the proper element of the specified array. After reading each card, a test is made for a negative sign in the first field; reading is terminated if the sign is negative. The numerical data cards processed by this subroutine is discussed in Section I of Volume IX.

SUBROUTINE USPANF

Subroutine USPANF is used to determine the lifting surface unit airload shears, moments, CP's and lift-curve slopes for a combination of mach number and altitude specified by the main program.

Methods used for the horizontal and vertical tail surface are the same as those described in Volume III, Section II, for the SWEEP program.

Methods used to develop the wing unit airload data include the airload distributions caused by wing bending and torsional deflections resulting from (1) lift due to angle of attack, (2) lift due to flap deflection, and (3) inertia load due to vertical acceleration. The applicable methods are described in Section II herein.

FUNCTION CØDIM2

Function CØDIM2 is an interpolation routine for the determination of a point on a single curve fitted through four points.

FUNCTION FCØDM2

Function FCØDM2 is an interpolation routine for the determination of a point from a family of fitted curves. The subroutine utilized CØDIM2 for each family curve interpolation.

SUBROUTINE ATMØS

Subroutine ATMØS is used to determine the 1962 U.S. Standard Atmosphere density and speed of sound for a given geometric altitude. The methods employed can be followed in the logical flow chart and the program listing shown in Appendix A.

SUBROUTINE WFLEX

Subroutine WFLEX solves the wing static aeroelastic problem for the α , δ FLAP, and vertical inertia load effects. The subroutine uses distributed rigid airload data, along with flight condition data and structural influence coefficients from subroutine FLXSIC. The logical flow chart and the program listing are shown in Appendix A.

Usage

All input-output data, except printed results and diagnostic printed results, are passed through the call statement.

CALL WFLEX (AFW, AFWCP, AFWF, AFWDF, F, YEIGJ, EI, GJ, CR, BØ2, BLBS, ANGLE, FSLERT, ANGERA, FSEAØ, WLAMDA, Q, CLAR, EØTA, SW, NØEIGJ, NS, ICALCS, IPRINS, IPRINA)

Definition of call statement variables:

() = program dimensions

<u>Variable ()</u>	<u>Data Type</u>	<u>Description</u>
AFW(10,3)	INPUT	Rigid load distributions on NS number of chordwise strips. Stored by columns: Col 1, α load; col 2, δ_{FLAP} load; col 3, inertia load for $N_z = 1$.
AFWCP(10,3)	INPUT	Chordwise centers of pressure for rigid loads provided in AFW. These X/C values are stored by columns.
AFWF(10-3)	OUTPUT	Total flexible load distributions, by column.
AFWDF(10,3)	OUTPUT	Delta flexible load distributions, by column.
F(3,4)	OUTPUT	Summation of load distributions: Col 1, Σ rigid loads; col 2, Σ total flexible loads; col 3, Σ delta flexible loads; col 4, flexible-to-rigid ratios.
YEIGJ(20)	INPUT	Elastic axis y-coordinates for wing EI and GJ. NOTE: YEIGJ (1) must equal zero, (in.).
EI(20)	INPUT	EI, wing bending stiffness (lb in. ²).
GJ(20)	INPUT	GJ, wing torsional stiffness (lb in. ²).

<u>Variable ()</u>	<u>Data Type</u>	<u>Descriptions</u>
CR	INPUT	Chord of wing at fuselage ζ (in.).
BØ2	INPUT	Wing semispan, b/2 (in.).
BLBS	INPUT	Butt line of body side (in.).
ANGLE	INPUT	Angle of wing leading edge sweep (deg).
FSLERT	INPUT	Fuselage station of wing leading edge at fuselage ζ (in.).
ANGEA	INPUT	Angle of wing elastic axis sweep (deg)
FSEAØ	INPUT	Fuselage station of elastic axis at ζ (in.).
WLAMDA	INPUT	Wing taper ratio, $\lambda_W = \frac{\text{chord tip}}{\text{chord } \zeta}$
Q	INPUT	Dynamic pressure, q (psf).
CLAR	INPUT	$C_{L\alpha}$ /RAD for the wing.
EØTA	INPUT	Exposed/total load ratio, for distributions.
SW	INPUT	Wing area (ft ²).
NØEIGJ	INPUT	Number of values in the YEIGJ, EI and GJ lists, 20 maximum.
NS	INPUT	Numbers of load strips on the exposed wing, 10 maximum.
ICALCS	INPUT	Controls calculation of SIC matrix: 0 - Do not calculate SIC 1 - Do calculate SIC

<u>Variable ()</u>	<u>Data Type</u>	<u>Descriptions</u>
IPRINS	INPUT	Controls printing of SIC matrix and other diagnostic data from subroutine FLXSIC: 0 - Do not print SIC 1 - Do print SIC NOTE: IPRINS has no effect if ICALCS = 0
IPRINA	INPUT	Controls printing of diagnostic data from subroutine WFLEX: 0 - Do not print diagnostic data 1 - Do print diagnostic data

Restrictions

The number of load strips, NS, may not exceed 10, and the number of EI and GJ values, NØEIGJ, may not exceed 20.

Error Returns

If NS is greater than 10, or NØEIGJ is greater than 20, an error message will be printed and execution will be stopped.

Method

The method is described under the heading "Wing Aeroelastic Distributions" in Section II. Note that when using subroutine GLSQ to obtain the solution, the D-matrix must be reloaded into A for each load effect, because GLSQ destroys A in the solution process. Also, note that region A must be cleared prior to loading D for at least two more rows than the number of rows in D, in order for the GLSQ solution to work.

Operational Notes

Rigid load distributions that enter into WFLEX are for loads on the exposed wing panel only and can be handled several ways. But regardless of the manner in which it is used, the α load, per radian, on the exposed wing panel due to a unit angle of attack is computed in the program as:

$$\text{LOAD} = \text{CLAR} * \text{E} \theta \text{TA} * \text{Q} * \frac{\text{SW}}{2} * \sum_{\text{I}=1}^{\text{NS}} \text{AFW}(\text{I}, 1)$$

The variable $\text{E} \theta \text{TA}$ in application to this flexible airloads program is equated to 1.0.

SUBROUTINE FLXSIC

Using wing geometry and wing EI and GJ distributions as input data, subroutine FLXSIC computes wing structural influence coefficient for use in the static aeroelastic solution that is calculated in subroutine WFLEX. The logical flow chart and program listing are shown in Appendix A.

Usage

All input-output data, except printed diagnostic results, are passed through the call statement.

CALL FLXSIC (SICBAR, YEIGJ, EI, GJ, CR, BØ2, BLBS, ANGLE, FSLERT, ANGEA, FSEAØ, WLAMDA, XØCFWD, XØCAFT, NØEIGJ, NS, IPRINS)

Definition of call statement variables:

() = Program dimensions

<u>Variable ()</u>	<u>Data Type</u>	<u>Description</u>
SICBAR(10,20)	OUTPUT	Matrix of strip slopes due to loads at the SIC points (radians/lb).
YEIGJ(20)	INPUT	Elastic axis y-coordinates for wing EI and GJ. NOTE: YEIGJ(1) must equal zero, (in.).

<u>Variable ()</u>	<u>Data Type</u>	<u>Description</u>
EI(20)	INPUT	EI, wing bending stiffness (lb-in. ²).
GJ(20)	INPUT	GJ, wing torsional stiffness (lb-in. ²).
CR	INPUT	Chord of wing at fuselage ζ (in.).
BØ2	INPUT	Wing semispan, b/2 (in.).
BLBS	INPUT	Butt line of body side (in.).
ANGLE	INPUT	Angle of wing leading edge sweep (deg).
FSLERT	INPUT	Fuselage station of wing leading edge at fuselage ζ (in.).
ANGEA	INPUT	Angle of wing elastic axis sweep (deg).
FSEAØ	INPUT	Fuselage station of elastic axis at ζ (in.).
WLAMDA	INPUT	Wing taper ratio, $\lambda_W + \frac{\text{tip chord}}{\zeta \text{ chord}}$
XØCFWD	INPUT	Strip X/C forward, used as 0.15.
XØCAFT	INPUT	Strip X/C aft, used as 0.65.
NØEIGJ	INPUT	Number of values in the YEIGJ, EI and GJ lists, 20 maximum.
NS	INPUT	Number of load strips on the exposed wing, 10 maximum.
IPRINS	INPUT	Controls printing of SIC matrix and other diagnostic data: 0 - Do not print SIC and diagnostic 1 - Do print SIC and diagnostic

Restrictions

The number of load strip, NS, may not exceed 10, the number of EI and GJ values may not exceed 20, and YEIGJ(1) must equal 0.

Error Returns

In the logic of this routine, it is possible for \bar{y} in the swept elastic axis system to become negative for a highly swept wing. If it does, this subroutine will print out an error message and execution will be stopped.

Method

The method is described under the heading "Wing Structural Influence Coefficients," in Section II. Coding, with the exception of the technique used in integration of equation 44 is self-explanatory. Integration of equation 44 is accomplished trapezoidally after the input EI and GJ data are first interpolated, using the CØDIM2 subroutine, to obtain 20 intervals between the ξ and the point at which the deflection is being computed. For example:

$$\int_0^{\bar{y}} f(\bar{\lambda}) d\lambda = \sum_{i=2}^{21} (f(\bar{\lambda})_{i-1} + f(\bar{\lambda})_i) \frac{\Delta\lambda}{2}$$

where

$$\Delta\bar{\lambda} = \bar{y}/20$$

Note that if the value of \bar{y} ever exceeds the value of $\bar{\eta}$, the integration upper limit is changed to $\bar{\eta}$ by simply zeroing out the value of the functions of $\bar{\lambda}$ in both the bending and torsion integrals.

Recommended Operational Data Setup

In the formulation of the aeroelastic solution that uses the SIC matrix from this subroutine, the wing elastic axis (EA) has been carried inboard of the side of the body to the body centerline. In general, the wing carry-through structure does not extend along the wing EA, but is directed across the airplane. Since bending across the airplane does not affect wing angle of attack, and the wing is effectively fixed in torsion at the side of the body, stiffness EI and GJ inboard of the body side should be arbitrarily greatly increased.

EI and GJ recommended data setup:

$$y_{\text{BODY SIDE}} = \frac{BL_{\text{BS}}}{\cos \Lambda E_A}$$

YEIGJ(1) = 0.	EI(1) = 10 EI _{BS}	GJ(1) = 10 GJ _{BS}
(2) = 0.25 \bar{y}_{BS}	(2) = 10 EI _{BS}	(2) = 10 GJ _{BS}
(3) = 0.50 \bar{y}_{BS}	(3) = 10 EI _{BS}	(3) = 10 GJ _{BS}
(4) = \bar{y}_{BS}	(4) = EI _{BS}	(4) = GJ _{BS}
(5) = 1.10 \bar{y}_{BS}	(5) = See Note	(5) = See Note

NOTE: Data for point 5 and on should be taken from the EI and GJ curves. Sufficient data points should be input (20 maximum) to give good definition of the curves when fitted with CØDIM2 .

Subroutines USPANF through RERDAT set up EI and GJ values in accordance with the preceding note and interpolate EI and GJ input data BF(47) through BF(106) to obtain 15 additional points outboard of YEIGJ(5). Resulting EI and GJ data are then located in BF(114) through BF(173), as shown in Table 4, for transfer to this subroutine.

SUBROUTINE GLSQ

This FORTRAN subprogram gives the least squares solution to a system of overdetermined linear equations $Bx = C$, where B is an N x M matrix, with

$N \geq M$ and C a column vector of dimension N . The logical flow chart and the program listing are shown in Appendix A.

Calling Sequence

CALL GLSQ (A, X, IL, N, M, ALPHA, E1, E2)

Definition of call statement variables:

() = program dimensions

<u>Variable ()</u>	<u>Data Type</u>	<u>Description</u>
A(25,26)	INPUT	The augmented matrix B,C of at least dimension $(M+2) \times (M+1)$ or $N \times (M+1)$, whichever is greater.
X(26)	OUTPUT	The vector where the solution is stored and must be of at least dimension $M + 1$.
IL(26)	INPUT	A temporary vector of at least dimension $M+1$.
N	INPUT	Number of rows of B.
M	INPUT	Number of columns of B.
ALPHA	OUTPUT	The square root of the sum of the squares of the residuals.
E1 and E2	INPUT	Two nonnegative numbers which are small compared to the size of the numbers in the input matrix.

Restrictions

This subprogram has a dimension statement A(25, 26), X(26), IL(26). The calling program must be dimensioned exactly the same. The input data, A, are destroyed during the computation.

Method

The method is discussed under "Wing Aeroelastic Distributions," in Section II. In the triangularization process, if any number to be annihilated is already less in magnitude than E_1 , it is considered to be zero and the computations to annihilate the element are omitted.

Let b_j denote the j^{th} column of B . If the routine finds that b_k is a linear combination of b_1, \dots, b_{k-1} , then it sets the k^{th} component of x to zero. The routine considers that such a linear combination holds whenever numbers $\lambda_1, \dots, \lambda_{k-1}$ can be found so that the length of the vector

$$b_k - (\lambda_1 b_1 + \dots + \lambda_{k-1} b_{k-1})$$

is less than E_2 .

Operational Notes

When using GLSQ to solve an exactly determinate set of linear equations, the dimension of the augmented matrix must be at least $A(M+2, M+1)$, and the region must be cleared prior to loading the augmented matrix.

SUBROUTINE MATRIT

Subroutine MATRIT prints matrices by row or column in format IP8E13.5 and with a heading statement that is transmitted in the calling sequence. The logical flow chart and the program listing are shown in Appendix A.

Usage

CALL MATRIT (AMN, NR, NC, NRMAX, MTYPE, IPRIN, HEAD)

Definition of call statement variables:

() = Program Dimensions

<u>Variable ()</u>	<u>Data Type</u>	<u>Description</u>
AMN(1)	INPUT	Matrix to be printed.
NR	INPUT	Number of rows in AMN.
NC	INPUT	Number of column in AMN.
NRMAX	INPUT	Maximum number of rows in AMN, dimension in calling program.
MTYPE	INPUT	Type of matrix: 1 - real -1 - complex (do not use)
IPRIN	INPUT	Print by rows or columns: 1 - print by rows 2 - print by columns
HEAD(100)	INPUT	Format of matrix heading; for example, 24H (IHI 20X, 11HMASS, MATRIX).

SUBROUTINE BNLDSF

Subroutine BNLDSF is used to determine the limit airloads and CP's on the airplane components, and up inertia factors for the flight conditions specified by the main program. There are five types of flight conditions for which the airloads can be determined; namely, (1) the balanced maneuver condition, (2) the pitching acceleration condition, (3) the vertical gust condition, (4) the lateral gust condition, and (5) the yawing acceleration condition. The methods used in deriving the component loads for these conditions are presented in Section II and include the aeroelastic effects of wing flexibility.

The subroutine BNLDSF logical flow chart and the program listing are shown in Appendix A.

SUBROUTINE SPABMF

Subroutine SPABMF is used to determine the net limit airload shear and moments along the load reference line on the wing, horizontal tail, and vertical tail surfaces. The methods employed are described in Section II. The logical flow chart and the program listing are shown in Appendix A.

OPERATING CORE, TCØM

The program operating core, TCØM, is dimensioned to 4,400 locations and is blocked into data regions as shown in Table 10. A description and the location of the data within each data block can be found in the tables referenced by Table 10.

OUTPUT DATA DESCRIPTION

GENERAL

Primary output of the program is a deck of cards containing airplane component limit airloads, CP locations, and wing and empennage limit airload shears and moments at the spanwise stations along the load reference line selected for weight analysis. Punched card output is in a format for use as an optional airloads input to the SWEEP program. Printout of other data is also included for visual inspection of the results of final and intermediate calculations.

PUNCHED CARD OUTPUT

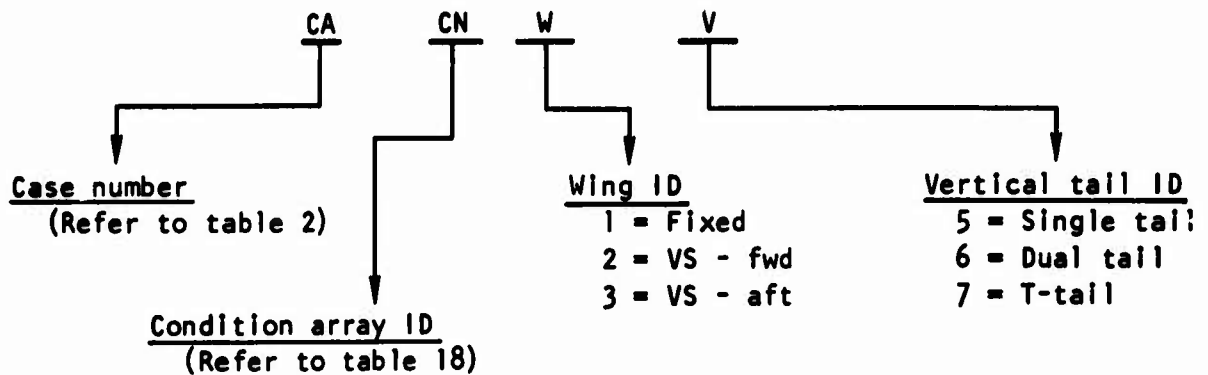
The output punched cards list limit airloads data in an E-format to be read by subroutine DECRD in SWEEP. A sample printout of data on the punched cards is shown in Table 17. Each card contains a DECRD array index number, followed by five decimal data items and the card identification number. A "yes" in control factor ND(40), per Table 1, will provide the punched card output.

Output data array is described in Table 15. The index number punched on each card corresponds to the location within the array for the first item of decimal data on the card.

Condition identification number and component loads identification numbers are assigned by the program and are included in the punched output deck for each condition. Component loads identification numbers also appear in the printed output.

Condition ID

The condition identification number is punched in columns 13 to 24 of card 1 and is defined as follows:



Fuselage Loads ID

The fuselage loads identification number is punched in columns 25 to 36 of card 1 and appears on the components load and CP printed page. It is defined as follows:

CA CN 0

Wingloads ID

The wingloads identification number is punched in columns 25 to 36 of card 5 and appears on the wing spanwise loads printed page. It is defined as follows:

CA CN W

Horizontal Tail Loads ID

The horizontal tailloads identification number is punched in columns 61 to 72 of card 15 and appears on the horizontal tail spanwise loads printed page. It is defined as follows:

CA CN 4

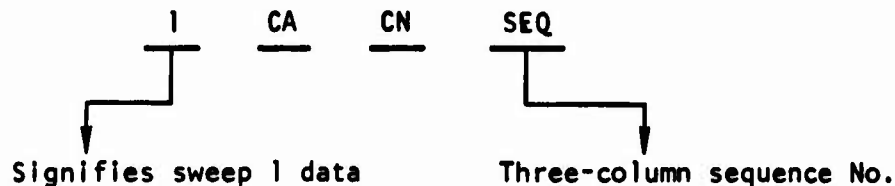
Vertical Tail Loads ID

The vertical tailloads identification number is punched in columns 37 to 48 of card 26 and appears on the vertical tail spanwise loads printed page. It is defined as follows:

CA CN V

Punched Card ID

The punched output identification and card sequence number is punched in columns 73 to 80 and is defined as follows:



PRINTED OUTPUT DATA

The program will always print the data in Tables 19 through 28. With a "yes" in ND(41), per Table 1, a listing of the data on the punched output cards will be printed as shown in Table 17. With a "yes" in ND(44), per Table 1, FLXSIC matrices will be printed as shown in Tables 29 through 35. With a "yes" in ND (45), per Table 1, WFLEX matrices will be printed as shown in Tables 36 through 38.

Data of Primary Interest

Data of primary interest to the user consist of (1) that which is descriptive of the data that are to be used as optional input to SWEEP, and (2) input data for the main program, BFCNTL.

Table 17 shows a sample printout of the data on the output punched cards. Data items can be identified using Table 15. Table 25 presents a summary of the component limit airloads, CP's, and the airplane inertia factors. Tables 26 through 28 show sample printouts of limit airload shears and moments along the load reference line for the wing, horizontal tail, and vertical tail, respectively. Tables 19 and 20 show sample printouts of the program input BC and BF data sets; the data items can be identified using Tables 3 and 4.

Intermediate Step and Diagnostic Data

Tables of printed data presented are divided into three groups. The first group consists of intermediate-step results produced by subroutine USPANF as spanwise unit airload distributions for the wing, and horizontal and vertical tails are developed. The second group consists of optional diagnostic matrix data produced by subroutine FLXSIC. The third group consists of optional diagnostic matrix data produced by subroutine WFLEX.

Intermediate-Step Data

Tables 21, 23, and 24 are produced by subroutine USPANF. Table 22 is produced by subroutine WFLEX, which is subordinate to subroutine USPANF. These printed data are not optional in the current configuration of the flexible airloads stand-alone program. Table 21 shows sample printouts of the rigid loading data extracted from the data bank aerodynamic data for the condition mach number and the subject air vehicle configuration. Table 22 shows sample printouts of rigid loading and CP data input to subroutine WFLEX by subroutine USPANF, and aeroelastic loading data returned to subroutine USPANF by subroutine WFLEX. Table 23 shows sample printouts of final unit spanwise loading distributions for the wing, and horizontal and vertical tails developed by subroutine USPANF. Table 24 shows sample printouts of spanwise variation of unit shear, bending moment, and torque for three surfaces as developed by subroutine USPANF and stored in data region BU.

FLXSIC Diagnostic Data

Tables 29 through 35 present optional diagnostic data produced by subroutine FLXSIC. If control factor ND(44) is assigned a value of 1, these tables will be produced. A value of 0 will eliminate them. Table 29 shows a sample printout of the data input to subroutine FLXSIC by subroutine WFLEX. Table 30 shows a sample printout of the elastic axis geometry developed by subroutine FLXSIC. Tables 31 through 35 show sample printouts of the various structural influence coefficient (SIC) matrices developed by subroutine FLXSIC. Subroutine FLXSIC is recalled only when there is a change in wing geometry or stiffness properties.

WFLEX Diagnostic Data

Tables 36 through 38 present optional diagnostic data produced by subroutine WFLEX. If control factor ND(45) is assigned a value of 1, these data will be produced. A value of 0 will eliminate them. Table 36 shows a sample printout of the pertinent aerodynamic data used by subroutine WFLEX. Table 37 shows a sample printout of the aeroelastic D-matrix developed by the subroutine. Table 38 shows sample printouts of the rigid and the resultant flexible loads matrices. Subroutine WFLEX is called whenever mach number, dynamic pressure, wing geometry, wing stiffness properties, or wing weight distribution change.

TABLE 1. ND CONTROL FACTORS CARD

Control Factor	Card Col	ND 13	ND 14	ND 15	ND 23	ND 24	ND 25	ND 26	ND 27
SWEEP A/V class	2								
Fighter		1							
Attack		2							
Bomber I		3							
Bomber II		4							
Cargo-assault		5							
Cargo-transport		6							
Wing Type									
Fixed wing	3,4		-1						
Variable sweep	4		1						
Vertical tail type									
Single tail	5,6			-1					
Dual tail	6			0					
T-tail	6			1					
Loads requirements									
Select components	21,22				-1				
Fuselage No	23,24					-1			
Fuselage Yes	24					1			
Wing No	25,26						-1		
Wing Yes	26						1		
Horizontal tail No	27,28							-1	
Horizontal tail Yes	28							1	
Vertical tail No	29,30								-1
Vertical tail Yes	30								1
Do all components	22,24 26,28 & 30				1	0	0	0	0

TABLE 1. ND CONTROL FACTORS CARD (CONT)

Control Factor	Card Col	ND 28	ND 29	ND 30	ND 31	ND 32	ND 33	ND 34	ND 35	ND 36	ND 40	ND 41
Basic condition types*												
Pos bal flight	No	31,32	-1									
	Yes	32	1									
Neg bal flight	No	33,34		-1								
	Yes	34		1								
Maneuvering flap	No	35,36			-1							
	Yes	36			1							
1 g trim flap	No	37,38				-1						
	Yes	38				1						
Pos vert gust	No	39,40					-1					
	Yes	40					1					
Neg vert gust	No	41,42						-1				
	Yes	42						1				
Lateral gust	No	43,44							-1			
	Yes	44							1			
Pitch acceler	No	45,46								-1		
	Yes	46								1		
Yawing acceler	No	47,48									-1	
	Yes	48									1	
Tunch output factors												
Punched output	No	55,56										-1
	Yes	56										1
Print check	No	57,58										-1
	Yes	58										1

TABLE 1. ND CONTROL FACTORS CARD (CONCL)

Control Factor	Card Col	ND 42	ND 43	ND 44	ND 45	ND 46
Input control factors - No. of values YEIGJ, EL, GJ (20 Maximum) Wing weight strips	59,60	20				
	61,62		10			
Diagnostic printing FLXSIC matrices	No Yes	64 64		0 1		
MFLEX matrices	No Yes	66 66			0 1	
Case No.	67,68					**
<p>*Basic conditions not specifically defined by the chosen case number will not be produced, even if the type factor is entered as yes. Type factors are used for the selection or rejection of basic conditions described by the chosen case number.</p> <p>**Enter case number selected from Table 2 (the number must be right-adjusted in the field).</p>						

TABLE 2. CASE NUMBER CONDITIONS

Case No.	Condition No.	Condition Type	Mach No.	Altitude
1	104 WV 106 WV 107 WV	+ Bal man. Pitch accel Yaw accel	$M_{L1,1}$	$h_{1,1}$
	108 WV 110 WV 111 WV	+ Bal man. Pitch accel Yaw accel		$h_{1,2}$
	112 WV 114 WV 115 WV	+ Bal man. Pitch accel Yaw accel		$h_{1,3}$
2	208 WV 210 WV 211 WV	+ Bal man. Pitch accel Yaw accel	$M_{L1,2}$	$h_{1,2}$
	212 WV 214 WV 215 WV	+ Bal man. Pitch accel Yaw accel		$h_{1,3}$
3	312 WV 314 WV 315 WV	+ Bal man. Pitch accel Yaw accel	$M_{L1,3}$	$h_{1,3}$
4	401 WV 402 WV 403 WV 405 WV	+ Vert gust - Vert gust Lat gust - Bal man.	$M_{H1,1}$	$h_{1,1}$
	409 WV 413 WV	- Bal man. - Bal man.		$h_{1,2}$ $h_{1,3}$
5	501 WV 502 WV 505 WV	+ Vert gust - Vert gust Lat gust	$M_{H1,2}$ or $M_{H1, 20,000 ft^*}$	$h_{1,2}$ or 20,000 ft*
	509 WV 513 WV	- Bal man. - Bal man.	$M_{H1,2}$	$h_{1,2}$ $h_{1,3}$

TABLE 2. CASE NUMBER CONDITIONS (CONCL)

Case No.	Condition No.	Condition Type	Mach No.	Altitude
6	601 WV 602 WV 603 WV	+ Vert gust - Vert gust Lat gust	$M_{H1,3}$ or $M_{H1, 20,000 \text{ ft}^*}$	$h_{1,3}$ or 20,000 ft*
	613 WV	- Bal man.	$M_{H1,3}$	$h_{1,3}$
7	704 WV 705 WV 706 WV 707 WV	+ Bal man. - Bal man. Pitch man. Yaw man.	0.90	$h_{1,1}$
	708 WV 709 WV 710 WV 711 WV	+ Bal man. - Bal man. Pitch man. Yaw man.		$h_{1,2}$
	712 WV 713 WV 714 WV 715 WV	+ Bal man. - Bal man. Pitch man. Yaw man.		$h_{1,3}$
8	816 WV	Flap man.	1.5 V _{SO}	SL
9	917 WV	1 g flap trim	1.2 V _{SL}	SL
10	1018 WV 1019 WV 1020 WV 1021 WV	+ Vert gust - Vert gust + Bal man. - Bal man.	$M_{H2,1}$	$h_{2,1}$
	1022 WV 1023 WV	+ Bal man. - Bal man.		$h_{2,2}$
11	1118 WV 1119 WV	+ Vert gust - Vert gust	$M_{H2,2}$ or $M_{H2, 20,000 \text{ ft}^*}$	$h_{2,2}$ or 20,000 ft*
	1122 WV 1123 WV	+ Bal man. - Bal man.	$M_{H2,2}$	$h_{2,2}$
*Gust conditions maximum altitude is 20,000 feet.				
W = 1 = Fixed wing		V = 5 = Single vertical tail		
2 = Variable sweep (fwd)		6 = Dual vertical tail		
3 = Variable sweep (aft)		7 = T - tail		

TABLE 3. BC INPUT DATA SET

LOCATIONS	DESCRIPTIONS	
1	MAXIMUM DESIGN WEIGHT (MDW).	POUNDS
2	CENTER OF GRAVITY STATION (X) AT MDW-VARIABLE SWEEP WING FWD.	INCHES
3	CENTER OF GRAVITY STATION (X) AT MDW-VARIABLE SWEEP WING AFT. -FIXED WING.	INCHES
4	BASIC FLIGHT DESIGN WEIGHT (BFDW).	POUNDS
5	CENTER OF GRAVITY STATION (X) AT BFDW-VARIABLE SWEEP WING FWD.	INCHES
6	CENTER OF GRAVITY STATION (X) AT BFDW-VARIABLE SWEEP WING AFT. -FIXED WING.	INCHES
7	PITCHING MOMENT OF INERTIA (IYY) AT BFDW-VARIABLE SWEEP WING FORWARD.	SLUG-FT SQUARED
8	PITCHING MOMENT OF INERTIA (IYY) AT BFDW-VARIABLE SWEEP WING AFT. -FIXED WING.	SLUG-FT SQUARED
9	YAWING MOMENT OF INERTIA (IZZ) AT BFDW-VARIABLE SWEEP WING FORWARD.	SLUG-FT SQUARED
10	YAWING MOMENT OF INERTIA (IZZ) AT BFDW-VARIABLE SWEEP WING AFT. -FIXED WING.	SLUG-FT SQUARED
11	LANDING DESIGN WEIGHT (LDW).	POUNDS
12	CENTER OF GRAVITY STATION (X) AT LDW.	INCHES
13	LIMIT POSITIVE LOAD FACTOR (NZ) AT BFDW-SUBSONIC.	
14	LIMIT POSITIVE LOAD FACTOR (NZ) AT BFDW-SUPERSONIC.	
15	LIMIT NEGATIVE LOAD FACTOR (-NZ) AT BFDW-NEGATIVE SIGN (-) REQUIRED.	
16	LIMIT LOAD FACTOR (NZ) FOR FLAP DOWN MANEUVER AT MDW.	
17	PITCHING ACCELERATION AT ML FOR BFDW.	RAD./SECOND SQUARED
18	YAWING ACCELERATION AT ML FOR BFDW.	RAD./SECOND SQUARED
19-21	ALTITUDES--FIXED WING OR VARIABLE SWEEP IN AFT POSITION.	FEET
22-24	SPEEDS MH--FIXED WING OR VARIABLE SWEEP IN AFT POSITION.	MACH NUMBER
25-30	ARE NOT USED IF A/V HAS FIXED WING--ENTER ZERCS.	
25-27	ALTITUDES FOR VARIABLE SWEEP WING IN FORWARD POSITION.	FEET
28-30	SPEEDS MH FOR VARIABLE SWEEP WING IN FORWARD POSITION.	MACH NUMBER
31	MINIMUM SPEED FLAPS UP (VSO) AT MDW.	KNOTS
32	MINIMUM SPEED FLAPS DOWN (VSL) AT LDW.	KNOTS
33	XO-DISTANCE FROM X REFERENCE POINT TO BODY NOSE.	INCHES
34	LN-LENGTH OF BODY NOSE.	INCHES

TABLE 3. BC INPUT DATA SET (CONT)

LOCATIONS	DESCRIPTIONS	UNITS
35	VN-BODY NOSE VOLUME.	INCHES CUBED
36	PN=SQUARE ROOT (MAXIMUM NOSE AREA/PI)	INCHES
37	YRW-BODY HALF WIDTH AT WING-BODY INTERFACE.	INCHES
DATA LOCATIONS 38-57 ARE FOR A FIXED WING OR A VARIABLE SWEEP WING AFT POSITION.		
38	WING LEADING EDGE SWEEP ANGLE.	DEGREES
39	WING LOADS REFERENCE AXIS SWEEP ANGLE.	DEGREES
40	WING APEX (X) STATION-LEADING EDGE AT CENTER LINE.	INCHES
41	WING APEX CHORD (CR)-ALONG CENTER LINE.	INCHES
42	WING TAPEX RATIO-TIP CHORD/ROOT CHORD.	INCHES
43	WING ASPECT RATIO (AR)-SPAN SQUARED/AREA.	INCHES
44	WING TOTAL TRAPEZOIDAL AREA.	SQUARE FEET
45	WING SPAN-TIP TO TIP.	FEET
46-56	ELEVEN WING NORMAL SPAN (Y) STATIONS FOR WEIGHT ANALYSIS. FROM ROOT TO TIP.	INCHES
57	PERCENT OF WING CHORD OF LOADS REFERENCE AXIS (X/C).	DECIMAL
58-68	ARE NOT USED. ENTER ZEROS.	
69-88	ARE NOT USED IF A/V HAS FIXED WING-ENTER ZEROS.	
DATA LOCATIONS 69-88 ARE FOR A VARIABLE SWEEP WING IN THE FORWARD POSITION.		
69	WING LEADING EDGE SWEEP ANGLE.	DEGREES
70	WING LOADS REFERENCE AXIS SWEEP ANGLE.	DEGREES
71	WING APEX (X) STATION-LEADING EDGE AT CENTER LINE.	INCHES
72	WING APEX CHORD (CR)-ALONG CENTER LINE.	INCHES
73	WING TAPEX RATIO-TIP CHORD/ROOT CHORD.	INCHES
74	WING ASPECT RATIO (AR)-SPAN SQUARED/AREA.	INCHES
75	WING TOTAL TRAPEZOIDAL AREA.	SQUARE FEET
76	WING SPAN-TIP TO TIP.	FEET
77-87	ELEVEN WING NORMAL SPAN (Y) STATIONS FOR WEIGHT ANALYSIS. FROM ROOT TO TIP.	INCHES
88	PERCENT OF WING CHORD OF LOADS REFERENCE AXIS (X/C).	DECIMAL
89-99	ARE NOT USED-ENTER ZEROS.	
100	BUTT LINE (Y) OF FLAP-INBOARD END.	INCHES
101	-CUTBOARD END.	INCHES
102	FLAP CHORD/WING CHORD RATIO-AERODYNAMIC.	DECIMAL

TABLE 3. BC INPUT DATA SET (CONCL)

LOCATIONS	DESCRIPTIONS	
103	MAXIMUM FLAP DEFLECTION FOR FLAP MANEUVER.	DEGREES
104	Z DISTANCE FROM VERT TAIL ROOT TO HOR TAIL PLANE.	INCHES
105	HOR TAIL LEADING EDGE SWEEP ANGLE.	DEGREES
106	HOR TAIL LOADS REFERENCE AXIS SWEEP ANGLE.	DEGREES
107	HOR TAIL APEX (X) STATION-LEADING EDGE AT HOR TAIL CEN LINE.	INCHES
108	HOR TAIL APEX CHORD (CR)-ALONG HOR TAIL CENTER LINE.	INCHES
109	HOR TAIL TAPER RATIO-TIP CHORD/ROOT CHORD.	
110	HOR TAIL ASPECT RATIO-SPAN SQUARED/AREA.	SQUARE FEET
111	HOR TAIL TOTAL TRAPEZOIDAL AREA.	FEET
112	HOR TAIL SPAN-TIP TO TIP.	INCHES
113	YBH-BODY HALF WIDTH AT HOR TAIL-BODY INTERFACE.	INCHES
114-124	ELEVEN HOR TAIL NORMAL SPAN (YH) STATIONS FOR WEIGHT ANALYSIS. FROM ROOT TO TIP.	INCHES
125	PERCENT OF HOR TAIL CHORD OF LOADS REFERENCE AXIS (X/C).	DECIMAL
126-136	ARE NOT USED-ENTER ZEROS.	
137	VERT TAIL LEADING EDGE SWEEP ANGLE.	DEGREES
138	VERT TAIL LOADS REFERENCE AXIS SWEEP ANGLE.	DEGREES
139	VERT TAIL APEX (X) STATION-LEADING EDGE AT VERT TAIL ROOT.	INCHES
140	VERT TAIL APEX CHORD (CR)-ALONG VERT TAIL ROOT.	INCHES
141	VERT TAIL TAPER RATIO-TIP CHORD/ROOT CHORD.	
142	VERT TAIL ASPECT RATIO-SPAN SQUARED/AREA.	SQUARE FEET
143	VERT TAIL TRAPEZOIDAL AREA-PER SURFACE IF DUAL.	FEET
144	VERT TAIL SPAN-ROOT TO TIP.	INCHES
145	Z DISTANCE FROM VERT TAIL ROOT TO VERT TAIL-BODY INTERFACE.	INCHES
146-156	ELEVEN VERT TAIL NORMAL SPAN (ZV) STATIONS FOR WEIGHT ANALYSIS. FROM ROOT TO TIP.	INCHES
157	PERCENT OF VERT TAIL CHORD OF LOADS REFERENCE AXIS (X/C).	DECIMAL
158-165	ARE NOT USED-ENTER ZEROS	
166-168	SPEEDS ML-FIXED WING OR VARIABLE SWEEP IN AFT POSITION.	MACH NUMBER

TABLE 4. THE BF DATA REGION

LOCATIONS	DESCRIPTIONS	
9F(1) IS EQUIVALENT TO TCCM(4001).		
1-106	INPUT DATA FROM SWEEP	
1	SPEED MH AT 2000 FEET-FIXED WING OR VARIABLE SWEEP AFT.	MACH NUMBER
2	SPEED MH AT 2000 FEET-VARIABLE SWEEP WING FORWARD. ENTER ZERO IF A/V HAS FIXED WING.	MACH NUMBER
3-24	DATA FOR A FIXED WING OR A VARIABLE SWEEP WING IN AFT POSITION.	
3	WING ELASTIC AXIS SWEEP ANGLE.	DEGREES
4	(X) STATION OF ELASTIC AXIS AT CENTER LINE.	INCHES
5-14	TFN WING OUTER PANEL STRIP WEIGHTS-BODY INTERFACE TO TIP.	POUNDS
15-24	TEN WING OUTER PANEL STRIP CG (X/C) VALUES.	DECIMAL
25-46	DATA FOR A VARIABLE SWEEP WING IN FORWARD POSITION. ARE NOT USED IF A/V HAS FIXED WING-ENTER ZEROS.	
25	WING ELASTIC AXIS SWEEP ANGLE.	DEGREES
26	(X) STATION OF ELASTIC AXIS AT CENTER LINE.	INCHES
27-36	TFN WING OUTER PANEL STRIP WEIGHTS-BODY INTERFACE TO TIP.	POUNDS
37-46	TEN WING OUTER PANEL STRIP CG (X/C) VALUES.	DECIMAL
47-66	STATIONS (YFA) ALONG ELASTIC AXIS-20 MAXIMUM.	INCHES
67-86	VALUES OF FI AT (YFA) STATIONS-20 MAXIMUM.	POUND-INCHES SQUARED
87-106	VALUES OF GJ AT (YEA) STATIONS-20 MAXIMUM.	POUND-INCHES SQUARED
107-113	TEMPORARY STORAGE FOR SOME BC INPUT DATA TO BE REARRANGED.	
107	BUTT LINE (Y) OF FLAP-INBOARD END.	INCHES
108	-OUTBOARD END.	INCHES
109	FLAP CHORD/WING CHORD RATIO-AERODYNAMIC.	DECIMAL
110	MAXIMUM FLAP DEFLECTION FOR FLAP MANEUVER.	DEGREES

TABLE 4. THE BF DATA REGION (CONCL)

LOCATIONS	DESCRIPTIONS	MACH NUMBER
111-113	SPEEDS W/ FIXED WING OR VARIABLE SWEEP IN AFT POSITION.	
114-173	MODIFIED ARRAYS OF YFA, EI, AND GJ FOR INPUT TO SUBROUTINE WFLEX.	
114-133	TWENTY (YEA) STATIONS ALONG ELASTIC AXIS--ROOT TO TIP.	INCHES
134-153	VALUES OF EI FOR (YEA) STATIONS.	POUND-INCHES SQUARED
154-173	VALUES OF GJ FOR (YEA) STATIONS.	POUND-INCHES SQUARED
174	ELASTIC AXIS LENGTH FROM ROOT TO TIP.	INCHES
175	(YEA TIP - YEA BODY SIDE) / 15.0	INCHES
176-200	ARE NOT USED.	

TABLE 5. DT DATA SET

Location	Description
DT(1) is equivalent to TCOM (100)	
1 - 4	(1) through (4), span station, fraction of semispan
5 - 9	(1) through (4), taper ratios
9 - 20	M(1) through M(12), mach numbers
21 - 32	B/K (1) through B/K (12), compressible section lift-curve slope parameters
33 - 44	X/C _w (1) through X/C _w (12), wing section center of pressure locations, ^w fraction of chord
45 - 56	X/C _T (1) through X/C _T (12), tail section center of pressure locations, fraction of chord

TABLE 6. DB DATA SET

Location	Description
DB(1) is equivalent to TCOM (156)	
1 - 6	$\Lambda_B(1)$ through $\Lambda_B(6)$, compressible sweep angle (deg)
7 - 13	BA/K(1) through BA/K(6), aspect ratio parameter
14 - 55	Table of $C_L / C_{L_{AV}}$ values versus Λ_B and BA/K for $n(1)$, $\lambda(1)$ (42 values per table)
56 - 97	Same as 14 - 55, except for $\eta(1)$, $\lambda(2)$
78 - 139	Same as 14 - 55, except for $\eta(1)$, $\lambda(3)$
140 - 181	Same as 14 - 55, except for $\eta(1)$, $\lambda(4)$
182 - 349	Same as 14 - 181, except $\eta = \eta(2)$
350 - 517	Same as 14 - 181, except $\eta = \eta(3)$
518 - 685	Same as 14 - 181, except $\eta = \eta(4)$
686 - 727	Table of $BC_{L\alpha}/K$ values versus Λ_B and BA/K for $\lambda(1)$ (42 values per table)
728 - 769	Same as 686 - 727, except $\lambda = \lambda(2)$
770 - 811	Same as 686 - 727, except $\lambda = \lambda(3)$
812 - 853	Same as 686 - 727, except $\lambda = \lambda(4)$
<p>NOTES: Table data order = values for BA/K(1), $\Lambda_B(1)$ through $\Lambda_B(6)$ BA/K(2), $\Lambda_B(1)$ through $\Lambda_B(6)$, etc</p>	

Refer to Table 2 in Volume III, Section II, for numerical values of data.

TABLE 7. DF DATA SET

Location	Description
DF(1) is equivalent to TOQM (1009)	
1 - 5	$C_F/C_W(1)$ through $C_F/C_W(5)$, flap chord to wing chord ratios
6 - 10	X/C (1) through X/C (5), centers of pressure of section lift due to flap deflection, fraction of wing chord
11 - 15	K_{CF} (1) through K_{CF} (5), flap lift effectiveness parameters
16 - 25	b_F/b_W (1) through b_F/b_W (10), flap span to wingspan ratios
26 - 36	η (1) through $\eta(11)$ wingspan stations, fraction of wing semispan
37 - 146	Table of C_L $C/C_{L\alpha}$ C_{AV} values versus η , b_F/b_W
<p>NOTE: Table data order = values for $b_F/b_W(1)$, $\eta(1)$ through $\eta(11)$ $b_F/b_W(2)$, $\eta(1)$ through $\eta(11)$, etc</p>	

Refer to Table 3 in Volume III, Section II, for numerical value of data.

TABLE 8. DP DATA SET

Location	Description
DP(1) is equivalent to TOOM (1155)	
1 - 5	BA(1) through BA(5), aspect ratio parameter
6 - 14	Bm(1) through Bm(9), sweep parameter
15 - 59	Table of $2\Gamma/V_{ab}$ values versus Bm and BA for $\eta(1)$, $\lambda(1)$ (45 values per table)
60 - 104	Same as 15 - 59, except for $\eta(1)$, $\lambda(2)$
105 - 149	Same as 15 - 59, except for $\eta(1)$, $\lambda(3)$
150 - 194	Same as 15 - 59, except for $\eta(1)$, $\lambda(4)$
195 - 374	Same as 15 - 194, except $\eta = \eta(2)$
375 - 554	Same as 15 - 194, except $\eta = \eta(3)$
555 - 734	Same as 15 - 194, except $\eta = \eta(4)$
NOTE: Table data order = Values for BA(1), Bm(1) through Bm(9), etc	

Refer to Table 4 in Volume III, Section II, for numerical values of data.

TABLE 9. INTERNAL REARRANGED BC DATA SET

LOCATIONS	DESCRIPTIONS	
BC(1) IS EQUIVALENT TO TCOM(2758)		
1	MAXIMUM DESIGN WEIGHT (MDW).	POUNDS
2	CENTER OF GRAVITY STATION (X) AT MDW-VARIABLE SWEEP WING FWD.	INCHES
3	CENTER OF GRAVITY STATION (X) AT MDW-VARIABLE SWEEP WING AFT. -FIXED WING.	INCHES
4	BASIC FLIGHT DESIGN WEIGHT (BFDW).	POUNDS
5	CENTER OF GRAVITY STATION (X) AT BFDW-VARIABLE SWEEP WING FWD.	INCHES
6	CENTER OF GRAVITY STATION (X) AT BFDW-VARIABLE SWEEP WING AFT. -FIXED WING.	INCHES
7	PITCHING MOMENT OF INERTIA (IYY) AT BFDW-VARIABLE SWEEP WING FORWARD.	SLUG-FT SQUARED
8	PITCHING MOMENT OF INERTIA (IYY) AT BFDW-VARIABLE SWEEP WING AFT. -FIXED WING.	SLUG-FT SQUARED
9	YAWING MOMENT OF INERTIA (IZZ) AT BFDW-VARIABLE SWEEP WING FORWARD.	SLUG-FT SQUARED
10	YAWING MOMENT OF INERTIA (IZZ) AT BFDW-VARIABLE SWEEP WING AFT. -FIXED WING.	SLUG-FT SQUARED
11	LANDING DESIGN WEIGHT (LDW).	POUNDS
12	CENTER OF GRAVITY STATION (X) AT LDA.	INCHES
13	LIMIT POSITIVE LOAD FACTOR (NZ) AT BFDW-SUBSONIC.	
14	LIMIT POSITIVE LOAD FACTOR (NZ) AT BFDW-SUPERSONIC.	
15	LIMIT NEGATIVE LOAD FACTOR (-NZ) AT BFDW-NEGATIVE SIGN (-) REQUIRED.	
16	LIMIT LOAD FACTOR (NZ) FOR FLAP DOWN MANEUVER AT MDW.	
17	PITCHING ACCELERATION AT ML FOR BFDW.	RAD./SECOND SQUARED
18	YAWING ACCELERATION AT ML FOR BFDW.	RAD./SECOND SQUARED
19-21	ALTITUDES--FIXED WING OR VARIABLE SWEEP IN AFT POSITION.	FEET
22-24	SPEEDS MH--FIXED WING OR VARIABLE SWEEP IN AFT POSITION.	MACH NUMBER
25-27	SPEEDS ML--FIXED WING OR VARIABLE SWEEP IN AFT POSITION.	MACH NUMBER
28	SPEED MH AT 20000 FT--VARIABLE SWEEP WING IN THE AFT POSITION. -AND FOR A FIXED WING.	MACH NUMBER
29-33	ARE NOT USED IF A/V HAS FIXED WING.	
29-30	ALTITUDES FOR VARIABLE SWEEP WING IN FORWARD POSITION.	FEET
31-32	SPEEDS MH FOR VARIABLE SWEEP WING IN FORWARD POSITION.	MACH NUMBER

TABLE 9. INTERNAL REARRANGED BC DATA SET (CONT)

LOCATIONS	DESCRIPTIONS	UNITS
33	SPEED MH AT 20000 FT-VARIABLE SWEEP WING FORWARD POSITION.	MACH
34	MINIMUM SPEED FLAPS UP (V _{SU}) AT MDW.	KNOTS
35	MINIMUM SPEED FLAPS DOWN (V _{SL}) AT LDW.	KNOTS
36	XO-DISTANCE FROM X REFERENCE POINT TO BODY NOSE.	INCHES
37	LN-LENGTH OF BODY NOSE.	INCHES
38	VN-BODY NOSE VOLUME.	INCHES CUBED
39	RN=SQUARE ROOT (MAXIMUM NOSE AREA/PI)	INCHES
40	YBW-BODY HALF WIDTH AT WING-BODY INTERFACE.	INCHES
41	BUTT LINE (Y) OF FLAP-INBOARD END.	INCHES
42	-OUTBOARD END.	INCHES
43	FLAP CHORD/WING CHORD RATIO--AERODYNAMIC.	DECIMAL
44	MAXIMUM FLAP DEFLECTION FOR FLAP MANEUVER.	DEGREES
DATA LOCATIONS 45-86	ARE FOR A FIXED WING OR A VARIABLE SWEEP WING AFT POSITION.	POSITION
45	WING LEADING EDGE SWEEP ANGLE.	DEGREES
46	WING ELASTIC AXIS SWEEP ANGLE.	DEGREES
47	WING LOADS REFERENCE AXIS SWEEP ANGLE.	DEGREES
48	WING APEX (X) STATION--LEADING EDGE AT CENTER LINE.	INCHES
49	WING ELASTIC AXIS (X) STATION AT CENTER LINE.	INCHES
50	WING APEX CHORD (CR)--ALONG CENTER LINE.	INCHES
51	WING TAPE RATIO-TIP CHORD/ROOT CHORD.	INCHES
52	WING ASPECT RATIO (AR)--SPAN SQUARED/AREA.	SQUARE FEET
53	WING TOTAL TRAPEZOIDAL AREA.	FEET
54	WING SPAN-TIP TO TIP.	FEET
55	PERCENT OF WING CHORD OF LOADS REFERENCE AXIS (X/C).	DECIMAL
56-66	ELEVEN WING NORMAL SPAN (Y) STATIONS FOR WEIGHT ANALYSIS. FROM ROOT TO TIP.	DECIMAL
67-76	TEN WING OUTER PANEL STRIP WEIGHTS--BODY INTERFACE TO TIP.	INCHES
77-86	TEN WING OUTER PANEL STRIP CG (X/C) VALUES.	POUNDS
87-128	ARE NOT USED IF A/V HAS FIXED WING-ENTER ZERCS.	DECIMAL
DATA LOCATIONS 87-128	ARE FOR A VARIABLE SWEEP WING IN THE FORWARD POSITION.	POSITION
87	WING LEADING EDGE SWEEP ANGLE.	DEGREES
88	WING ELASTIC AXIS SWEEP ANGLE.	DEGREES
89	WING LOADS REFERENCE AXIS SWEEP ANGLE.	DEGREES

TABLE 9. INTERNAL REARRANGED BC DATA SET (CONT)

LOCATIONS	DESCRIPTIONS	
90	WING APEX (X) STATION-LEADING EDGE AT CENTER LINE.	INCHES
91	WING ELASTIC AXIS (X) STATION AT CENTER LINE.	INCHES
92	WING APEX CHORD (CR)-ALONG CENTER LINE.	INCHES
93	WING TAPEX RATIO-TIP CHORD/ROOT CHORD.	
94	WING ASPECT RATIO (AR)-SPAN SQUARED/AREA.	SQUARE FEET
95	WING TOTAL TRAPEZOIDAL AREA.	FEET
96	WING SPAN-TIP TO TIP.	DECIMAL
97	PERCENT OF WING CHORD OF LOADS REFERENCE AXIS (X/C).	INCHES
98-108	ELEVEN WING NORMAL SPAN (Y) STATIONS FOR WEIGHT ANALYSIS. FROM ROOT TO TIP.	POUNDS DECIMAL DEGREES DEGREES INCHES INCHES
109-118	TEN WING OUTER PANEL STRIP WEIGHTS-BODY INTERFACE TO TIP.	
119-128	TEN WING OUTER PANEL STRIP CS (X/C) VALUES.	
129	HOR TAIL LEADING EDGE SWEEP ANGLE.	
130	HOR TAIL LOADS REFERENCE AXIS SWEEP ANGLE.	
131	HOR TAIL APEX (X) STATION-LEADING EDGE AT HOR TAIL CEN LINE.	
132	HOR TAIL APEX CHORD (CR)-ALONG HOR TAIL CENTER LINE.	
133	HOR TAIL TAPEX RATIO-TIP CHORD/ROOT CHORD.	
134	HOR TAIL ASPECT RATIO-SPAN SQUARED/AREA.	SQUARE FEET
135	HOR TAIL TOTAL TRAPEZOIDAL AREA.	FEET
136	HOR TAIL SPAN-TIP TO TIP.	INCHES
137	YBH-BODY HALF WIDTH AT HOR TAIL-BODY INTERFACE.	DECIMAL
138	PERCENT OF HOR TAIL CHORD OF LOADS REFERENCE AXIS (X/C).	INCHES
139-149	ELEVEN HOR TAIL NORMAL SPAN (YH) STATIONS FOR WEIGHT ANALYSIS. FROM ROOT TO TIP.	DEGREES DEGREES INCHES INCHES
150	VERT TAIL LEADING EDGE SWEEP ANGLE.	
151	VERT TAIL LOADS REFERENCE AXIS SWEEP ANGLE.	
152	VERT TAIL APEX (X) STATION-LEADING EDGE AT VERT TAIL ROOT.	
153	VERT TAIL APEX CHORD (CR)-ALONG VERT TAIL ROOT.	
154	VERT TAIL TAPEX RATIO-TIP CHORD/ROOT CHORD.	
155	VERT TAIL ASPECT RATIO-SPAN SQUARED/AREA.	SQUARE FEET
156	VERT TAIL TRAPEZOIDAL AREA-PER SURFACE IF DUAL.	FEET
157	VERT TAIL SPAN-ROOT TO TIP.	INCHES
158	Z DISTANCE FROM VERT TAIL ROOT TO VERT TAIL-BODY INTERFACE.	

TABLE 9. INTERNAL REARRANGED BC DATA SET (CONCL)

LOCATIONS	DESCRIPTIONS	
159	Z DISTANCE FROM VERT TAIL ROOT TO HOR TAIL PLANE.	INCHES
160	PERCENT OF VERT TAIL CHORD OF LOADS REFERENCE AXIS (X/C).	DECIMAL
161-171	ELEVEN VERT TAIL NORMAL SPAN (ZV) STATIONS FOR WEIGHT ANALYSIS. FROM ROOT TO TIP.	INCHES
172-195	ARE NOT USED.	INCHES

TABLE 10. TOAM BLOCKED CORE LOCATIONS

Data Block	Core Location		TOAM Equivalence	Data are Described in:	
	Data	TOAM()		Table No.	Page No.
---	Not used	TOAM(1)	---	---	
DT	DT(1) through DT(56)	TOAM(100)	5	93	
DB	DB(1) through DB(853)	TOAM(156)	6	94	
DF	DF(1) through DF(146)	TOAM(1009)	7	95	
DP	DP(1) through DP(734)	TOAM(1155)	8	96	
---	Not used	TOAM(1889)	---	---	
BC	BC(1) through BC(195)	TOAM(2758)	9	97-100	
BB	BB(1) through BB(20)	TOAM(2953)	11	102	
BS	BS(1) through BS(20)	TOAM(2973)	12	103-104	
BD	BD(1) through BD(160)	TOAM(2993)	13	105-107	
BU	BU(1) through BU(500)	TOAM(3153)	14	108-111	
BØ	BØ(1) through BØ(348)	TOAM(3653)	15	112-114	
BF	BF(1) through BF(200)	TOAM(4001)	4	91-92	
ND	ND(1) through ND(200)	TOAM(4201)	16	115-117	

TABLE 11. CONDITION DATA REGION BB***

Location	Description
BB(1) is equivalent to TOAM(2953)	
1	W, airplane weight (lb)
2	XCG, airplane center of gravity location (FS) (in.)
3	I _y , airplane pitching moment of inertia (slug ft ²)
4	I _z , airplane yawing moment of inertia (slug ft ²)
5	δ _F , flap deflection (deg)
6	N _z , airplane limit normal load factor
7	Q̇, airplane pitching acceleration (rad/sec ²)
8	Ṙ, airplane yawing acceleration (rad/sec ²)
9	h _p , altitude (ft)
10	M, mach number
11	Previous condition altitude (ft)
12	Wing ID number*
13	Horizontal ID number = 4.0
14	Vertical tail ID number**
15	Condition number
16	Previous condition mach number
17	q, dynamic pressure (psf)
18	C _{L₀WR} , wing rigid lift curve slope per radian
19	V _E , equivalent airspeed (knots)
20	Balance N _z , airplane normal load factor for balanced part
<p>*Fixed wing ID = 1.0 Variable wing forward ID = 2.0 Variable wing aft ID = 3.0</p> <p>**Single vertical tail ID = 5.0 Dual vertical tail ID = 6.0 T-type vertical tail ID = 7.0</p> <p>***This condition data region is set up for each condition by the main program BFCNTL.</p>	

TABLE 12. PARAMETER DATA REGION BS FOR SUBROUTINES
USPANF AND BNLDSE

Location	Description
USPANF	
BS(1) is equivalent to TOOM(2973)	
1	B/K, subsonic lift-curve slope parameter
2	M, mach number
3	$(X/C)_{CP}$, section center of pressure, fraction of chord
4	Y_{BS} , wing-body interface station (BL), or horizontal
5	Λ_{LE} , surface leading edge sweep angle (deg)
6	Λ_{EA} , surface elastic axis sweep angle (deg)
7	Λ_{RA} , surface load reference line sweep angle (deg)
8	X_{LE} , fuselage sta. of root chord leading edge (in.)
9	X_{EA} , fuselage sta of elastic axis at root chord (in.)
10	C_R , root chord of theoretical surface (in.)
11	λ_S , taper ratio of theoretical surface
12	A_S , aspect ratio of theoretical surface
13	S_S , area of theoretical surface (ft ²)
14	$b_S/2$ or b_V , span of surface panel (in.)
15	η_{BS} or η_{BV} , span station of surface-body interface station, fraction of panel span
16	$(X/C)_{RA}$, location of load reference line in fraction of chord
17	$Y_{FO}/b_W/2$, wingspan station of outboard end of flap, fraction of semispan
18	$Y_{FI}/b_W/2$, wingspan station of inboard end of flap, fraction of semispan
19	Λ_B , subsonic compressible sweep parameter, or BA , supersonic aspect ratio parameter
20	BA/K , subsonic aspect ratio parameter, or B_m , supersonic sweep parameter

TABLE 12. PARAMETER DATA REGION BS FOR SUBROUTINES
USPANF AND BNLDSF (CONCL)

Location	Description
BNLDSF	
BS(1) is equivalent to TOOM(2973)	
1	S_S , area of theoretical surface (ft ²)
2	X_{LE} , fuselage station of root chord leading edge (in.)
3	b_S , span of surface (ft)
4	PZN/PZW1, ratio of fuselage nose normal load to wing normal load due to angle of attack
5	A, balance equation factor
6	B, balance equation factor
7	C, balance equation factor
8	D, balance equation factor
9	E, balance equation factor
10	F, balance equation factor
11	W _{OP} , exposed wing panel weight per side (lb)
12	K _{CF} , flap lift effectiveness parameter
13	PZW1, wing flexible normal airload due to angle of attack (lb)
14	PZW2, wing rigid normal airload due to flap deflection (lb)
15	PZW3, wing increment flexible normal airload due to flap deflection (lb)
16	PZW4, wing flexible normal airload due to vertical acceleration (lb)
17	PZH, horizontal tailload (lb)
18	μ , airplane mass ratio
19	K _g , gust alleviation factor
20	Δ PZHQ, incremental horizontal tailload due to pitching acceleration (lb)

TABLE 13. THE BD DATA REGION

Location	Description
BD(1) is equivalent to TCØM(2993)	
1-4	Array (YA) - subsonic ($BC_{L\alpha}/K$) table values
5-20	Array (YB) - rigid loading table values (first)
5-20	Array (YB) - loading at weight analysis stations (second)
21-25	Array (YC) - rigid loading values at aero data stations
26-30	Array (ED) - aero data stations fraction of span
31-43	Array (ESS) - strip boundary stations (first) fraction of span
31-43	Array (ESS) - weight analysis stations (second) fraction of span
44	No. of wing outer panel weight strips per side
45-57	Array (YSS) - strip running loadings (first)
45-57	Array (YSS) - torsional loading at weight analysis station (second)
58-68	Array (DPA) - strip alpha loads
69	Flap lift center of pressure, fraction of wing chord (X/C)
70-80	Array (DPF) - flap effects strip loads
81-88	Subroutine FCØDM2 factors
81-84	Array (T)
85-88	Array (YX)
89	PWØ - summated strip alpha loads to centerline (first)
89	Summated AFW (I,1) - exposed rigid alpha loads (second)

TABLE 13. THE BD DATA REGION (CONT)

Location	Description
90	$P_{W1} - P_{W0}$ less half carry-over strip load (first)
90	Summated AFWF (I,1) - exposed flexible alpha loads (second)
91	Summated wing outer panel weights (first) (lb)
91	Ratio of exposed alpha load to total (second) (dec) = 1.0
92	Atmospheric density (Rho) (slugs/feet cubed)
93	Factor (NB-I) - number of strips counter
94	Speed of Sound (ah) (knots)
95-105	Array (ECP) - strip center of pressure, fraction of span
106-116	Array (ULN) - running load at weight analysis stations
117-129	Array (DXS) - swept torsion arms (in.)
130-140	Array (UTN) - torsional loading at weight analysis station (in.)
141	Parameter K sweep
142	Fraction of swept chord of reference axis, X/C
143	Fraction of swept chord of center of pressure, X/C
144	Swept chord (in.)
145	Expression: $1.0 - K_s (1.0 - (X/C) \text{ of RA} - (X/C) \text{ of RA})$
146	Integral of Array (ULN) versus (Y/b/2) - tip to root
147	KUZ, span-loading normalizing parameter
148	Swept bending moment at body side (in./lb)
149	Swept torsion moment at body side (in./lb)

TABLE 13. THE BD DATA REGION (CONCL)

Location	Description
150	Empennage swept torsion arm at body interface (in.)
151	Body nose load due to vertical gust (lb)
152	Exposed wingload due to vertical gust (lb)
153	Body carry-over load due to vertical gust (lb)
154	Horizontal tailload due to vertical gust (lb)
155	Parameter KPA
156	Wing semispan (first) (in.)
156	Horizontal tail semispan (second) (in.)
156	Vertical tail span (third) (in.)
157	Wing reference axis sweep angle (first) (deg)
157	Horizontal tail reference axis sweep angle (second) (deg)
157	Vertical tail reference axis sweep angle (third) (deg)
158	Swept distance from vertical tail root to horizontal tail plane (in.)
159	Gust load factor
160	Wing inertial aeroelastic load due to vertical gust (lb)

TABLE 14. THE BU DATA REGION

Location	Description
BU(1) is equivalent to TOM (3153)	
1-60	<u>Data for wing flexible alpha effects</u>
1	Flexible lift curve slope
2	X-distance from apex to total load CP (in.)
3	Y-distance from CL to exposed load CP (in.)
4	X-distance from apex to exposed load CP (in.)
5	X-distance from apex to carry-over load CP (in.)
6	Airload unit shear at side of body (dec)
7	Airload unit bending moment at side of body (in.)
8	Airload unit torsion moment at side of body (in.)
9-21	13 load stations, percent span from tip to ζ (dec)
22-34	Airload unit shears from tip to centerline (dec)
35-47	Airload unit bending moments - swept (in.)
48-60	Airload unit torsion moments - swept (in.)
61-107	<u>Data for wing rigid flap effects</u>
61	Parameter KBF
62	X-distance from apex to total load CP (in.)
63	Y-distance from CL to exposed load CP (in.)
64	X-distance from apex to exposed load CP (in.)
65	X-distance from apex to carry-over load CP (in.)
66	Airload unit shear at side of body (dec)
67	Airload unit bending moment at side of body (in.)

TABLE 14. THE BU DATA REGION (CONT)

Location	Description
68	Airload unit torsion moment at side of body (in.)
69-81	Airload unit shears from tip to centerline (dec)
82-94	Airload unit bending moments - swept (in.)
95-107	Airload unit torsion moments - swept (in.)
108-166	<u>Data for horizontal tail effects</u>
108	Horizontal tail lift curve slope
109	Parameter KH(B)
110	YH distance from centerline to horizontal tailload CP (in.)
111	XH distance from HT apex to HT load CP (in.)
112	Airload unit shear at side of body (dec)
113	Airload unit bending moment at side of body (in.)
114	Airload unit torsion moment at side of body (in.)
115-127	Thirteen HT load stations - percent spantip to centerline (dec)
128-140	Airload unit shears from tip to centerline (dec)
141-153	Airload unit bending moments - swept (in.)
154-166	Airload unit torsion moments - swept (in.)
167-225	<u>Data for vertical tail effects</u>
167	Vertical tail lift curve slope
168	Parameter KV(B)
169	Z-distance from VT root to vertical tailload CP (in.)

TABLE 14. THE BU DATA REGION (CONT)

Location	Description
170	XV distance from VT apex to vertical tailload CP (in.)
171	Airload unit side shear at body interface (dec)
172	Airload unit bending moment at body interface (in.)
173	Airload unit torsion moment at body interface (in.)
174-186	Thirteen VT load stations - percent spantip to root (dec)
187-199	Airload unit side shears from tip to root (dec)
200-212	Airload unit bending moments - swept (in.)
213-225	Airload unit torsion moments - swept (in.)
226-357	<u>Data arrays for subroutine WFLEX</u>
226-255	Rigid load matrix - AFW(10,3) (1b)
256-285	Rigid load CP(X/C) matrix - AFWCP (10,3) (dec)
286-315	Flexible load matrix - AFWF(10,3) (1b)
316-345	Aeroelastic increment load matrix - AFWDF(10,3) (1b)
346-357	Unit loads and F/R matrix - F(3,4) (dec)
358-403	<u>Data for aeroelastic flap effects</u>
358	X-distance from apex to total load CP (in.)
359	Y-distance from centerline to exposed load CP (in.)
360	X-distance from apex to exposed load CP (in.)
361	X-distance from apex to carry-over load CP (in.)
362	Airload unit shear at side of body (dec)
363	Airload unit bending moment at side of body (in.)
364	Airload unit torsion moment at side of body (in.)

TABLE 14. THE BU DATA REGION (CONCL)

Location	Description
365-377	Airload unit shears from tip to centerline (dec)
378-390	Airload unit bending moments - swept (in.)
391-403	Airload unit torsion moments - swept (in.)
404-449	<u>Data for inertial aeroelastic effects</u>
404	X-distance from apex to total load CP (in.)
405	Y-distance from centerline to exposed load CP (in.)
406	X-distance from apex to exposed load CP (in.)
407	X-distance from apex to carry-over load CP (in.)
408	Airload unit shear at side of body (dec)
409	Airload unit bending at side of body (in.)
410	Airload unit torsion at side of body (in.)
411-423	Airload unit shears from tip to centerline (dec)
424-436	Airload unit bending moments - swept (in.)
437-449	Airload unit torsion moments - swept (in.)
450-454	<u>Data for subroutine SPAEMF</u>
450	Wing total flexible alpha airload (PZW1) (1b)
451	Wing total rigid flap airload (PZW2) (1b)
452	Wing total aeroelastic flap airload (PZW3) (1b)
453	Wing total inertia aeroelastic airload (PZW4) (1b)
455-494	Previously inputed EI and GJ arrays
495-500	Are not used

TABLE 15. OUTPUT BØ DATA REGION

Location	Description
BØ(1) through BØ(180) is equivalent to TOØM(3653) through TOØM(3832)	
1	Condition number
2	Fuselage ID number
3	P_{ZN} , body nose normal load (lb)
4	P_{YN} , body nose side load (lb)
5	\bar{X}_N , body nose CP (fus sta) (in.)
6	$P_{ZW(B)}/2$, exposed wing panel load (per side) (lb)
7	$\bar{Y}_{W(B)}$, spanwise CP of exposed wing panel load (BL) (in.)
8	$\bar{X}_{W(B)}$, exposed wing panel CP (fus sta) (in.)
9	$P_{ZB(W)}$, body carry-over load (lb)
10	$\bar{X}_{B(W)}$, body carry-over CP (fus sta) (in.)
11	$P_{ZHT}/2$, horizontal tail panel load (per side) (lb)
12	\bar{Y}_{HT} , spanwise CP of horizontal tail panel load (BL) (in.)
13	\bar{X}_{HT} , horizontal tailload CP (fus sta) (in.)
14	$M_{XV(H)}$, incremental unsymmetrical horizontal tail rolling moment (for T-tail and fus) (in./lb)
15	P_{YVT} , vertical tail side load
16	\bar{Z}_{VT} , vertical tail spanwise CP (WL) (in.)
17	\bar{X}_{VT} , vertical tail CP (fus sta) (in.)
18	N_Z , airplane normal load factor
19	N_Y , airplane side load factor
20	\dot{Q} , airplane pitching acceleration (rad/sec ²)

TABLE 15. OUTPUT BØ DATA REGION (CONT)

Location	Description
21	\dot{R} , airplane yawing acceleration (rad/sec ²)
22	Wing ID number
23	Y_{BW} , wing-body interface station (BL) (in.)
24	S_{ZBW} , wing shear load at side of body station (lb)
25	M_{XBW} , exposed wing panel rolling moment at side of body station (in./lb)
26	M_{YBW} , exposed wing panel pitching moment at intersection of load reference line and side of body station (in./lb)
Wing shears and moments at stations $Y_{W\Lambda}$ (1) through $Y_{W\Lambda}$ (12) along load reference line:	
27	$Y_{W\Lambda}$ (1), first wing station (in.)
28	S_{ZW} (1), shear at station $Y_{W\Lambda}$ (1) (lb)
29	$M_{X\Lambda}$ (1), bending moment at station $Y_{W\Lambda}$ (1) (in./lb)
30	$M_{Y\Lambda}$ (1), torsional moment at station $Y_{W\Lambda}$ (1) (in./lb)
31 - 74	Station, shear, and moments in same order as 27 through 30, for next 11 wing stations
75	Horizontal tail ID number
76	Y_{BH} , horizontal tail-body interface station (BL) (in.)
77	S_{ZBH} , horizontal tail shear at side of body station (lb)
78	M_{XBH} , exposed horizontal tail panel rolling moment at side of body station (in./lb)
79	M_{YBH} , exposed horizontal tail panel pitching moment at intersection of load reference line and side of body station (in./lb)

TABLE 15. OUTPUT BØ DATA REGION (CONCL)

Location	Description
Horizontal tail shears and moments at stations $Y_{HA}(1)$ through $Y_{HA}(12)$ along load reference line:.	
80	$Y_{HA}(1)$, first horizontal tail station (in.)
81	S_{ZH} , shear at station $Y_{HA}(1)$ (lb)
82	M_{XA} , bending moment at station $Y_{HA}(1)$ (in./lb)
83	M_{YA} , torsional moment at station $Y_{HA}(1)$ (in./lb)
84 - 127	Station, shear, and moments in same order as 80 through 81, for next 11 horizontal tail stations
128	Vertical tail ID number
129	Z_{BV} , vertical distance from vertical tail root chord station to vertical tail-body interface station (in.)
130	S_{YBV} , vertical tail shear at vertical tail-body interface station (lb)
131	M_{XBV} , exposed vertical tail panel rolling moment at vertical tail-body interface station (in./lb)
132	M_{ZBV} , exposed vertical tail panel yawing moment at the intersection of the load reference line and the vertical tail-body interface station (in./lb)
Vertical tail shears and moments at stations $Z_{VA}(1)$ through $Z_{VA}(12)$ along load reference line	
133	$Z_{VA}(1)$, first vertical tail station (in.)
134	$S_Z(1)$, shear at station $Z_V(1)$ (lb)
135	$M_{XA}(1)$, bending moment at station $Z_{VA}(1)$ (in./lb)
136	$M_{ZA}(1)$, torsional moment at station $Z_{VA}(1)$ (in./lb)
137 - 180	Station, shear, and moments in same order as 133 through 136, for next 11 vertical tail stations

TABLE 16. INTEGER DATA REGION (ND)

Location	Description
ND(1) is equivalent to TCOM(4201)	
1-12	Integers
13-46	Control factors (refer to Table 1)
47-99	Are not used
100	BFCNTL - Case number counter (NC)
101	Integer Variable (I)
102	Integer Variable (J)
103	USPANF - NΦEIGJ = 20
103	BFCNTL - Punched card index number col 2-12 (IC)
104	Punched card ID number col 73-80 (IDC)
105	BFCNTL, USPANF - SIC matrix calculation option (IACALCS)
106	BFCNTL, BNLDSE - Condition type factor (NI)
107	BFCNTL, RERDAT, USPANF - RERDAT entry factor (IR)
108	BFCNTL, USPANF - (NF = -1)
109-131	BFCNTL - Condition selection array (No = -1, Yes = 1)
132	RERDAT, USPANF - Integer variable (I)
133	Integer variable (J)
134	USPANF - Integer variable (K)
135	Integer variable (L)
136	Integer variable (M)
137	USPANF, RERDAT, BNLDSE, SPABMF - Wing position factor (IP) (Refer to note)

TABLE 16. INTEGER DATA REGION (ND) (CONT)

Location	Description
138	FOØDM2 - Interpolation factor (N3)
139	Interpolation factor (N4)
140	Integer variable (I)
141	Integer variable (K)
142	Integer variable (L)
143	OØDIM2 - Interpolation factor (N1)
144	Integer variable (J)
145	Integer variable (JJ)
146	Integer variable (K)
147	Integer variable (L)
148	Integer variable (M)
149	USPANF - Repeatative operation counter (NT)
150	BNLDSF - Repeatative operation counter (NT)
151	Integer variable (I)
152	Integer variable (J)
153	Integer variable (K)
154	SPAEMF - Distribution selector (ID)
155	Integer variable (I)
156	Integer variable (J)
157	Integer variable (K)

TABLE 16. INTEGER DATA REGION (ND) (CONCL)

Location	Description
158	Integer variable (L)
159	Integer variable (M)
160-200	Not used
NOTE: (-1) = fixed, (0) = VS wing fwd, (1) = VS wing aft	

TABLE 17. LISTING OF CONDITION PUNCHED OUTPUT COMPONENT LIMIT AIRLOADS DATA FOR SWEEP

1	6.03150E 04	6.03600E 03	1.35195E 03	2.51056E 03	7.99106E 01	10603001
6	1.19952E 04	5.66348E 01	3.53530E 02	4.50491E 03	2.76666E 02	10603002
11	-1.52359E 03	4.97644E 01	4.99432E 02	1.97602E 04	1.31553E 04	10603003
16	5.62251E 01	5.01705E 02	1.00000E 00	5.75951E-01	0.0	10603004
21	-1.84769E 00	6.03100E 03	3.35000E 01	1.19952E 04	7.59712E 05	10603005
26	-9.86198E 05	3.12810E 02	0.0	0.0	0.0	10603006
31	2.90517E 02	1.41979E 02	1.58255E 03	-1.25360E 03	2.68222E 02	10603007
36	5.28448E 02	9.05667E 03	-4.98466E 03	2.45926E 02	1.09545E 03	10603008
41	2.71602E 04	-1.11774E 04	2.23631E 02	1.61895E 03	5.96493E 04	10603009
46	-2.00877E 04	2.01335E 02	2.71062E 03	1.10144E 05	-3.23895E 04	10603010
51	1.79040E 02	3.76775E 03	1.82363E 05	-0.84892E 04	1.56744E 02	10603011
56	4.96191E 03	2.79679E 05	-6.83463E 04	1.34449E 02	6.27109E 03	10603012
61	4.04902E 05	-9.19881E 04	1.12153E 02	7.67537E 03	5.60374E 05	10603013
66	-1.19361E 05	8.96577E 01	9.15146E 03	7.47955E 05	-1.50260E 05	10603014
71	6.75622E 01	1.06841E 04	9.69078E 05	-1.64523E 05	6.03400E 03	10603015
76	2.60000E 01	-1.01266E 03	-3.62321E 04	3.75607E 04	1.51761E 02	10603016
81	0.0	0.0	0.0	1.42160E 02	-2.39596E 01	10603017
86	-1.15262E 02	2.39698E 01	1.32430E 02	-8.49236E 01	-6.44955E 02	10603018
91	8.97107E 01	1.22701E 02	-1.63484E 02	-1.85341E 03	1.83874E 02	10603019
96	1.12971E 02	-2.50995E 02	-3.86976E 03	2.99969E 02	1.03242E 02	10603020
101	-3.45271E 02	-6.77046E 03	4.37148E 02	9.35121E 01	-4.42818E 02	10603021
106	-1.06044E 04	5.91534E 02	8.37825E 01	-5.40487E 02	-1.53879E 04	10603022
111	7.58705E 02	7.40529E 01	-6.37482E 02	-2.11185E 04	9.37256E 02	10603023
116	6.43233E 01	-7.33545E 02	-2.77883E 04	1.12651E 03	5.45937E 01	10603024
121	-8.28535E 02	-3.53874E 04	1.32593E 03	4.48642E 01	-9.22137E 02	10603025
126	-4.39041E 04	1.53453E 03	6.03500E 03	2.15500E 01	1.08541E 04	10603026
131	5.00967E 05	-4.83068E 05	1.69513E 02	0.0	0.0	10603027
136	0.0	1.57840E 02	2.73391E 02	1.59565E 03	-3.20031E 02	10603028
141	1.46113E 02	9.45717E 02	8.74359E 03	-1.18194E 03	1.34387E 02	10603029
146	1.79495E 03	2.48129E 04	-2.42102E 03	1.22660E 02	2.74101E 03	10603030
151	5.14084E 04	-3.97791E 03	1.10933E 02	3.75287E 03	8.94836E 04	10603031
156	-5.83148E 03	9.92069E 01	4.78932E 03	1.39569E 05	-7.92323E 03	10603032
161	8.74804E 01	5.82532E 03	2.01805E 05	-1.02088E 04	7.57539E 01	10603033
166	6.85508E 03	2.76157E 05	-1.26758E 04	6.40273E 01	7.87850E 03	10603034
171	3.62547E 05	-1.53173E 04	5.23008E 01	8.89077E 03	4.60670E 05	10603035
176	-1.81220E 04	4.05743E 01	9.88735E 03	5.70971E 05	-2.10706E 04	10603036

TABLE 18. CONDITION ARRAY ID (CN)

ARRAY NO.	DESCRIPTIONS
01	POSITIVE VERTICAL GUST. (NOT COMPUTED AT ALTITUDES ABOVE 20000 FT) CASE 4 = MH(1,1) AT ALT(1,1) CASE 5 = MH(1,2) AT ALT(1,2) OR MH(1,20) AT 20000 FT CASE 6 = MH(1,3) AT ALT(1,3) OR MH(1,20) AT 20000 FT
02	NEGATIVE VERTICAL GUST. (NOT COMPUTED AT ALTITUDES ABOVE 20000 FT) CASE 4 = MH(1,1) AT ALT(1,1) CASE 5 = MH(1,2) AT ALT(1,2) OR MH(1,20) AT 20000 FT CASE 6 = MH(1,3) AT ALT(1,3) OR MH(1,20) AT 20000 FT
03	LATERAL GUST. (NOT COMPUTED AT ALTITUDES ABOVE 20000 FT) CASE 4 = MH(1,1) AT ALT(1,1) CASE 5 = MH(1,2) AT ALT(1,2) OR MH(1,20) AT 20000 FT CASE 6 = MH(1,3) AT ALT(1,3) OR MH(1,20) AT 20000 FT
04	POSITIVE LOAD FACTOR BALANCED FLIGHT MANEUVER AT ALT(1,1) CASE 1 = ML(1,1) CASE 7 MN=.90
05	NEGATIVE LOAD FACTOR BALANCED FLIGHT MANEUVER AT ALT(1,1) CASE 4 = MH(1,1) CASE 7 MN=.90
06	PITCHING ACCELERATION AT ALT(1,1) CASE 1 = ML(1,1) CASE 7 MN=.90
07	YAWING ACCELERATION AT ALT(1,1) CASE 1 = ML(1,1) CASE 7 MN=.90
08	POSITIVE LOAD FACTOR BALANCED FLIGHT MANEUVER AT ALT(1,2) CASE 1 = ML(1,1) CASE 2 = ML(1,2) CASE 7 MN=.90
09	NEGATIVE LOAD FACTOR BALANCED FLIGHT MANEUVER AT ALT(1,2) CASE 4 = MH(1,1) CASE 5 = MH(1,2) CASE 7 MN=.90

TABLE 18. CONDITION ARRAY ID (CN) (CONT)

ARRAY NO.	DESCRIPTIONS
10	PITCHING ACCELERATION AT ALT(1,2) CASE 1 = ML(1,1) CASE 2 = ML(1,2) CASE 7 MN=.90
11	YAWING ACCELERATION AT ALT(1,2) CASE 1 = ML(1,1) CASE 2 = ML(1,2) CASE 7 MN=.90
12	POSITIVE LOAD FACTOR BALANCED FLIGHT MANEUVER AT ALT(1,3) CASE 1 = ML(1,1) CASE 2 = ML(1,2) CASE 3 = ML(1,3) CASE 7 MN=.90
13	NEGATIVE LOAD FACTOR BALANCED FLIGHT MANEUVER AT ALT(1,3) CASE 4 = MH(1,1) CASE 5 = MH(1,2) CASE 6 = MH(1,3) CASE 7 MN=.90
14	PITCHING ACCELERATION AT ALT(1,3) CASE 1 = ML(1,1) CASE 2 = ML(1,2) CASE 3 = ML(1,3) CASE 7 MN=.90
15	YAWING ACCELERATION AT ALT(1,3) CASE 1 = ML(1,1) CASE 2 = ML(1,2) CASE 3 = ML(1,3) CASE 7 MN=.90
16	MANEUVERING FLAP AT SEA LEVEL FOR 1.5VSO
17	1 G TRIMMED FLAP AT SEA LEVEL FOR 1.2VSL
18	POSITIVE VERTICAL GUST. (NOT COMPUTED AT ALTITUDES ABOVE 20000 FT) CASE 10 = MH(2,1) AT ALT(2,1) CASE 11 = MH(2,2) AT ALT(2,2) OR MH(2,20) AT 20000 FT

TABLE 18. CONDITION ARRAY ID (CN) (CONCL)

ARRAY NO.	DESCRIPTIONS
19	NEGATIVE VERTICAL GUST. (NOT COMPUTED AT ALTITUDES ABOVE 20000 FT) CASE 10 = MH(2,1) AT ALT(2,1) CASE 11 = MH(2,2) AT ALT(2,2) OR MH(2,20) AT 20000 FT
20	POSITIVE LOAD FACTOR BALANCED FLIGHT MANEUVER CASE 10 = MH(2,1) ALT(2,1)
21	NEGATIVE LOAD FACTOR BALANCED FLIGHT MANEUVER CASE 10 = MH(2,1) ALT(2,1)
22	POSITIVE LOAD FACTOR BALANCED FLIGHT MANEUVER AT ALT(2,2) CASE 10 = MH(2,1) CASE 11 = MH(2,2)
23	NEGATIVE LOAD FACTOR BALANCED FLIGHT MANEUVER AT ALT(2,2) CASE 10 = MH(2,1) CASE 11 = MH(2,2)

TABLE 20. INPUT BF DATA SET

1.05000E 00	1.05000E 00	4.22670E 01	2.40670E 02	4.12100E 02
2.90600E 02	2.90600E 02	2.50600E 02	1.75200E 02	1.36500E 02
1.19000E 02	7.42000E 01	4.51000E 01	2.43000E 01	3.31900E -01
4.46600E -01	4.75900E -01	4.84200E -01	4.63700E -01	4.99100E -01
4.78400E -01	4.46500E -01	4.26500E -01	5.37400E -01	4.22670E 01
2.40870E 02	4.12100E 02	2.90600E 02	2.36400E 02	2.50600E 02
1.75200E 02	1.36500E 02	1.19000E 02	7.42000E 01	4.51000E 01
2.43000E 01	3.31900E -01	4.46600E -01	4.75900E -01	4.84200E -01
4.63700E -01	4.99100E -01	4.78400E -01	4.46500E -01	4.26500E -01
5.37400E -01	0.0	2.00000E 01	4.50000E 01	4.70000E 01
6.00000E 01	1.20000E 02	1.60000E 02	2.00000E 02	2.40000E 02
2.80000E 02	3.20000E 02	0.0	0.0	0.0
0.0	0.0	0.0	0.0	0.0
0.0	1.40000E 11	1.40000E 11	1.41000E 10	1.39000E 10
1.16000E 10	6.00000E 09	2.60000E 09	1.15000E 09	5.50000E 08
3.50000E 08	3.00000E 08	0.0	0.0	0.0
0.0	0.0	0.0	0.0	0.0
0.0	9.20000E 10	9.20000E 10	9.30000E 09	9.20000E 09
7.96000E 09	5.65000E 09	2.25000E 09	8.50000E 08	2.60000E 08
2.10000E 08	1.70000E 08	0.0	0.0	0.0
0.0	0.0	0.0	0.0	0.0
0.0				

TABLE 21. INTERPOLATED AERODYNAMIC DATA

SUBSONIC DATA

VALUES FROM BCLA/K TABLES FOR AR= 3.8556 SWB= 47.07 TR= 0.2617 BA/K= 3.9420

TR= 0.0 0.25 0.50 1.00

0.05348 0.05340 0.05140 0.04761 (WING)

VALUES FROM LOADING TABLES FOR MN= 0.367

1.34059 1.19621 1.10823 0.96240 STA= 0.0
 1.22852 1.16908 1.14557 1.12861 STA= 0.383
 0.85683 0.93744 0.99356 1.08126 STA= 0.707
 0.37612 0.55667 0.61396 0.67689 STA= 0.924

SUPERSONIC DATA

AR= 3.8556 TR= 0.2617 BA= 1.7668 BM= 0.3979

TR= 0.0 0.25 0.50 1.00 (WING)

VALUES FROM LOADING TABLES FOR MN= 1.050

1.49775 1.17622 0.97766 0.79550 STA= 0.0
 1.45710 1.33428 1.31289 1.21675 STA= 0.383
 1.13541 1.30192 1.46587 1.44676 STA= 0.707
 0.61892 0.61251 0.80966 0.65049 STA= 0.924

STATION	LOADING AT DATA STATIONS	MN= 1.050
0.0	1.16427	
0.38300	1.33160	
0.70700	1.30965	
0.92400	0.81495	
1.00000	0.0	

TABLE 21. INTERPOLATED AERODYNAMIC DATA (CONT)

STATION	WING OUTB LDNG	WING INBD LDNG	FLAP INCR	MN= 1.050	DF= 0.0
1.00000	0.0	0.0	0.0		
0.91447	0.08115	0.03653	0.04461		
0.82894	0.12804	0.05036	0.07767		
0.74341	0.17555	0.06048	0.11511		
0.65788	0.23900	0.07573	0.16328		
0.57235	0.31540	0.10339	0.21201		
0.48683	0.40193	0.13960	0.26232		
0.40130	0.56997	0.17533	0.39464		
0.31577	0.84779	0.21565	0.63214		
0.23024	0.96921	0.31283	0.65638		
0.14471	1.02427	0.48415	0.54012		
0.0	1.05540	0.64714	0.40825		

TABLE 21. INTERPOLATED AERODYNAMIC DATA (CONCL.)

AR= 3.5344 TR= 0.3019 BA= 1.6197 BM= 0.3974
 TR= 0.0 0.25 0.50 1.00 (HOR TAIL)

VALUES FROM LOADING TABLES FOR MN= 1.050

1.56779 1.22710 1.02270 0.83722 STA= 0.0
 1.51018 1.37684 1.36066 1.26379 STA= 0.383
 1.17146 1.34236 1.52054 1.48327 STA= 0.707
 0.63376 0.81399 0.81261 0.65712 STA= 0.924

AR= 3.1960 TR= 0.2653 BA= 1.4646 BM= 0.3879

TR= 0.0 0.25 0.50 1.00 (VERT TAIL)

VALUES FROM LOADING TABLES FOR MN= 1.050

1.61315 1.25576 1.04946 0.86701 STA= 0.0
 1.55051 1.40412 1.39613 1.29877 STA= 0.383
 1.20098 1.37384 1.57827 1.51917 STA= 0.707
 0.64666 0.81652 0.81571 0.86409 STA= 0.924

HOR TAIL

STATION	LOADING AT DATA STATIONS
0.0	1.17510
0.38300	1.37055
0.70700	1.37891
0.92400	0.81645
1.00000	0.0

VERT TAIL

STATION	LOADING AT DATA STATIONS
0.0	1.23900
0.38300	1.40084
0.70700	1.38554
0.92400	0.81923
1.00000	0.0

TABLE 22. WFLEX LOADING MATRICES

RIGID LOAD ON STRIPS (ALPHA, DELTA FLAP, AND NZ) (AFW Matrix)

COLUMN NO. = 1

9.60337E-02 1.00846E-01 1.02855E-01 1.04063E-01 1.04835E-01 1.04772E-01 1.01050E-01 9.24351E-02
 7.78254E-02 3.42254E-02

COLUMN NO. = 2

1.64784E-01 1.77458E-01 1.41410E-01 9.64782E-02 6.53257E-02 5.16845E-02 3.63391E-02 2.65497E-02
 1.68414E-02 6.14430E-03

COLUMN NO. = 3

-2.33352E-01 -1.64553E-01 -1.34994E-01 -1.41903E-01 -9.42073E-02 -7.72933E-02 -6.73639E-02 -4.26159E-02
 -2.55379E-02 -1.37599E-02

CIRCUMWISE C.P. ON STRIPS (X/C), RIGID LOADS (AFWCP Matrix)

COLUMN NO. = 1

5.80000E-01 5.80000E-01 5.80000E-01 5.80000E-01 5.80000E-01 5.80000E-01 5.80000E-01 5.80000E-01
 5.80000E-01 5.80000E-01

COLUMN NO. = 2

4.65386E-01 4.65386E-01 4.65386E-01 4.65386E-01 4.65386E-01 4.65386E-01 4.65386E-01 4.65386E-01
 4.65386E-01 4.65386E-01

COLUMN NO. = 3

3.31900E-01 4.46600E-01 4.75900E-01 4.64200E-01 4.65700E-01 4.99100E-01 4.78400E-01 4.46500E-01
 4.28500E-01 5.37400E-01

TABLE 22. WFLX LOADING MATRICES (CONT)

FLEXIBLE LOAD ON STRIPS (AFWF MATRIX)

COLUMN NO. = 1						
9.20860E-02	8.65268E-02	6.38896E-02	7.75115E-02	6.90841E-02	5.96213E-02	4.67020E-02
2.49692E-02	1.03641E-02					3.57144E-02
COLUMN NO. = 2						
1.61676E-01	1.69876E-01	1.30474E-01	7.00067E-02	4.90040E-02	3.37250E-02	1.98886E-02
2.91944E-03	1.12185E-04					5.09006E-03
COLUMN NO. = 3						
-2.28764E-01	-1.55008E-01	-1.20814E-01	-1.23113E-01	-7.58442E-02	-5.06720E-02	-3.91126E-02
-3.57190E-03	-4.05184E-03					-1.58653E-02

DELTA FLEX LOAD ON STRIPS (AFWDF MATRIX)

COLUMN NO. = 1						
-5.94777E-03	-1.23192E-02	-1.89649E-02	-2.05710E-02	-5.57509E-02	-4.51510E-02	-5.43464E-02
-5.28562E-02	-2.38613E-02					-5.67207E-02
COLUMN NO. = 2						
-3.70830E-03	-7.56171E-03	-1.09511E-02	-1.36115E-02	-1.63166E-02	-1.79595E-02	-1.84505E-02
-1.39219E-02	-6.03211E-03					-1.06536E-02
COLUMN NO. = 3						
4.58637E-03	9.54431E-03	1.41601E-02	1.87899E-02	2.33561E-02	2.66214E-02	2.82711E-02
2.19660E-02	9.70807E-03					2.02106E-02

TABLE 23. SPANWISE LOADING DISTRIBUTION

ANALYSIS STATIONS	LOADING-FLEXIBLE ALPHA EFFECT	LOADING-RIGID FLAP EFFECT
1.00000	0.0	0.0
0.92873	0.18109	0.11429
0.85746	0.31347	0.21640
0.78618	0.41756	0.31041
0.71491	0.52389	0.42396
0.64363	0.64791	0.55174
0.57236	0.75473	0.68316
0.50108	0.84218	0.84346
0.42981	0.92030	1.14465
0.35853	0.98083	1.65334
0.28726	1.02695	2.03326
0.21598	1.06672	1.99504
0.0	0.54620	1.52710

ANALYSIS STATIONS	TOR LODG	TOR LODG
1.00000	0.0	0.0
0.92873	-1.5983	-0.3534
0.85746	-3.1774	-0.7640
0.78618	-4.8116	-1.2540
0.71491	-6.7853	-1.9271
0.64363	-9.3877	-2.7869
0.57236	-11.9803	-3.7837
0.50108	-14.5777	-5.1219
0.42981	-17.2531	-7.5801
0.35853	-19.8076	-11.7061
0.28726	-22.2242	-15.3922
0.21598	-24.5857	-15.6722
0.0	-22.7147	-40.0398

TABLE 23. SPANWISE LOADING DISTRIBUTION (CONT)

ANALYSIS STATIONS	INCREMENT LOADING-FLAP AEROELASTIC	ANALYSIS STATIONS	INCREMENT LOADING-INERTIA AEROELASTIC
1.00000	0.0	1.00000	0.0
0.92873	-0.10513	0.92873	0.16751
0.85746	-0.17125	0.85746	0.26959
0.78618	-0.19705	0.78618	0.30645
0.71491	-0.21416	0.71491	0.52923
0.64363	-0.21365	0.64363	0.32027
0.57236	-0.20182	0.57236	0.29429
0.50108	-0.18179	0.50108	0.25545
0.42981	-0.15619	0.42981	0.21074
0.35853	-0.12781	0.35853	0.16579
0.28726	-0.09559	0.28726	0.12072
0.21598	-0.05813	0.21598	0.07268
0.0	0.0	0.0	0.0

ANALYSIS STATIONS	TOR LODG	ANALYSIS STATIONS	TOR LODG
1.00000	0.0	1.00000	0.0
0.92873	0.9330	0.92873	-1.4862
0.85746	1.7224	0.85746	-2.7121
0.78618	2.2706	0.78618	-3.5313
0.71491	2.7766	0.71491	-4.2685
0.64363	3.0810	0.64363	-4.6193
0.57236	3.2006	0.57236	-4.6668
0.50108	3.1463	0.50108	-4.4307
0.42981	2.9281	0.42981	-3.9512
0.35853	2.5810	0.35853	-3.3482
0.28726	2.0690	0.28726	-2.6152
0.21598	1.3260	0.21598	-1.6539
0.0	0.0	0.0	0.0

TABLE 23. SPANWISE LOADING DISTRIBUTION (CONCL)

ANALYSIS STATIONS	LOADING-(HOR TAIL)	LOADING--(VERT TAIL)
1.00000	0.0	0.0
0.93661	0.70005	0.75481
0.87251	1.06136	1.09296
0.80841	1.20845	1.24102
0.74430	1.32003	1.35903
0.68020	1.40389	1.42191
0.61610	1.41453	1.42660
0.55199	1.40742	1.42555
0.48789	1.39507	1.41111
0.42379	1.38048	1.39991
0.35969	1.36407	1.38215
0.29558	1.34036	1.35675
0.0	1.17510	1.23900

ANALYSIS STATIONS	LOADING-(HOR TAIL)	LOADING--(VERT TAIL)
1.00000	0.0	0.0
0.93661	0.70005	0.75481
0.87251	1.06136	1.09296
0.80841	1.20845	1.24102
0.74430	1.32003	1.35903
0.68020	1.40389	1.42191
0.61610	1.41453	1.42660
0.55199	1.40742	1.42555
0.48789	1.39507	1.41111
0.42379	1.38048	1.39991
0.35969	1.36407	1.38215
0.29558	1.34036	1.35675
0.0	1.17510	1.23900

STATION	DX SWEEP	DX SWEEP
1.00000	0.873	0.983
0.93661	1.000	1.171
0.87251	1.130	1.359
0.80841	1.259	1.547
0.74430	1.388	1.736
0.68020	1.518	1.924
0.61610	1.647	2.112
0.55199	1.776	2.301
0.48789	1.906	2.489
0.42379	2.035	2.677
0.35969	2.164	2.865
0.29558	2.294	3.054
0.0	20.128	17.942

TABLE 24. USPANF SPANWISE UNIT DISTRIBUTIONS

WING FLEXIBLE ALPHA PARAMETERS MN= 1.050 CLA= 2.83530
 DXTOTAL= 175.75 YW(B)= 95.65 DXW(B)= 188.02 DXB(M)= 64.11

SIDE OF BODY UNITS

USZWB= 0.83869 UMXWB= 52.289 UMYWB= -68.303

SPANWISE UNIT DISTRIBUTIONS

STA SWEPT	USZW(B)	UMXW(B) SWEEP	UMYW(B) SWEEP
1.0000	0.0	0.0	0.0
0.9287	0.00944	0.105	-0.083
0.8575	0.03524	0.603	-0.332
0.7862	0.07337	1.814	-0.749
0.7149	0.12247	3.997	-1.354
0.6436	0.18359	7.409	-2.198
0.5724	0.25675	12.318	-3.312
0.5011	0.34005	18.971	-4.697
0.4298	0.43198	27.578	-6.358
0.3585	0.53114	38.314	-8.291
0.2873	0.63586	51.324	-10.483
0.2160	0.74506	66.718	-12.925
0.0	1.00000	125.668	-20.401

TABLE 24. USPANF SPANWISE UNIT DISTRIBUTIONS (CONT)

RIGID FLAP DOWN PARAMETERS DF= 0.0 KBF= 0.31051 MN= 1.050
 UXTOTAL= 149.75 YW(B)= 86.57 DXW(B)= 165.01 DXB(W)= 60.24

SIDE OF BODY UNITS

USZWB= 0.75682 UMXWB= 40.167 UMYWB= -44.217

SPANWISE UNIT DISTRIBUTIONS

STA SWEPT	USZN(B)	UMXW(B) SWEEP	UMYW(B) SWEEP
1.0000	0.0	0.0	0.0
0.9287	0.00399	0.645	-0.012
0.6575	0.01555	0.262	-0.051
0.7862	0.03396	0.814	-0.122
0.7149	0.05962	1.857	-0.233
0.6436	0.09371	3.567	-0.398
0.5724	0.13687	6.137	-0.627
0.5011	0.19021	9.783	-0.939
0.4298	0.25968	14.799	-1.382
0.3585	0.35746	21.678	-2.056
0.2873	0.48628	31.084	-3.003
0.2160	0.62704	43.495	-4.089
0.0	1.00000	98.458	-9.988

TABLE 24. USPANF SPANWISE UNIT DISTRIBUTIONS (CONT)

AEROELASTIC FLAP PARAMETERS DF= 6.0 MN= 1.050
 DXTOTAL= 211.96 YM(B)= 129.71 DXW(B)= 214.53 DXB(W)= 71.56

SIDE OF BODY UNITS

USZWB= 0.97704 UMXWB= 94.001 UMYWB=-105.468

SPANWISE UNIT DISTRIBUTIONS

STA SWEPT	USZW(B)	UMXW(B) SWEEP	UMYW(B) SWEEP
1.0000	0.0	0.0	0.0
0.9287	0.02950	0.329	-0.262
0.8575	0.10707	1.851	-1.007
0.7862	0.21043	5.391	-2.128
0.7149	0.32584	11.369	-3.544
0.6436	0.44591	19.972	-5.188
0.5724	0.56251	31.214	-6.951
0.5011	0.67017	44.955	-8.732
0.4298	0.76502	60.955	-10.437
0.3585	0.84473	78.900	-11.983
0.2873	0.90742	98.432	-13.288
0.2160	0.95056	119.145	-14.241
0.0	1.00000	185.037	-15.369

TABLE 24. USPANF SPANWISE UNIT DISTRIBUTIONS (CONT)

AEROELASTIC INERTIA PARAMETERS WEIGHT= 27200. FSCG= 313.00 MN= 1.050

DXTOTAL= 215.10 YW(B)= 133.24 DXW(B)= 217.36 DXB(W)= 71.67

SIDE OF BODY UNITS

USZWB= 0.98031 UMXWB= 97.778 UMYWB=-108.594

SPANWISE UNIT DISTRIBUTIONS

STA SWEPT	USZW(B)	UMXW(B) SWEEP	UMYW(B) SWEEP
1.0000	0.0	0.0	0.0
0.9287	0.03238	0.361	-0.287
0.8575	0.11688	2.025	-1.099
0.7862	0.22823	5.872	-2.306
0.7149	0.35112	12.330	-3.814
0.6436	0.47667	21.558	-5.532
0.5724	0.59547	33.510	-7.327
0.5011	0.70174	47.971	-9.085
0.4298	0.79186	64.622	-10.706
0.3585	0.86465	83.088	-12.117
0.2873	0.92004	102.983	-13.270
0.2160	0.95742	123.913	-14.095
0.0	1.00000	190.037	-15.064

TABLE 24. USPANF SPANWISE UNIT DISTRIBUTIONS (CONT)

MOR TAIL PARAMETERS MN= 1.050
 CLA= 4.33216 KM(B)=0.76509 YH= 49.76 DXH= 90.21

SIDE OF BODY UNITS

USZHB= 0.76509 UMXHB= 28.885 UMYHB= -28.378

SPANWISE UNIT DISTRIBUTIONS

STA SWEPT	USZH(B)	UMXH(B) SWEEP	UMYH(B) SWEEP
1.0000	0.0	0.0	0.0
0.9366	0.01810	0.087	-0.018
0.8725	0.06416	0.487	-0.068
0.8084	0.12352	1.400	-0.139
0.7443	0.18963	2.924	-0.227
0.6802	0.26086	5.115	-0.330
0.6161	0.33456	8.012	-0.447
0.5520	0.40835	11.626	-0.573
0.4879	0.48163	15.956	-0.708
0.4238	0.55421	20.995	-0.851
0.3597	0.62598	26.736	-1.002
0.2956	0.69670	33.171	-1.159
0.0	1.00000	71.231	-4.382

TABLE 24. USPANF SPANWISE UNIT DISTRIBUTIONS (CONCL)

VERT TAIL PARAMETERS MN= 1.050
 CYB= 3.99680 KV(B)=0.82507 DZV= 56.23 DXV= 105.65

TOP OF BODY UNITS

USYVB= 0.82507 UMXVB= 38.081 UMZVB= -36.720

SPANWISE UNIT DISTRIBUTIONS

STA SWEPT	USYV(B)	UMXV(B) SWEEP	UMZV(B) SWEEP
1.0000	0.0	0.0	0.0
0.9311	0.02078	0.121	-0.024
0.8620	0.07189	0.665	-0.090
0.7928	0.13644	1.886	-0.184
0.7236	0.20836	3.908	-0.302
0.6544	0.28527	6.802	-0.443
0.5852	0.36406	10.609	-0.602
0.5161	0.44281	15.340	-0.776
0.4469	0.52113	20.992	-0.964
0.3777	0.59886	27.559	-1.164
0.3085	0.67583	35.033	-1.378
0.2394	0.75159	43.402	-1.602
0.0	1.00000	78.937	-4.126

TABLE 25. COMPONENT LIMIT AIRLOADS AND CENTERS OF PRESSURE

CONDITION NO= 6030. MN= 1.050 ALT= 20000. DF= 0.0
 BODY LOADS
 PZN= 1352. PYN= 2511. XBN= 79.91
 WING PANEL LOAD
 PZW(B)/2= 11995. YBW(B)= 96.83 XBW(B)= 353.53
 WING CARRY-OVER LOAD
 PZB(W)= 4505. XBB(W)= 276.67
 HORIZONTAL TAIL LOADS
 PZH/2= -1324. YBH= 49.76 XBH= 499.43 DMXH= 19760.
 VERTICAL TAIL LOAD
 PYV= 13155. ZBV= 56.23 XBV= 501.70
 AIRPLANE INERTIA FACTORS
 NZ= 1.00 NY= 0.58 QDOT= 0.0 RDOT= -1.848
 COMPONENT SPANWISE FACTORS
 PZW61= 27848. PZMB2= 0. PZMB3= 0. PZMB4= 647. PZMB= -2647.

TABLE 26. WING LIMIT AIRLOAD DISTRIBUTIONS

WING LOADS	COND NO=	6031.	MM=	1.050	ALT=	20000.	DF=	0.0	TORSM SCB=	-966196.IN-LB
BODY INT=	33.50IN	SHEAR SCB=	11995.LB	BEMOM SCB=	755712.IN-LB					
STATION (IN)	SHEAR (LB)	BEMOM (IN-LB)	TORS MOM (IN-LB)							
312.01	0.	0.	0.							
296.52	142.	1583.	-1254.							
266.22	528.	4057.	-4985.							
245.53	1045.	27160.	-11177.							
223.63	1619.	59649.	-20086.							
201.34	2711.	110144.	-32390.							
175.04	3768.	162363.	-46469.							
156.74	4962.	279679.	-66346.							
134.45	6271.	464902.	-91986.							
112.15	7675.	560374.	-119361.							
89.86	9151.	747955.	-150260.							
67.56	10654.	969076.	-164523.							

TABLE 27. HORIZONTAL TAIL LIMIT AIRLOAD DISTRIBUTIONS

HORIZONTAL TAIL LUALS		CUND NO= 6034.	MN= 1.050	ALT= 20000.		
BODY INT= 26.001N	SHEAR SUB= -1013.16	BENDM SOB= -38232.1N-LB	TORSM SOB=	37561.1N-LB		
STATION (IN)	SHEAR (LB)	BEND MOM (IN-LB)	TORS MOM (IN-LB)			
151.78	0.	0.	0.			
142.16	-24.	-115.	24.			
132.43	-85.	-645.	90.			
122.70	-163.	-1853.	184.			
112.97	-251.	-3870.	300.			
103.24	-345.	-6770.	437.			
93.51	-443.	-10604.	592.			
63.78	-540.	-15388.	759.			
74.05	-637.	-21119.	937.			
64.32	-734.	-27788.	1127.			
54.59	-829.	-35387.	1326.			
44.86	-922.	-43904.	1535.			

TABLE 28. VERTICAL TAIL LIMIT AIRLOAD DISTRIBUTIONS

VERTICAL TAIL LOADS	COND NO=	6035.	MN=	1.650	ALT=	20000.	TORSN SOB=	-23068.IN-LB
BOLY INT=	21.55IN	SHEAR SOB=	10854.LB	BENDM SOB=	500967.IN-LB	TORSN SOB=	-23068.IN-LB	
STATION (IN)	SHEAR (LB)	BEND MOM (IP-LB)	TORS MOM (IN-LB)					
169.51	0.	0.	0.					
157.64	273.	1596.	-320.					
146.11	946.	8744.	-1182.					
134.39	1795.	24813.	-2421.					
122.66	2741.	51408.	-3978.					
110.93	3753.	89484.	-5831.					
99.21	4769.	139569.	-7923.					
87.48	5825.	201805.	-10209.					
75.75	6856.	276157.	-12676.					
64.03	7876.	362547.	-15317.					
52.30	8891.	460870.	-16122.					
40.57	9887.	570971.	-21071.					

TABLE 29. WFLEX INPUT DATA

DATA FROM SUBROUTINE FLXSIC

NS = 10 NOEICJ = 11
 CR = 190.35 IN. B02 = 231.50 IN. BLBS = 33.50 IN.
 ANGLE = 49.036 DEG. FSLERT = 164.73 IN.
 ANGEA = 42.267 DEG. FSEAO = 240.87 IN.
 WLANDA = 0.262 XOCFWD = 0.150 XOCAFT = 0.650

ELASTIC AXIS Y COORDINATES FOR WING EI AND GJ

COLUMN NO. = 1

0.0 2.00000E 01 4.50000E 01 4.70000E 01 8.00000E 01 1.20000E 02 1.60000E 02 2.00000E 02
 2.40000E 02 2.80000E 02 3.20000E 02

EI

COLUMN NO. = 1

1.40000E 11 1.40000E 11 1.41000E 10 1.39000E 10 1.16000E 10 6.00000E 09 2.60000E 09 1.15000E 09
 5.50000E 08 3.50000E 08 3.00000E 08

GJ

COLUMN NO. = 1

9.20000E 10 9.20000E 10 9.30000E 09 9.20000E 09 7.96000E 09 5.65000E 09 2.25000E 09 8.50000E 08
 2.60000E 08 2.10000E 08 1.70000E 08

TABLE 30. FLXSIC GEOMETRY

SIC FUSELAGE STATIONS

COLUMN NO. = 1	2.39313E 02	3.21314E 02	2.60313E 02	3.36304E 02	2.81312E 02	3.51294E 02	3.02312E 02	3.66284E 02
	3.23312E 02	3.81274E 02	3.44312E 02	3.96264E 02	3.65312E 02	4.11254E 02	3.86312E 02	4.26244E 02
	4.07311E 02	4.41233E 02	4.28311E 02	4.56223E 02				

SIC BUTT LINES

COLUMN NO. = 1	4.3399E 01	4.3399E 01	6.31997E 01	6.31997E 01	8.29995E 01	8.29995E 01	1.02799E 02	1.02799E 02
	1.22599E 02	1.22599E 02	1.42399E 02	1.42399E 02	1.62199E 02	1.62199E 02	1.81998E 02	1.81998E 02
	2.01798E 02	2.01798E 02	2.21596E 02	2.21596E 02				

SIC ELASTIC AXIS X COORDINATES

COLUMN NO. = 1	-3.03408E 01	3.03447E 01	-2.81162E 01	2.81219E 01	-2.58915E 01	2.58986E 01	-2.36668E 01	2.36759E 01
	-2.14419E 01	2.14531E 01	-1.92172E 01	1.92301E 01	-1.69925E 01	1.70072E 01	-1.47676E 01	1.47843E 01
	-1.25429E 01	1.25613E 01	-1.03182E 01	1.03384E 01				

SIC ELASTIC AXIS Y COORDINATES

COLUMN NO. = 1	3.10710E 01	8.62207E 01	5.96472E 01	1.10955E 02	8.66235E 01	1.35689E 02	1.17400E 02	1.60424E 02
	1.46176E 02	1.85158E 02	1.74952E 02	2.05892E 02	2.03729E 02	2.34627E 02	2.32505E 02	2.59361E 02
	2.61281E 02	2.84095E 02	2.90057E 02	3.08830E 02				

TABLE 31. DELTA SIC, BENDING (IN./LB) MATRIX

ROW NO. = 1										
6.95994E-08	2.56968E-07	1.67365E-07	3.41002E-07	2.65131E-07	4.25035E-07	3.62897E-07	5.09068E-07	4.60663E-07	5.93102E-07	7.61169E-07
5.51726E-07	9.29236E-07	9.44491E-07	6.77136E-07	6.56194E-07	7.61169E-07	7.53961E-07	8.45203E-07	9.29236E-07	9.44491E-07	1.01327E-06
ROW NO. = 2										
2.56968E-07	3.84425E-06	1.17032E-06	6.35199E-06	4.08785E-06	8.65972E-06	7.00539E-06	1.13675E-05	9.92254E-06	1.38752E-05	1.88907E-05
2.15931E-05	2.39061E-05	2.45106E-05	1.63829E-05	1.57580E-05	1.88907E-05	1.86755E-05	2.13984E-05	2.39061E-05	2.45106E-05	2.64139E-05
ROW NO. = 3										
1.67365E-07	1.17032E-06	7.12883E-07	2.07946E-06	1.46233E-06	2.74083E-06	2.25178E-06	3.40220E-06	3.02123E-06	4.06357E-06	5.38632E-06
6.09903E-06	6.70906E-06	6.86847E-06	4.72494E-06	4.56012E-06	5.38632E-06	5.32958E-06	6.04769E-06	6.09903E-06	6.70906E-06	7.37043E-06
ROW NO. = 4										
3.41002E-07	6.35199E-06	2.07946E-06	1.16681E-05	6.68404E-06	1.76098E-05	1.33641E-05	2.33516E-05	2.00442E-05	2.90934E-05	4.05770E-05
4.67644E-05	5.20605E-05	5.34445E-05	3.48351E-05	3.34043E-05	4.05770E-05	4.00844E-05	4.63187E-05	4.67644E-05	5.20605E-05	5.78023E-05
ROW NO. = 5										
2.65131E-07	4.08785E-06	1.48233E-06	6.66404E-06	4.37106E-06	9.61977E-06	7.58014E-06	1.23781E-05	1.07692E-05	1.51364E-05	2.06530E-05
2.36255E-05	2.61697E-05	2.68346E-05	1.78947E-05	1.72073E-05	2.06530E-05	2.04164E-05	2.34114E-05	2.36255E-05	2.61697E-05	2.89280E-05
ROW NO. = 6										
4.25035E-07	8.85972E-06	2.74083E-06	1.76096E-05	9.61977E-06	2.80303E-05	1.98674E-05	3.90697E-05	3.27107E-05	5.01090E-05	7.12405E-05
8.40838E-05	9.42661E-05	9.69270E-05	6.11483E-05	5.83972E-05	7.12405E-05	7.12405E-05	8.32288E-05	8.40838E-05	9.42661E-05	1.05305E-04
ROW NO. = 7										
3.62897E-07	7.00539E-06	2.25178E-06	1.33641E-05	7.58014E-06	1.98674E-05	1.50161E-05	2.69200E-05	2.29779E-05	3.37635E-05	4.74506E-05
5.48254E-05	6.11377E-05	6.27872E-05	4.06070E-05	3.89016E-05	4.74506E-05	4.68636E-05	5.42942E-05	5.48254E-05	6.11377E-05	6.79812E-05
ROW NO. = 8										

TABLE 31. DELTA SIC, BENDING (IN./LB) MATRIX (CONT)

5.09066E-07	1.13675E-05	3.40220E-06	2.33516E-05	1.23781E-05	3.90697E-05	2.69200E-05	5.61613E-05
4.67180E-05	7.80274E-05	6.98303E-05	5.78933E-05	9.25426E-05	1.17759E-04	1.16055E-04	1.37625E-04
1.39167E-04	1.57491E-04	1.62260E-04	1.77357E-04				
ROW NO. = 9							
4.60663E-07	9.92294E-06	3.02123E-06	2.00442E-05	1.07892E-05	3.27107E-05	2.29779E-05	4.67180E-05
3.91925E-05	6.18360E-05	5.59077E-05	7.62033E-05	7.26229E-05	9.05707E-05	8.93383E-05	1.04938E-04
1.00053E-04	1.19306E-04	1.22769E-04	1.33673E-04				
ROW NO. = 10							
5.93102E-07	1.38752E-05	4.06357E-06	2.90934E-05	1.51364E-05	5.01090E-05	3.37635E-05	7.80274E-05
6.18360E-05	1.12316E-04	9.79592E-05	1.47111E-04	1.38440E-04	1.81906E-04	1.78921E-04	2.16700E-04
2.19461E-04	2.51495E-04	2.59882E-04	2.86289E-04				
ROW NO. = 11							
5.58429E-07	1.28405E-05	3.79068E-06	2.67242E-05	1.39983E-05	4.55540E-05	3.09397E-05	6.98303E-05
5.59077E-05	9.79592E-05	8.70637E-05	1.26389E-04	1.19452E-04	1.54228E-04	1.51840E-04	1.82067E-04
1.84228E-04	2.09906E-04	2.16616E-04	2.37745E-04				
ROW NO. = 12							
6.77136E-07	1.63829E-05	4.72494E-06	3.48351E-05	1.78947E-05	6.11483E-05	4.06070E-05	9.78933E-05
7.62033E-05	1.47111E-04	1.26389E-04	2.04357E-04	1.89558E-04	2.63743E-04	2.58649E-04	3.23129E-04
3.27739E-04	3.82515E-04	3.96829E-04	4.41901E-04				
ROW NO. = 13							
6.56194E-07	1.57580E-05	4.56012E-06	3.34043E-05	1.72073E-05	5.83972E-05	3.89016E-05	9.29426E-05
7.26229E-05	1.38440E-04	1.19452E-04	1.89559E-04	1.75687E-04	2.40510E-04	2.36066E-04	2.92416E-04
2.96445E-04	3.44314E-04	3.56823E-04	3.96212E-04				
ROW NO. = 14							
7.61169E-07	1.88907E-05	5.38632E-06	4.05770E-05	2.06530E-05	7.21875E-05	4.74506E-05	1.17759E-04
9.05707E-05	1.81906E-04	1.54228E-04	2.63743E-04	2.40516E-04	3.62286E-04	3.53678E-04	4.62634E-04
4.70424E-04	5.62982E-04	5.87170E-04	6.63331E-04				
ROW NO. = 15							
7.53961E-07	1.86755E-05	5.32958E-06	4.00844E-05	2.04164E-05	7.12405E-05	4.68636E-05	1.16055E-04

TABLE 31. DELTA SIC, BENDING (IN./LB) MATRIX (CONCL)

8.93383E-05	1.78921E-04	1.51840E-04	2.58649E-04	2.36066E-04	3.53678E-04	3.45876E-04	4.50192E-04
4.57650E-04	5.46264E-04	5.69422E-04	6.42338E-04				
ROM NO. = 16							
8.45203E-07	2.13984E-05	6.04769E-06	4.63187E-05	2.34114E-05	8.32268E-05	5.42942E-05	1.37625E-04
1.04938E-04	2.16700E-04	1.82067E-04	3.23129E-04	2.92416E-04	4.62634E-04	4.50192E-04	6.20363E-04
6.33230E-04	7.86112E-04	8.26664E-04	9.51863E-04				
ROM NO. = 17							
6.51726E-07	2.15931E-05	6.09903E-06	4.67644E-05	2.36255E-05	8.40838E-05	5.48254E-05	1.39167E-04
1.06053E-04	2.19401E-04	1.84228E-04	3.27739E-04	2.96445E-04	4.70424E-04	4.57650E-04	6.33230E-04
6.46679E-04	8.05514E-04	8.47022E-04	9.77717E-04				
ROM NO. = 18							
9.29236E-07	2.39061E-05	6.70906E-06	5.20605E-05	2.61697E-05	9.42661E-05	6.11377E-05	1.57491E-04
1.19306E-04	2.51495E-04	2.09906E-04	3.62515E-04	3.44314E-04	5.62982E-04	5.46264E-04	7.86112E-04
6.05514E-04	1.05609E-03	1.12065E-03	1.32392E-03				
ROM NO. = 19							
9.49491E-07	2.45106E-05	6.86847E-06	5.34445E-05	2.68346E-05	9.69270E-05	6.27872E-05	1.62280E-04
1.22769E-04	2.59882E-04	2.16616E-04	3.96829E-04	3.56823E-04	5.87170E-04	5.69422E-04	8.26664E-04
6.47022E-04	1.12065E-03	1.19739E-03	1.42434E-03				
ROM NO. = 20							
1.01327E-06	2.64138E-05	7.37043E-06	5.78023E-05	2.69280E-05	1.05305E-04	6.79812E-05	1.77357E-04
1.33673E-04	2.86289E-04	2.37745E-04	4.41901E-04	3.96212E-04	6.63331E-04	6.42338E-04	9.51863E-04
9.77717E-04	1.32392E-03	1.42434E-03	1.73689E-03				

TABLE 32. DELTA SIC, TORSION (IN./LB) MATRIX

ROM NO. = 1

3.28066E-07 -3.28108E-07 3.04011E-07 -3.04072E-07 2.79956E-07 -2.80035E-07 2.55901E-07 -2.56000E-07
 4.31845E-07 -2.31965E-07 2.07789E-07 -2.07928E-07 1.83734E-07 -1.83893E-07 1.59678E-07 -1.59858E-07
 1.35622E-07 -1.35821E-07 1.11567E-07 -1.11786E-07

ROM NO. = 2

-3.28108E-07 5.41801E-06 -5.02011E-06 5.02113E-06 -4.62290E-06 4.62420E-06 -4.22568E-06 4.22731E-06
 -3.82843E-06 3.83043E-06 -3.43121E-06 3.43351E-06 -3.03400E-06 3.03662E-06 -2.63674E-06 2.63972E-06
 -2.23953E-06 2.24280E-06 -1.84231E-06 1.84591E-06

ROM NO. = 3

3.04011E-07 -5.02011E-06 2.11725E-06 -2.11767E-06 1.94972E-06 -1.95027E-06 1.78219E-06 -1.78288E-06
 1.61465E-06 -1.61549E-06 1.44712E-06 -1.44809E-06 1.27960E-06 -1.28070E-06 1.11206E-06 -1.11331E-06
 9.44528E-07 -9.45910E-07 7.77000E-07 -7.78521E-07

ROM NO. = 4

-3.04072E-07 5.02113E-06 -2.11767E-06 7.48151E-06 -6.88815E-06 6.89010E-06 -6.29629E-06 6.29873E-06
 -5.70439E-06 5.70736E-06 -5.11253E-06 5.11595E-06 -4.52067E-06 4.52458E-06 -3.92877E-06 3.93321E-06
 -3.33691E-06 3.34179E-06 -2.74505E-06 2.75043E-06

ROM NO. = 5

2.79956E-07 -4.62290E-06 1.94972E-06 -6.88815E-06 4.16510E-06 -4.16628E-06 3.60722E-06 -3.60870E-06
 3.44931E-06 -3.45111E-06 3.09143E-06 -3.09349E-06 2.73355E-06 -2.73591E-06 2.37563E-06 -2.37832E-06
 2.01775E-06 -2.02070E-06 1.65987E-06 -1.66312E-06

ROM NO. = 6

-2.80035E-07 4.62420E-06 -1.95027E-06 6.89010E-06 -4.16628E-06 9.44540E-06 -8.63137E-06 8.63472E-06
 -7.61996E-06 7.62403E-06 -7.00859E-06 7.01328E-06 -6.19724E-06 6.20259E-06 -5.38582E-06 5.39191E-06
 -4.57446E-06 4.58115E-06 -3.76310E-06 3.77047E-06

ROM NO. = 7

2.55901E-07 -4.22568E-06 1.78219E-06 -6.29629E-06 3.90722E-06 -8.63137E-06 5.87389E-06 -5.87617E-06
 5.32170E-06 -5.32447E-06 4.76954E-06 -4.77274E-06 4.21740E-06 -4.22104E-06 3.66520E-06 -3.66934E-06
 3.11305E-06 -3.11760E-06 2.56090E-06 -2.56591E-06

ROM NO. = 8

TABLE 32. DELTA SIC, TORSION (IN./LB) MATRIX (CONT)

-2.55600E-07	4.22731E-06	-1.76286E-06	6.29673E-06	-3.80870E-06	8.63472E-06	-5.87417E-06	1.23608E-05
-1.12125E-05	1.12184E-05	-1.00492E-05	1.00559E-05	-8.88563E-06	8.89350E-06	-7.72237E-06	7.73110E-06
-6.55902E-06	6.56862E-06	-5.39567E-06	5.40623E-06				
ROW NO. = 9							
2.31845E-07	-3.82843E-06	1.61465E-06	-5.70439E-06	3.44931E-06	-7.81996E-06	5.32170E-06	-1.12125E-05
7.76821E-06	-7.77226E-06	6.96221E-06	-6.96687E-06	6.15623E-06	-6.16154E-06	5.35017E-06	-5.35622E-06
4.54418E-06	-4.55083E-06	3.73820E-06	-3.74552E-06				
ROW NO. = 10							
-2.31965E-07	3.83043E-06	-1.61549E-06	5.70736E-06	-3.45111E-06	7.82403E-06	-5.32447E-06	1.12184E-05
-7.77226E-06	1.71838E-05	-1.53929E-05	1.54032E-05	-1.36109E-05	1.36227E-05	-1.18268E-05	1.18422E-05
-1.00466E-05	1.00615E-05	-8.26486E-06	8.28104E-06				
ROW NO. = 11							
2.07789E-07	-3.43121E-06	1.44712E-06	-5.11253E-06	3.09143E-06	-7.00859E-06	4.76954E-06	-1.00492E-05
6.96221E-06	-1.53929E-05	1.10969E-05	-1.11043E-05	9.81225E-06	-9.82072E-06	8.52750E-06	-8.53714E-06
7.24286E-06	-7.25346E-06	5.95821E-06	-5.96988E-06				
ROW NO. = 12							
-2.07928E-07	3.43351E-06	-1.44809E-06	5.11595E-06	-3.09349E-06	7.01328E-06	-4.77274E-06	1.00559E-05
-6.96687E-06	1.54032E-05	-1.11043E-05	2.42116E-05	-2.13944E-05	2.14129E-05	-1.85932E-05	1.86142E-05
-1.57922E-05	1.56153E-05	-1.29912E-05	1.30166E-05				
ROW NO. = 13							
1.83734E-07	-3.03400E-06	1.27960E-06	-4.52067E-06	2.73355E-06	-6.19724E-06	4.21740E-06	-8.68583E-06
6.15623E-06	-1.36109E-05	9.81225E-06	-2.13944E-05	1.63094E-05	-1.63235E-05	1.41740E-05	-1.41900E-05
1.20387E-05	-1.20564E-05	9.90346E-06	-4.92265E-06				
ROW NO. = 14							
-1.83893E-07	3.03662E-06	-1.28070E-06	4.52456E-06	-2.73591E-06	6.20259E-06	-4.22104E-06	8.69350E-06
-6.16154E-06	1.36227E-05	-9.82072E-06	2.14129E-05	-1.63235E-05	3.56714E-05	-3.09741E-05	3.10091E-05
-2.63079E-05	2.63464E-05	-2.16418E-05	2.16841E-05				
ROW NO. = 15							
1.59678E-07	-2.63674E-06	1.11206E-06	-3.92877E-06	2.37563E-06	-5.38582E-06	3.66520E-06	-7.72237E-06

TABLE 32. DELTA SIC, TORSION (IN./LB) MATRIX (CONCL)

5.35017E-06 -1.18288E-05 8.52750E-06 -1.25932E-05 1.41740E-05 -3.09741E-05 2.54164E-05 -2.54451E-05
 2.15875E-05 -2.16191E-05 1.77585E-05 -1.77933E-05

ROW NO. = 16

-1.59858E-07 2.63972E-06 -1.11331E-06 3.93321E-06 -2.37832E-06 5.39191E-06 -3.66934E-06 7.73110E-06
 -5.35622E-06 1.18422E-05 -8.53714E-06 1.86142E-05 -1.41500E-05 3.10691E-05 -2.54451E-05 4.60615E-05
 -4.07920E-05 4.08517E-05 -3.35569E-05 3.36226E-05

ROW NO. = 17

1.35622E-07 -2.23953E-06 9.44528E-07 -3.33691E-06 2.01775E-06 -4.57446E-06 3.11305E-06 -6.55902E-06
 4.54418E-06 -1.00468E-05 7.24286E-06 -1.57922E-05 1.20387E-05 -2.63079E-05 2.15875E-05 -4.07920E-05
 3.59060E-05 -3.59586E-05 2.95375E-05 -2.95453E-05

ROW NO. = 18

-1.35821E-07 2.24280E-06 -9.45910E-07 3.34179E-06 -2.02070E-06 4.58115E-06 -3.11760E-06 6.56862E-06
 -4.55083E-06 1.00615E-05 -7.25346E-06 1.58153E-05 -1.20564E-05 2.63464E-05 -2.16191E-05 4.08517E-05
 -3.59586E-05 5.28395E-05 -4.34040E-05 4.34890E-05

ROW NO. = 19

1.11567E-07 -1.64231E-06 7.77000E-07 -2.74505E-06 1.65967E-06 -3.76310E-06 2.56090E-06 -5.39567E-06
 3.73820E-06 -8.26486E-06 5.95821E-06 -1.29912E-05 9.90346E-06 -2.16418E-05 1.77586E-05 -3.35569E-05
 2.95375E-05 -4.34040E-05 3.66232E-05 -3.86988E-05

ROW NO. = 20

-1.11786E-07 1.84591E-06 -7.78521E-07 2.75043E-06 -1.66312E-06 3.77047E-06 -2.56591E-06 5.40623E-06
 -3.74552E-06 8.28104E-06 -5.96988E-06 1.30166E-05 -9.92285E-06 2.16418E-05 -1.77933E-05 3.36226E-05
 -2.95953E-05 4.34890E-05 -3.86988E-05 4.93537E-05

TABLE 33. STRUCTURAL INFLUENCE COEFFICIENTS (IN./LB) MATRIX (CONT)

2.5308E-07	1.55948E-05	1.61931E-06	2.96503E-05	6.56941E-06	4.77044E-05	2.16438E-05	7.05421E-05
3.55054E-05	8.92457E-05	5.97611E-05	1.07949E-04	6.40566E-05	1.26653E-04	1.08333E-04	1.45356E-04
1.32606E-04	1.64406E-04	1.56684E-04	1.82763E-04				
ROW NO. = 9							
6.92507E-07	6.09451E-06	4.63568E-06	1.43398E-05	1.42385E-05	2.48908E-05	2.82996E-05	3.55054E-05
4.69607E-05	5.40637E-05	6.28699E-05	6.92365E-05	7.87792E-05	8.44092E-05	9.46885E-05	9.95619E-05
1.10598E-04	1.14755E-04	1.26507E-04	1.29927E-04				
ROW NO. = 10							
3.61137E-07	1.77056E-05	2.44806E-06	3.48008E-05	1.16853E-05	5.79330E-05	2.84391E-05	8.92457E-05
5.40637E-05	1.29500E-04	8.25663E-05	1.62514E-04	1.24829E-04	1.95528E-04	1.67092E-04	2.26542E-04
2.09355E-04	2.61556E-04	2.51617E-04	2.94570E-04				
ROW NO. = 11							
7.66218E-07	9.40927E-06	5.23780E-06	2.16117E-05	1.70897E-05	3.85454E-05	3.57093E-05	5.97811E-05
6.28699E-05	8.25663E-05	9.81606E-05	1.15285E-04	1.29264E-04	1.44406E-04	1.60366E-04	1.73530E-04
1.91471E-04	2.02653E-04	2.22575E-04	2.31775E-04				
ROW NO. = 12							
4.69208E-07	1.98164E-05	3.27685E-06	3.99511E-05	1.48012E-05	6.81615E-05	3.58343E-05	1.07949E-04
6.92365E-05	1.62514E-04	1.15285E-04	2.28569E-04	1.66164E-04	2.65156E-04	2.40056E-04	3.41743E-04
3.11947E-04	3.98330E-04	3.83836E-04	4.54917E-04				
ROW NO. = 13							
8.39924E-07	1.27240E-05	5.63972E-06	2.88836E-05	1.99409E-05	5.22000E-05	4.31190E-05	8.40568E-05
7.87792E-05	1.24829E-04	1.29264E-04	1.66164E-04	1.91996E-04	2.24195E-04	2.50240E-04	2.78226E-04
3.08463E-04	3.32257E-04	3.66727E-04	3.86289E-04				
ROW NO. = 14							
5.77276E-07	2.19273E-05	4.10561E-06	4.51015E-05	1.79171E-05	7.83901E-05	4.32295E-05	1.26653E-04
6.44092E-05	1.95528E-04	1.44408E-04	2.85156E-04	2.24195E-04	3.97957E-04	3.22704E-04	4.93643E-04
4.44116E-04	5.89328E-04	5.65528E-04	6.85015E-04				
ROW NO. = 15							
9.13636E-07	1.60366E-05	6.44164E-06	3.61556E-05	2.27921E-05	6.58547E-05	5.05287E-05	1.08333E-04

TABLE 33. STRUCTURAL INFLUENCE COEFFICIENTS (IN./LB) MATRIX (CONCL)

9.46885E-05	1.67092E-04	1.60366E-04	2.40056E-04	2.50240E-04	3.22704E-04	3.71294E-04	4.24747E-04
4.79237E-04	5.24645E-04	5.87120E-04	6.24544E-04				
ROW NO. = 16							
6.85345E-07	2.40381E-05	4.93437E-06	5.02519E-05	2.10336E-05	8.86187E-05	5.06248E-05	1.45356E-04
9.95819E-05	2.28542E-04	1.73530E-04	3.41743E-04	2.78226E-04	4.93643E-04	4.24747E-04	6.86444E-04
5.92438E-04	8.26963E-04	7.92507E-04	9.85485E-04				
ROW NO. = 17							
9.87348E-07	1.93535E-05	7.04355E-06	4.34275E-05	2.56432E-05	7.95093E-05	5.79385E-05	1.32608E-04
1.10598E-04	2.09355E-04	1.91471E-04	3.11947E-04	3.08483E-04	4.44116E-04	4.79237E-04	5.92438E-04
6.82585E-04	7.69555E-04	8.76554E-04	9.48122E-04				
ROW NO. = 18							
7.93415E-07	2.61469E-05	5.76315E-06	5.54023E-05	2.41490E-05	9.88473E-05	5.80201E-05	1.64060E-04
1.14755E-04	2.61556E-04	2.02653E-04	3.98330E-04	3.32257E-04	5.89328E-04	5.24645E-04	8.26963E-04
7.69555E-04	1.10893E-03	1.07724E-03	1.36740E-03				
ROW NO. = 19							
1.06106E-06	2.26662E-05	7.64547E-06	5.06994E-05	2.84944E-05	9.31639E-05	6.53481E-05	1.56884E-04
1.26507E-04	2.51617E-04	2.22575E-04	3.83838E-04	3.66727E-04	5.65528E-04	5.87180E-04	7.92507E-04
8.76559E-04	1.07724E-03	1.23601E-03	1.38564E-03				
ROW NO. = 20							
9.01481E-07	2.82597E-05	6.59191E-06	6.05527E-05	2.72649E-05	1.09076E-04	6.54153E-05	1.62763E-04
1.29927E-04	2.94570E-04	2.31775E-04	4.54917E-04	3.86289E-04	6.85015E-04	6.24544E-04	9.85485E-04
9.48122E-04	1.36740E-03	1.38564E-03	1.76625E-03				

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TABLE 34. DTHEDA MATRIX

ROW NO. = 1									
1.21949E-02	-1.21949E-02	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ROW NO. = 2									
0.0	0.0	1.31595E-02	-1.31593E-02	0.0	0.0	0.0	0.0	0.0	0.0
0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ROW NO. = 3									
0.0	0.0	0.0	0.0	1.42894E-02	-1.42894E-02	0.0	0.0	0.0	0.0
0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ROW NO. = 4									
0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.56319E-02	-1.56319E-02
0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ROW NO. = 5									
0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1.72527E-02	-1.72527E-02	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ROW NO. = 6									
0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
0.0	0.0	1.92486E-02	-1.92486E-02	0.0	0.0	0.0	0.0	0.0	0.0
0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ROW NO. = 7									
0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.17665E-02	-2.17665E-02
0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ROW NO. = 8									

TABLE 34. DTHEDA MATRIX (CONCL)

0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.50425E-02
0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-2.50425E-02
ROW NO. = 9									
0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2.94793E-02	-2.94793E-02	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ROW NO. = 10									
0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
0.0	0.0	0.0	3.58264E-02	-3.58264E-02	0.0	0.0	0.0	0.0	0.0

TABLE 35. SICRAR MATRIX (RAD/LB)

ROW NO. = 1

5.71703E-09 -1.13820E-07 5.26963E-08 -1.38244E-07 1.31722E-06 -1.62667E-07 -2.63522E-06 -1.67091E-07
 -6.58769E-08 -2.11515E-07 -1.05401E-07 -2.35537E-07 -1.44925E-07 -2.60361E-07 -1.84450E-07 -2.64784E-07
 -2.23974E-07 -3.64208E-07 -2.63498E-07 -3.33631E-07

ROW NO. = 2

5.71703E-09 -2.00323E-07 3.77455E-08 -2.55131E-07 4.78495E-06 -3.11999E-07 -3.99234E-08 -3.68669E-07
 -1.27697E-07 -4.25740E-07 -2.15469E-07 -4.82608E-07 -3.03242E-07 -5.39479E-07 -3.91016E-07 -5.96346E-07
 -4.78769E-07 -6.53218E-07 -5.66561E-07 -7.10088E-07

ROW NO. = 3

5.71703E-09 -2.00323E-07 3.77455E-08 -3.53067E-07 4.40498E-08 -4.57580E-07 2.16236E-09 -5.59217E-07
 -1.52215E-07 -6.60854E-07 -3.06590E-07 -7.62489E-07 -4.60965E-07 -8.64125E-07 -6.15341E-07 -9.65762E-07
 -7.69717E-07 -1.06740E-06 -5.24691E-07 -1.16903E-06

ROW NO. = 4

5.71703E-09 -2.00323E-07 3.77455E-08 -3.53006E-07 4.40498E-08 -5.70068E-07 -2.40482E-09 -7.73750E-07
 -1.12640E-07 -9.50520E-07 -3.76287E-07 -1.12729E-06 -6.39933E-07 -1.30406E-06 -9.03563E-07 -1.48083E-06
 -1.16723E-06 -1.65760E-06 -1.43088E-06 -1.63437E-06

ROW NO. = 5

5.71704E-09 -2.00323E-07 3.77455E-08 -3.53007E-07 4.40497E-08 -5.70068E-07 -2.40595E-09 -9.27165E-07
 -1.22546E-07 -1.30146E-06 -3.39816E-07 -1.60929E-06 -7.94484E-07 -1.91710E-06 -1.24916E-06 -2.22492E-06
 -1.70382E-06 -2.53272E-06 -2.15848E-06 -2.84053E-06

ROW NO. = 6

5.71703E-09 -2.00323E-07 3.77455E-08 -3.53007E-07 4.40505E-08 -5.70068E-07 -2.40669E-09 -9.27165E-07
 -1.22547E-07 -1.53888E-06 -3.29622E-07 -2.18055E-06 -7.48762E-07 -2.70920E-06 -1.53386E-06 -3.23785E-06
 -2.31698E-06 -3.76651E-06 -3.10409E-06 -4.29516E-06

ROW NO. = 7

5.71703E-09 -2.00323E-07 3.77455E-08 -3.53007E-07 4.40500E-08 -5.70068E-07 -2.40567E-09 -9.27166E-07
 -1.22545E-07 -1.53888E-06 -3.29623E-07 -2.54651E-06 -7.00848E-07 -3.78220E-06 -1.57727E-06 -4.68888E-06
 -2.95225E-06 -5.59554E-06 -4.32720E-06 -6.50221E-06

ROW NO. = 8

TABLE 35. SICBAR MATRIX (RAD/LB) (CONCL.)

5.71704E-09 -2.00322E-07 3.77456E-08 -3.53065E-07 4.40503E-06 -5.70069E-07 -2.40561E-09 -9.27162E-07
 -1.22544E-07 -1.53867E-06 -3.29018E-07 -2.54650E-06 -7.00821E-07 -4.28074E-06 -1.33860E-06 -6.10279E-06
 -2.83483E-06 -7.57079E-06 -5.14140E-06 -9.03845E-06

ROW NO. = 9

5.71702E-09 -2.00323E-07 3.77455E-06 -3.53068E-07 4.40496E-06 -5.70069E-07 -2.40561E-09 -9.27165E-07
 -1.22546E-07 -1.53867E-06 -3.29623E-07 -2.54652E-06 -7.00838E-07 -4.28076E-06 -1.33858E-06 -6.91364E-06
 -2.56384E-06 -1.00045E-05 -5.91599E-06 -1.23661E-05

ROW NO. = 10

5.71708E-09 -2.00323E-07 3.77454E-06 -3.53068E-07 4.40496E-06 -5.70069E-07 -2.40652E-09 -9.27166E-07
 -1.22548E-07 -1.53887E-06 -3.29625E-07 -2.54651E-06 -7.00835E-07 -4.28078E-06 -1.33862E-06 -6.91370E-06
 -2.56386E-06 -1.03955E-05 -5.36078E-06 -1.43522E-05

TABLE 36. DATA FROM SUBROUTINE WFLEX

NS = 10

Q = 751.12 LB/FT**2

CLAR = 4.248

EOTA = 1.0000

SM = 386.10 FT**2

TABLE 37. D MATRIX

COLUMN NO. = 1

9.99994E-01 -2.65900E-04 -4.76779E-05 -2.94107E-04 -4.66315E-05 -2.99965E-04 -4.94145E-05 -3.03546E-04
 -4.97719E-05 -3.05742E-04 -4.97420E-05 -3.05556E-04 -4.79750E-05 -2.94704E-04 -4.38848E-05 -2.69576E-04
 -3.69465E-05 -2.26970E-04 -1.62490E-05 -9.56155E-05

COLUMN NO. = 2

9.40263E-04 1.06578E 00 1.70944E-03 1.05009E-02 1.74349E-03 1.07100E-02 1.76430E-03 1.08379E-02
 1.77700E-03 1.09162E-02 1.77594E-03 1.09097E-02 1.71290E-03 1.05221E-02 1.56666E-03 9.62497E-03
 1.51922E-03 6.10360E-03 5.80153E-04 3.56360E-03

COLUMN NO. = 3

-4.42617E-04 -2.71693E-03 9.99611E-01 -1.96140E-03 -3.25656E-04 -2.00046E-03 -3.29544E-04 -2.02434E-03
 -5.51927E-04 -2.03650E-03 -3.31726E-04 -2.03776E-03 -3.15944E-04 -1.96537E-03 -2.92666E-04 -1.79762E-03
 -2.46410E-04 -1.51366E-03 -1.08364E-04 -6.65664E-04

COLUMN NO. = 4

1.14050E-03 7.00591E-03 2.16023E-03 1.01539E 00 3.09250E-03 1.69966E-02 3.12941E-03 1.52235E-02
 3.15204E-03 1.93626E-02 3.15016E-03 1.92510E-02 3.03825E-03 1.86636E-02 2.77921E-03 1.70723E-02
 2.53995E-03 1.43740E-02 1.02905E-03 6.32129E-03

COLUMN NO. = 5

-1.17125E-04 -7.19483E-04 -4.18040E-04 -2.56756E-03 9.99608E-01 -2.40877E-03 -3.96606E-04 -2.43752E-03
 -3.59674E-04 -2.45514E-03 -3.99441E-04 -2.45371E-03 -3.85252E-04 -2.36655E-03 -3.52405E-04 -2.16477E-03
 -2.96702E-04 -1.82260E-03 -1.30480E-04 -6.01519E-04

COLUMN NO. = 6

1.34076E-03 8.23625E-03 2.66831E-03 1.63911E-02 4.01908E-03 1.02469E 00 5.07564E-03 3.11790E-02
 5.11234E-03 3.14644E-02 5.10927E-03 3.13655E-02 4.92777E-03 3.02706E-02 4.50763E-03 2.76697E-02
 3.79519E-03 2.33133E-02 1.66903E-03 1.02526E-02

COLUMN NO. = 7

2.08367E-04 1.27997E-03 3.35107E-04 2.05651E-03 -2.82286E-05 -1.73405E-04 1.00001E 00 7.00536E-05
 1.14953E-05 7.06136E-05 1.14884E-05 7.05715E-05 1.10667E-05 6.61041E-05 1.01276E-05 6.22086E-05
 6.53659E-06 5.24513E-05 3.75771E-06 2.30631E-05

COLUMN NO. = 8

TABLE 37. D MATRIX (CONT)

1.54108E-03 9.46661E-03 3.15641E-03 1.93844E-02 4.91544E-03 3.01437E-02 6.69192E-03 1.04234E 00
 8.32713E-03 5.11524E-02 8.32217E-03 5.11219E-02 6.02653E-03 4.93056E-02 7.34216E-03 4.51020E-02
 6.16175E-03 3.79736E-02 2.71657E-03 1.66998E-02

COLUMN NO. = 9

5.33665E-04 3.27946E-03 1.08120E-03 6.66501E-03 1.33235E-03 8.18446E-03 9.92189E-04 6.09487E-03
 1.00108E 00 6.65163E-03 1.06219E-03 6.64772E-03 1.04374E-03 6.41152E-03 9.54727E-04 5.66475E-03
 6.03648E-04 4.93742E-03 3.53515E-04 2.17159E-03

COLUMN NO. = 10

1.74137E-03 1.06970E-02 3.64451E-03 2.23877E-02 5.61140E-03 3.56966E-02 6.47252E-03 5.20455E-02
 1.17681E-02 1.07241E 00 1.38539E-02 8.51023E-02 1.33617E-02 8.20792E-02 1.222225E-02 7.50610E-02
 1.02906E-02 6.32139E-02 4.52556E-03 2.77999E-02

COLUMN NO. = 11

8.59358E-04 5.27692E-03 1.644140E-03 1.13115E-02 2.69292E-03 1.65423E-02 3.34836E-03 2.05665E-02
 3.12306E-03 1.91644E-02 1.00295E 00 1.61061E-02 2.84279E-03 1.74628E-02 2.60040E-03 1.59739E-02
 2.16943E-03 1.34493E-02 4.62856E-04 5.91468E-03

COLUMN NO. = 12

1.94165E-03 1.19275E-02 4.13254E-03 2.53660E-02 6.70754E-03 4.12055E-02 1.00531E-02 6.17546E-02
 1.45761E-02 8.95513E-04 1.95576E-02 1.12014E 00 2.20855E-02 1.35656E-01 2.02025E-02 1.24101E-01
 1.70095E-02 1.04487E-01 7.48034E-03 4.59567E-02

COLUMN NO. = 13

1.18465E-03 7.27655E-03 4.59455E-03 1.54574E-02 4.05349E-03 2.49000E-02 5.70454E-03 3.50422E-02
 7.23893E-03 4.44677E-02 6.67276E-03 4.05896E-02 1.00600E 00 5.72265E-02 5.54330E-03 3.40517E-02
 4.66732E-03 2.86707E-02 2.05254E-03 1.26064E-02

COLUMN NO. = 14

2.14194E-03 1.31577E-02 4.62070E-03 2.83843E-02 7.60370E-03 4.67084E-02 1.16336E-02 7.14638E-02
 1.73662E-02 1.06690E-01 2.43163E-02 1.49371E-01 3.30662E-02 1.20324E 00 3.40598E-02 2.09224E-01
 2.86766E-02 1.76156E-01 1.26112E-02 7.74688E-02

COLUMN NO. = 15

1.51034E-03 9.27783E-03 3.34770E-03 2.09644E-02 5.41406E-03 3.32560E-02 8.06075E-03 4.95161E-02

TABLE 37. D MATRIX (CONCL)

1.13541E-02 0.97464E-02 1.37395E-02 1.39081E-02 6.54357E-02 1.01064E 00 6.53865E-02
 6.96201E-03 5.50524E-04 3.54135E-03 8.43999E-02 2.42111E-02

COLUMN NO. = 16

2.34223E-03 1.43880E-02 5.10680E-03 3.13626E-02 8.9985E-03 5.22134E-02 1.32142E-02 6.11731E-02
 2.01562E-02 1.23829E-01 2.90745E-02 1.78603E-01 4.10043E-02 2.51684E-01 4.63237E-02 1.29685E 00
 4.63186E-02 2.84530E-01 2.03694E-02 1.25129E-01

COLUMN NO. = 17

1.83583E-03 1.12773E-02 4.10065E-03 2.51909E-02 6.77465E-03 4.16157E-02 1.04169E-02 6.39657E-02
 1.54691E-02 9.50248E-02 2.08062E-02 1.27609E-01 2.59045E-02 1.59128E-01 2.23062E-02 1.57024E-01
 1.01716E 00 1.05519E-01 7.55417E-03 4.64042E-02

COLUMN NO. = 18

2.54252E-03 1.56184E-02 5.59689E-03 3.43609E-02 9.39599E-03 5.77183E-02 1.47948E-02 9.08822E-02
 2.29482E-02 1.40967E-01 3.36336E-02 2.07635E-01 4.89226E-02 3.00525E-01 5.99977E-02 3.66557E-01
 6.65321E-02 1.40670E 00 3.05979E-02 1.67956E-01

COLUMN NO. = 19

2.16133E-03 1.52767E-02 4.65399E-03 2.96174E-02 8.13521E-03 4.99134E-02 1.27731E-02 7.64634E-02
 1.95842E-02 1.20303E-01 2.76728E-02 1.71216E-01 3.75007E-02 2.32619E-01 4.06562E-02 2.49757E-01
 3.91696E-02 2.40613E-01 1.01578E 00 9.69267E-02

COLUMN NO. = 20

2.74262E-03 1.66467E-02 6.06499E-03 5.73752E-02 1.02922E-02 6.32232E-02 1.63754E-02 1.00552E-01
 2.57382E-02 1.56106E-01 3.85922E-02 2.37067E-01 5.68409E-02 3.49165E-01 7.16723E-02 4.40273E-01
 8.22853E-02 5.05467E-01 4.26829E-02 1.26342E 00

Section IV

PROGRAM USAGE

GENERAL

The flexible airloads stand-alone program, BFCNTL, is designed to perform functions similar to the airloads module, BLCNTL, of SWEEP; that is, the program computes airloads on the airplane components for selected flight conditions. Punched card input variable data are generated by SWEEP. Operation of the program requires the user to prepare a program control factors card and to set up the program decks. Punched card output data are in a format that is compatible for use as an optional input to the SWEEP program.

PROGRAM DECK SETUP

The program deck setup is illustrated in Figures 6 and 7. The total deck setup must follow the blocked order shown. Twelve subordinate subroutines may be arranged in any order, but the total subroutine block must be immediately behind the main program deck. When only one case is to be run, the execute card must follow the last card of the DP data set.

When multiple cases are to be run, subsequent-case data must be arranged as shown in Figure 7 and placed immediately behind the first case. The execute card must then follow the last-case DP data termination card.

DATA INPUT DESCRIPTION

An ND control factors card must be provided for each case data block of a multiple-case computer run. It must be the first card of each case data block. The format of this card is discussed on page , and illustrated in Table 1.

Data set BC follows the ND card. Data set BF follows data set BC. After data sets BC and BF are read into core, subroutine RERDAT merges the data and forms a new BC data set. The initial BF data set is not disturbed. It is necessary, therefore, to repeat the entire input BC data set for each subsequent-case data block of a multiple-case computer run. Data sets DT, DB, DF, and DP follow data set BF in the order indicated in Figure 7.

All of the variables in data sets BC through DP are in the form to be read by subroutine DECRD. This subroutine and data card format are described in Section III. Data set BF for subsequent-case data blocks of a multiple-case computer run needs to contain only appropriate change variables with a DECRD termination punch in Column 1 of the last card in the data set, or a DECRD termination card if there are to be no changes. Data sets DT, DB, DF, and DP for subsequent-case data blocks require only the DECRD termination card for each set, since these data sets are read into core for the first case and remain undisturbed.

PROGRAM CONTROL FACTORS AND OPTIONS

The control of the program to obtain the user's desired options is accomplished by the input data contained on the ND control factors card. This card is prepared by the program user and must be prepared with a great deal of care to obtain desired output data.

A complete description of the data, locations by card column, and the options available are shown in Table 1. All of the variables in the list are in integer form and are entered in two-column fields. Single-character variables are entered in the second column of the field.

Factor ND(13) identifies the air vehicle class. Factors ND(14) and ND(15) identify the wing type (fixed or variable sweep) and the vertical tail type (single, dual, or T-tail).

Factors ND(23) through ND(27) instruct the program to compute loads on selected airframe components or on all airframe components.

Factors ND(28) through ND(36) provide for the selection of the types of conditions to be computed. Figure 1 and Table 2 show the types of conditions that may be selected for each of the 11 case numbers available for entry in ND(46). Any condition type not specifically defined by the chosen case number, ND(46), will not be computed, even if the type factors ND(28) through ND(36) are entered as "yes."

Factor ND(40) is used to select or reject the punched card output. Since the primary purpose of the program is to obtain the punched output for use as an optional input to the SWEEP program, it would be expected that the user would always put a "yes" in ND(40). The factor ND(41) provides for a print-out listing of the data contained in the punched card output.

Factors ND(44) and ND(45) provide for the optional printout of FLXSIC and WFLEX matrices.

Factor ND(42) defines the number of stations and EI and GJ values that are used by subroutines FLXSIC and WFLEX to describe wing stiffness distribution. The ND(42) entry should always be 20.

Factor ND(43) defines the number of chordwise loads strips along the exposed wing which are used in the calculation of the aeroelastic loadings. The ND(43) entry should always be 10.

Card columns 7 through 20 and 49 through 54 should be left blank.

BC DATA SET USAGE

A complete description of input BC data set is presented in Table 3. All of the variables in the list of inputs are in the form to be read by subroutine DECRD. Expanded explanations for those variables which might be subject to misinterpretation are in the following paragraphs.

The following data locations need be entered only if a variable sweep wing in the forward position is to be analyzed. Applicable case numbers for this configuration are 8, 9, 10, 11, as indicated in Table 2.

BC(2)
BC(5)
BC(7)
BC(9)
BC(25) through BC(30)
BC(69) through BC(88)

If a fixed wing or a variable sweep wing in the aft position is to be analyzed, these input data locations may be eliminated or, preferably entered as zeros.

The following input data locations are not used for any input data and may be eliminated or, preferably entered as zeros.

BC(58) through BC(68)
BC(89) through BC(99)
BC(126) through BC(136)
BC(158) through BC(165)

A separate BC data set must be entered for each subsequent-case data block of a multiple-case computer run.

BF DATA SET USAGE

A complete description of input BF data set is presented in Table 4. All of the variables in the list of inputs are in the form to be read by subroutine DECRD. Expanded explanations for those variables which might be subject to misinterpretation are in the following paragraphs.

BF(2) and BF(25) through BF(46) data locations need be entered only if a variable sweep wing in the forward position is to be analyzed. The applicable case numbers for this configuration are 8, 9, 10, and 11, as indicated in Table 2.

If a fixed wing or a variable sweep wing in the aft position is to be analyzed, these input data locations are eliminated or, preferably entered as zeros.

Data locations BF(5) through BF(14) and/or BF(27) through BF(36) contain the dead weights of the 10 chordwise strips along the exposed wing span, starting with the most inboard strip and ending with the most outboard strip as shown in Figure 2. Data locations BF(15) through BF(24) and/or BF(37) through BF(46) contain the corresponding chordwise (X/C) center-of-gravity values.

Stations along the elastic axis entered in BF(47) through BF(66), and the EI and GJ data entered in BF(67) through BF(86) and BF(87) through BF(106), should contain values for the body side station, a station slightly outboard of the body side, and a station at or near the tip. Inclusion of these stations insures an accurate curve fit operation by subroutine CØDIM2. A maximum of 20 stations can be used.

SEMIPERMANENT DATA SETS

DT, DB, DF, and DP data sets contain all of the required aerodynamic data required to develop the lifting surface load distributions. These data are semipermanent (fixed data) and are the same as the data contained in the SWEEP program data bank. These data are described in Section III and in Tables 5 through 8. Data cards are in the format to be read by subroutine DECRD.

OUTPUT DATA DESCRIPTION

Primary output of the program is a deck of cards containing airplane component limit airloads, centers of pressure locations, and wing and empennage limit airload shears and moments at spanwise stations along the load reference line selected for weight analysis. The punched card output is

a format for direct use as an optional external airloads input to SWEEP. The printout of other data is also included for visual inspection of the results of final and intermediate calculations.

PUNCHED CARD OUTPUT

Output punched cards list the limit airload data in an E-format to be read by subroutine DECRD in SWEEP. A sample printout of the data contained on the punched cards is shown in Table 17. Each card contains a DECRD array index number, followed by five decimal data items and the card identification number. The output data array is described in Table 15. The index number punched on each card corresponds to the location within the array for the first item of decimal data on the card. A "yes" in ND control factor ND(40) will provide the punched output data deck.

Condition identification, the component loads identification, and the punched card identification numbers are assigned by the program and are included in the punched output deck for each condition. Component loads identification numbers also appear in the printed output. These identification numbers described and located under "Punched Card Output," in Section III.

PRINTED OUTPUT DATA

Refer to Section III for a detail description of the print options and the printed data output, including the data of primary interest, the intermediate-step and diagnostic data, and sample printouts.

Appendix A

PROGRAM FLOW CHARTS AND FORTRAN LISTINGS

FLOW CHART USAGE

The automatically generated computer program flow charts (AUTOFLOW) presented in this document include a table of contents, flow charts, and FORTRAN listings of all routines in the module. The 80-column card listings are sequenced and grouped by routine.

CROSS-REFERENCE LIST

The AUTOFLOW table of contents which precedes the flow charts and FORTRAN lists serves to cross reference the latter two. This table lists the following from left to right:

- The card identification from columns 73 through 80 of this card, or card sequence number. When sequence number is used in place of card identification, it is enclosed in parentheses.
- The page and box number where this card is displayed in a flow chart.
- The FORTRAN statement number from columns 1 through 5 of this card.
- The card identification(s) or sequence number(s) of the card(s) referring to this card (repeated as required).
- The pages and box numbers where the cards referring to this card are displayed in a flow chart (repeated as required).

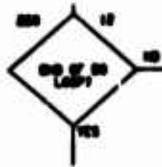
FLOW CHARTS

The flow charts produced by AUTOFLOW use USASI conventional symbols. Since the flow charts are mechanically drawn from the program source deck, there are no omissions or vague generalizations about the processing within the boxes.

Every box on each page is uniquely numbered and may be referred to from elsewhere in the program. The source of a reference to a box will be indicated by showing the page and box number. If the number is followed by an asterisk, there are multiple references to this point, and the others may be found by using the cross-reference list.



The most-often-used symbol is the decision box. Like all boxes, its box number is above and to the right of the box. Its FORTRAN statement number is above and to the left of the box. The decision choices for the paths are printed.



The unconditional transfer connector has its page number destination printed above or to the left of the box number destination within the connector. If there is a FORTRAN statement number at the destination, it is printed below the connector.



The exit box example shows a connector from page 9, box 15.



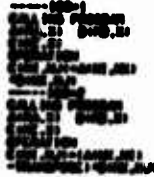
The subroutine call box includes the calling sequence. The page and box numbers of the flow chart of the called subroutine are shown on the left-hand side of the box. The page number is above the box number.



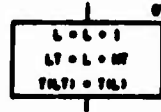
The note box encloses comments of a functional nature,



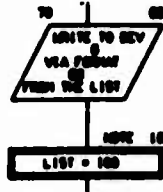
as differentiated from the 21 column comments, which are left justified without a box, that show the comment cards included in the FORTRAN deck.



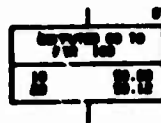
The process box is used to enclose FORTRAN arithmetic statements.



Input and output are shown as communicating with a device. The list used follows, if appropriate:



The computed GØ TØ becomes a branch table showing the page and box number of each of the ordered branches.



The column connectors and initial connectors are the only boxes without external box numbers. The function of the initial connector is always clear,

but the label given is the symbol in the next FORTRAN card, which is often blank.



The column connector identifies the page and box number to which it connects.



DIRECTORY OF FLOW CHARTS AND FORTRAN LISTINGS

Program or Subroutine	Page Number for:	
	Flow Charts	Listings
Table of Contents and References	173	
BFCNTL	183	248
RERDAT	195	251
DECRD	200	253
USPANF	202	253
ATMOS	219	261
FCDIM2	221	262
CODIM2	224	262
WFLEX	228	264
FLXSIC	231	265
GLSQ	235	267
MATRIT	237	267
BNLDSF	239	268
SPABMF	243	270

AUTOFLON CHART SET

FRONTL

05/01/73

FORTYTH NDBALE FLEXIBLE AIRLOADS SA PROGRAM

CHART TITLE - INTRODUCTORY COMMENTS

CHART TITLE - PROCEDURES

@CNT000	2.02	57										
@CNT000	2.02		@CNT020	2.03								
@CNT032	2.05	1										
@CNT032	2.05		@CNT032	2.06								
@CNT040	2.07	3										
@CNT077	3.03	5		@CNT000	11.02							
@CNT077	3.03		@CNT077	3.04								
@CNT085	3.07	7	@CNT085	3.08	@CNT085	3.08	@CNT085	3.08	@CNT085	3.08		
@CNT100	3.08	8										
@CNT105	3.09	9										
@CNT115	3.10	11	@CNT100	3.08	@CNT105	3.09						
@CNT120	3.11	12	@CNT100	3.08								
@CNT125	3.12	13	@CNT105	3.09								
@CNT110	3.14	10										
@CNT130	3.15	14	@CNT110	3.14								
@CNT140	3.16	15	@CNT110	3.14								
@CNT150	3.17	16	@CNT085	3.08	@CNT085	3.08	@CNT085	3.07	@CNT130	3.13		
@CNT110	3.14		@CNT110	3.14								
@CNT195	3.18	17										
@CNT100	3.19	18										
@CNT105	3.20	19										
@CNT206	3.21	27	@CNT150	3.17	@CNT105	3.20	@CNT170	3.27	@CNT185	3.29		
@CNT200	3.22	28										
@CNT210	3.23	29										
@CNT170	3.24	20	@CNT195	3.18	@CNT100	3.19						
@CNT175	3.25	21	@CNT195	3.18								
@CNT175	3.25	22	@CNT100	3.19								
@CNT180	3.26	23	@CNT105	3.20								
@CNT183	3.26	24	@CNT105	3.20								
@CNT190	4.01	25	@CNT085	3.08								
@CNT180	4.02	26	@CNT085	3.08								
@CNT216	4.03	30	@CNT200	3.22								
@CNT220	4.04	31	@CNT206	3.21	@CNT213	3.23						
@CNT223	4.05	32										
@CNT225	4.06	33										
@CNT230	4.07	36	@CNT220	4.04	@CNT220	4.06						
@CNT240	4.08	36										
@CNT230	4.09	34	@CNT223	4.05								
@CNT240	4.10	37	@CNT130	3.13	@CNT170	3.27						
@CNT250	4.11	38										
@CNT253	4.12	39										
@CNT256	4.13	40	@CNT250	4.11								
@CNT250	4.14	41	@CNT250	4.11								
@CNT260	4.15	42	@CNT253	4.12								
@CNT260	4.16	43	@CNT240	4.10								
@CNT260	4.17	44										
@CNT270	4.18	45										
@CNT273	5.01	46	@CNT260	4.17								
@CNT270	5.02	47	@CNT260	4.17								
@CNT270	5.03	48	@CNT270	4.18								
@CNT285	5.04	50	@CNT183	4.01	@CNT200	4.02	@CNT230	4.07	@CNT241	4.08	@CNT233	4.09
			@CNT253	4.12	@CNT260	4.16	@CNT270	4.18				
@CNT310	5.06		@CNT170	11.02								
@CNT312	5.07	60										
@CNT314	5.08	2										
@CNT314	5.08		@CNT314	5.09								
@CNT320	5.10	61	@CNT316	5.10								
@CNT330	5.14	62										
@CNT334	5.15	63	@CNT320	5.13								
@CNT342	6.01	64	@CNT316	5.10								
@CNT350	6.02	65	@CNT332	5.14	@CNT330	5.15						
@CNT364	6.04	66										
@CNT360	6.05	67	@CNT362	6.03								
@CNT374	6.06	68	@CNT316	5.10	@CNT316	5.10	@CNT316	5.10	@CNT316	5.10	@CNT364	7.01
@CNT370	6.07	69	@CNT316	5.10	@CNT316	5.10	@CNT316	5.10	@CNT316	5.10	@CNT366	7.02

05/04/73		TABLE OF CONTENTS AND REFERENCES		AUTOFLM CHART SET - BFCNTL						PAGE 2
CARD 10	PAGE/BOOK	NAME	REFERENCES (SOURCE SEQUENCE NO. AND PAGE/BOOK)							
BFCNT302	6.00	70	BFCNT316 5.10	BFCNT316 5.10	BFCNT316 5.10	BFCNT316 5.10	BFCNT316 5.10	BFCNT308 7.03		
BFCNT306	6.00	71	BFCNT316 5.10	BFCNT316 5.10	BFCNT400 7.06					
BFCNT308	6.10	72	BFCNT316 5.10	BFCNT316 5.10	BFCNT410 7.00					
BFCNT304	7.01	73	BFCNT316 5.10	BFCNT316 5.10	BFCNT316 5.10					
BFCNT305	7.02	74								
BFCNT300	7.03	75	BFCNT304 7.01							
BFCNT402	7.04	76	BFCNT305 7.02	BFCNT300 7.03						
BFCNT400	7.05	77	BFCNT316 5.10	BFCNT316 5.10						
BFCNT410	7.06	78								
BFCNT414	7.07	79	BFCNT410 7.06							
BFCNT420	7.08	80	BFCNT370 6.06	BFCNT300 6.07	BFCNT304 6.08	BFCNT300 6.09	BFCNT302 6.10			
BFCNT424	7.09	81	BFCNT420 7.08							
BFCNT428	7.10	82	BFCNT420 7.08							
BFCNT432	7.11	83	BFCNT420 7.08							
BFCNT436	7.12	84	BFCNT420 7.08							
BFCNT440	7.13	85	BFCNT420 7.08							
BFCNT444	8.01	86	BFCNT420 7.08							
BFCNT448	8.02	87	BFCNT420 7.08							
BFCNT452	8.03	88	BFCNT420 7.08							
BFCNT456	8.04	89	BFCNT420 7.08							
BFCNT460	8.05	90	BFCNT400 7.04 BFCNT420 7.12	BFCNT410 7.07 BFCNT442 7.13	BFCNT420 7.08 BFCNT448 6.01	BFCNT420 7.10 BFCNT456 6.02	BFCNT434 7.11 BFCNT454 6.03			
BFCNT464	8.07	91								
BFCNT468	8.08	92	BFCNT400 6.10							
BFCNT472	8.09	93	BFCNT404 6.06							
BFCNT476	8.10	94								
BFCNT480	8.11	95	BFCNT476 6.09							
BFCNT484	8.12	96	BFCNT474 6.08							
BFCNT488	8.14	97								
BFCNT492	8.15	98								
BFCNT496	8.17	99	BFCNT493 6.13	BFCNT496 6.16	BFCNT496 6.16					
BFCNT502	8.18	100	BFCNT494 6.14	BFCNT496 6.16	BFCNT496 6.16					
BFCNT506	8.19	100	BFCNT493 6.13 BFCNT496 6.14 BFCNT496 6.16	BFCNT494 6.14 BFCNT500 6.17	BFCNT496 6.16	BFCNT496 6.16	BFCNT496 6.16	BFCNT496 6.16		
BFCNT510	8.20	101	BFCNT506 6.19	BFCNT506 6.19	BFCNT506 6.19	BFCNT506 6.19	BFCNT506 6.19	BFCNT506 6.19		
BFCNT512	8.21	102								
BFCNT516	8.21	103	BFCNT510 6.20							
BFCNT520	8.22	105	BFCNT506 6.19	BFCNT506 6.19	BFCNT506 6.19	BFCNT506 6.19	BFCNT506 6.19	BFCNT506 6.19		
BFCNT524	8.23	107	BFCNT506 6.19 BFCNT506 6.19	BFCNT506 6.19 BFCNT506 6.19	BFCNT506 6.19 BFCNT506 6.19	BFCNT506 6.19 BFCNT506 6.19	BFCNT506 6.19 BFCNT506 6.19	BFCNT506 6.19 BFCNT506 6.19		
BFCNT528	8.24	109	BFCNT506 6.19	BFCNT506 6.19	BFCNT506 6.19					
BFCNT532	8.25	110								
BFCNT536	8.26	111	BFCNT532 6.24							
BFCNT540	8.27	112	BFCNT320 6.04 BFCNT340 6.10 BFCNT330 6.05	BFCNT370 6.05 BFCNT514 6.21	BFCNT420 7.08 BFCNT518 6.01	BFCNT420 7.08 BFCNT522 6.02	BFCNT506 6.19 BFCNT520 6.03			
BFCNT560	8.29	120	BFCNT504 6.08							
BFCNT570	10.01	117	BFCNT504 6.08							
BFCNT572	10.02	120	BFCNT506 6.09							
BFCNT582	10.06		BFCNT504 10.08							
BFCNT584	10.07	98								
BFCNT588	10.10	110	BFCNT506 6.09	BFCNT570 10.04						
BFCNT590	10.13	119	BFCNT590 10.11 BFCNT590 10.11 BFCNT590 10.11	BFCNT590 10.11 BFCNT590 10.11 BFCNT590 10.11	BFCNT590 10.11 BFCNT590 10.11 BFCNT590 10.11	BFCNT590 10.11 BFCNT590 10.11 BFCNT590 10.11	BFCNT590 10.11 BFCNT590 10.11 BFCNT590 10.11	BFCNT590 10.11 BFCNT590 10.11 BFCNT590 10.11		
BFCNT600	10.14	121	BFCNT590 10.11	BFCNT590 10.11						
BFCNT604	10.15	122	BFCNT590 10.11	BFCNT590 10.11						
BFCNT608	10.16	123	BFCNT590 10.11							
BFCNT612	10.17	124	BFCNT590 10.11	BFCNT590 10.11	BFCNT590 10.11					
BFCNT616	11.01	125	BFCNT590 10.11	BFCNT590 10.11	BFCNT590 10.11					
BFCNT610	11.02	126	BFCNT590 10.13	BFCNT602 10.14	BFCNT606 10.15	BFCNT610 10.16	BFCNT614 10.17			
BFCNT630	11.05	48								
BFCNT645	11.07		BFCNT660 11.11							
BFCNT660	11.10	91								
BFCNT685	11.12	96	BFCNT625 11.04							
BFCNT670	11.13	92								
BFCNT685	11.16		BFCNT700 11.20							
BFCNT700	11.19	95								
BFCNT710	11.22	127	BFCNT310 5.06	BFCNT605 11.12						

CHART TITLE - NON-PROCEDURAL STATEMENTS

CHART TITLE - SUBROUTINE RERDAT

RERDA005 13.01 RERDAT BFCNT045 2.10-K USPP1200 26.21-K

REDA030	13.02	1	
REDA040	13.11	2	
REDA040	13.11		REDA040 13.14
REDA050	13.12	26	REDA027 13.01
REDA060	13.13	27	
REDA090	13.16	3	
REDA090	13.16		REDA090 13.17
REDA093	13.19		REDA090 13.21
REDA095	13.20	4	
REDA090	13.24	5	
REDA090	13.24		REDA090 13.25
REDA095	14.02	6	
REDA095	14.02		REDA095 14.03
REDA110	14.06	7	
REDA110	14.06		REDA110 14.07
REDA120	14.09	8	
REDA120	14.09		REDA120 14.10
REDA130	14.12	9	
REDA135	14.13	10	
REDA135	14.13		REDA135 14.14
REDA145	14.15	11	REDA125 14.11
REDA150	14.16	12	
REDA150	14.16		REDA150 14.17
REDA160	14.20	13	
REDA165	14.20		REDA165 14.21
REDA175	14.23	14	
REDA175	14.23		REDA175 14.24
REDA205	14.27	15	REDA140 14.14
REDA210	15.01	16	
REDA210	15.01		REDA210 15.02
REDA214	15.04		REDA216 15.06
REDA216	15.05	17	
REDA235	15.09	18	
REDA235	15.09		REDA235 15.10
REDA270	15.14	19	
REDA270	15.14		REDA270 15.15
REDA270	15.17		REDA290 15.19
REDA290	15.19	20	
REDA290	15.21	21	
REDA295	15.22	22	
REDA295	15.22		REDA295 15.23
REDA305	15.24	23	REDA295 15.20
REDA330	15.28	24	REDA300 15.23
REDA340	15.29	25	
REDA340	15.29		REDA340 15.29
REDA375	16.01	26	REDA395 13.12
REDA395	16.02	29	REDA370 13.13
REDA420	16.05		REDA425 16.07
REDA425	16.06	30	
REDA440	16.10	31	
REDA440	16.10		REDA440 16.11
REDA450	16.13		REDA495 16.15
REDA495	16.14	32	

CHART TITLE - NON-PROCEDURAL STATEMENTS

CHART TITLE - SUBROUTINE DECRO(V)

(000374)	16.01	5	(000392)	16.12	(000383)	16.15								
(000374)	16.01	DECRO	BFCNT050	2.11-X	BFCNT055	2.12-X	LFCHT060	2.13-X	BFCNT065	3.01-X	REDA030	13.02-X		
			REDA032	13.03-X										
(000377)	16.04	21												
(000379)	16.05	22	(000376)	16.03										
(000385)	16.06	7	(000378)	16.05										
(000386)	16.07		(000391)	16.11										
(000388)	16.09	11												
(000389)	16.10	3	(000387)	16.09										
(000391)	16.11	2	(000388)	16.09										
(000393)	16.13	6												
(000381)	16.14	8	(010379)	16.05										

CHART TITLE - NON-PROCEDURAL STATEMENTS

CHART TITLE - SUBROUTINE USPAW

USPF0000	20.01	USPAW	BFCNT070	10.03-K				
USPF0005	20.02	1						
USPF0005	20.02		USPF0005	20.03				
USPF0070	20.06	2						
USPF0075	20.07	3						
USPF0105	20.08	6	USPF0005	20.05				
USPF0110	20.09	7						
USPF0005	20.10	4	USPF0070	20.06				
USPF0005	20.11	5	USPF0000	20.07				
USPF0120	20.12	8	USPF0105	20.04				
USPF0125	20.13	9	USPF0110	20.09	USPF0100	20.11	USPF0005	20.10
USPF0130	20.14	10	USPF0125	20.13			USPF2375	22.31
USPF0100	21.01	11	USPF0150	20.15				USPF2305
USPF0100	21.02	12						
USPF0105	21.02		USPF0105	21.03				
USPF0105	21.06	13						
USPF0105	21.06		USPF0105	21.07				
USPF0200	21.08	14	USPF0150	20.15				
USPF0205	21.09	15						
USPF0205	21.09		USPF0205	21.10				
USPF0225	21.13	16						
USPF0225	21.13		USPF0205	21.14				
USPF0230	21.15	17	USPF0150	21.07				
USPF0260	21.16	18	USPF0125	20.13				
USPF0275	21.18	19	USPF0205	21.17				
USPF0300	21.20	20						
USPF0300	21.20		USPF0300	21.21				
USPF0325	21.24	21						
USPF0325	21.24		USPF0325	21.25				
USPF0345	22.01	22	USPF0205	21.17				
USPF0370	22.03	23						
USPF0370	22.03		USPF0370	22.04				
USPF0305	22.07	24						
USPF0305	22.07		USPF0305	22.08				
USPF0410	22.10	25	USPF0250	21.15	USPF0370	21.26		
USPF0420	22.11	26	USPF0410	22.10				
USPF0450	22.14		USPF0400	22.16				
USPF0400	22.15	27						
USPF0500	22.22	30	USPF0400	22.21				
USPF0520	22.24	32	USPF0400	22.21				
USPF0540	22.26	34	USPF0400	22.21				
USPF0560	22.28	36	USPF0535	22.25				
USPF0570	22.29	37	USPF0515	22.23				
USPF0580	22.31		USPF0590	22.33				
USPF0590	22.32	38						
USPF0600	23.01	44	USPF0605	23.12				
USPF0605	23.02	39	USPF0410	22.10				
USPF0630	23.05		USPF0640	23.07				
USPF0640	23.06	40						
USPF0690	23.13	45	USPF0605	23.12				
USPF0695	23.14	46	USPF0595	22.33	USPF0605	23.01	USPF0675	23.21
USPF0720	23.17	48	USPF0745	23.20				
USPF0670	23.21	43						
USPF0755	24.01	50	USPF0745	23.20				
USPF0760	24.02		USPF0765	24.04				
USPF0705	24.03	51						
USPF0700	24.07	52						
USPF0700	24.09	53						
USPF0700	24.09		USPF0700	24.10				
USPF0805	24.12	54	USPF0775	24.06				
USPF0825	24.13	55	USPF0800	24.11				
USPF0855	24.18	58	USPF0845	24.17				
USPF0800	24.20	59						
USPF0800	24.20		USPF0800	24.21				
USPF0900	24.24	60						
USPF0900	24.24		USPF0900	24.25				
USPF0920	24.28		USPF0925	24.30				
USPF0925	24.29	61						
USPF0950	24.33	62						

CARD ID	PAGE/BOX	NAME	REFERENCES (SOURCE SEQUENCE NO. AND PAGE/BOX)
USPF0950	24.33		USPF0950 24.34
USPF0985	25.01 03		USPF0985 24.35
USPF0970	25.02 04		USPF0970 24.36
USPF0987	25.04		USPF0985 25.06
USPF0995	25.05 05		
USPF1025	25.10		USPF1095 25.16
USPF1095	25.14 08		
USPF1080	25.19		USPF1085 25.21
USPF1085	25.20 78		
USPF1095	25.23 71		
USPF1095	25.23		USPF1095 25.24
USPF1113	25.27		USPF1120 25.29
USPF1120	25.28 78		
USPF1135	25.31 73		
USPF1145	26.01 74		USPF1130 25.30
USPF1146	26.02 75		USPF1140 25.31
USPF1148	26.04		USPF1140 26.06
USPF1149	26.05 106		
USPF1195	26.08		USPF1170 26.10
USPF1170	26.09 76		
USPF1180	26.14 108		
USPF1182	26.15 110		USPF1180 26.13
USPF1184	26.16		USPF1186 26.17
USPF1186	26.17 112		
USPF1202	26.19 102		USPF1180 26.14 USPF1184 26.16
USPF1204	26.20 103		USPF1200 26.18
USPF1235	26.25		USPF1250 26.28
USPF1250	26.27 77		
USPF1285	26.31 78		USPF1080 26.09
USPF1290	26.32 78		USPF1285 26.31
USPF1303	26.34		USPF1305 26.36
USPF1305	26.35 80		
USPF1315	27.01 81		USPF1285 26.31
USPF1327	27.03		USPF1330 27.05
USPF1330	27.04 82		
USPF1340	27.06 83		USPF1285 26.31
USPF1343	27.07		USPF1345 27.09
USPF1345	27.08 84		
USPF1355	27.10 85		USPF1285 26.31
USPF1357	27.11		USPF1360 27.13
USPF1360	27.12 86		
USPF1365	27.14 87		USPF1350 27.09
USPF1380	27.15 88		USPF1310 26.36 USPF1330 27.05
USPF1387	27.18		USPF1420 27.21
USPF1420	27.20 89		
USPF1495	27.25		USPF1485 27.28
USPF1480	27.26 90		
USPF1475	27.27 91		USPF1495 27.25
USPF1485	27.28 92		USPF1470 27.26
USPF1505	27.31 94		USPF1500 27.30
USPF1520	28.01 96		USPF1500 27.30
USPF1535	28.02 98		USPF1500 27.30
USPF1550	28.03 100		USPF1500 27.30
USPF1560	28.04 102		USPF1515 27.31 USPF1530 28.01 USPF1545 28.02
USPF1600	28.10 105		USPF1595 28.09
USPF1625	28.11 107		USPF1595 28.09
USPF1650	28.12 109		USPF1595 28.09
USPF1670	28.13 111		USPF1595 28.09
USPF1685	28.14 113		USPF1620 28.10 USPF1645 28.11 USPF1685 28.12
USPF1695	28.16 114		
USPF1695	28.16		USPF1695 28.17
USPF1730	28.21		USPF1750 28.24
USPF1750	28.23 115		
USPF1760	28.26 116		
USPF1770	28.01 117		USPF1795 28.26
USPF1780	28.02 118		USPF1785 28.26
USPF1865	29.10 119		
USPF1875	29.11 120		USPF0845 24.17
USPF1880	29.12		USPF1920 30.04
USPF1890	29.13 121		USPF1890 29.12
USPF1905	30.01 122		USPF1880 29.12
USPF1910	30.02 123		USPF1895 29.13

CARD NO	PAGE/BOX	NAME	REFERENCES (SOURCE SEQUENCE NO. AND PAGE/BOX)
USPF1030	30.03	124	
USPF1040	30.07	126	
USPF1050	30.08	127	USPF1035 30.06
USPF1055	30.09	128	USPF1045 30.07
USPF1075	30.13	129	
USPF107C	30.13		USPF1075 30.14
USPF1080	31.01	130	USPF1080 30.15
USPF1085	31.02	131	
USPF2005	31.03	132	USPF1080 31.01
USPF2015	31.04	133	USPF1080 30.15 USPF2000 31.02
USPF2050	31.08	134	
USPF2060	31.09	135	USPF2045 31.07
USPF2070	31.10	136	USPF2055 31.08
USPF2080	31.12		USPF2120 32.02
USPF2095	31.14	137	USPF2005 31.13
USPF2110	32.01	138	USPF2005 31.13
USPF2120	32.02	139	USPF2100 31.14
USPF2135	32.07		USPF2215 32.14
USPF2160	32.08	142	
USPF2170	32.09	143	USPF2155 32.07
USPF2180	32.10	144	USPF2105 32.08
USPF2215	32.13	145	
USPF2235	32.16	146	
USPF2250	32.17	147	USPF2230 32.15
USPF2265	32.18	148	USPF2245 32.16
USPF2315	32.23	149	
USPF2335	32.26	150	USPF2318 32.22
USPF2355	32.28	151	USPF2330 32.25
USPF2360	32.29	152	
USPF2385	32.30	153	USPF2330 32.25 USPF2355 32.28
USPF2370	32.31	154	
USPF2541	33.01	169	USPF2400 33.12 USPF2535 34.14
USPF2555	33.04		USPF2560 33.07
USPF2560	33.05	170	
USPF2380	33.09	155	USPF2385 32.30
USPF2390	33.10	156	USPF2350 32.27 USPF2380 32.29
USPF2395	33.11	157	
USPF2400	33.12	158	USPF2535 34.14
USPF2405	33.13	159	USPF2505 33.08
USPF2415	33.14	160	USPF1085 29.18 USPF2380 33.10 USPF2395 33.11
USPF2420	33.15		USPF2525 34.12
USPF2425	33.16	161	USPF2420 33.15
USPF2445	33.18	162	USPF2420 33.15
USPF2485	33.22	163	USPF2420 33.15
USPF2485	34.01	164	USPF2420 33.15
USPF2500	34.04	165	USPF2440 33.18 USPF2460 33.21 USPF2400 33.24
USPF2515	34.08		USPF2520 34.11
USPF2520	34.09	166	
USPF2525	34.12	167	
USPF2535	34.14	168	
USPF2575	34.15	171	USPF2505 33.08 USPF2405 33.12
USPF2585	34.18		USPF2500 34.21
USPF2590	34.19	172	
USPF2610	34.22	181	USPF2405 33.13 USPF2530 34.13

CHART TITLE - NON-PROCEDURAL STATEMENTS

CHART TITLE - SUBROUTINE ATHDS(H,BCH,PH,AM)

ATHD0020	37.01	ATHDS	USPF1100	26.11-X
00000130	37.04	38		
00000170	37.05	40	00000120	37.03
00000180	37.06	45		
00000210	37.07	50	00000170	37.05
00000220	37.08	55		
00000260	37.09	60	00000210	37.07
00000270	37.10	65		
00000300	38.01	70	00000260	37.09
00000310	38.02	75		
00000350	38.03	80	00000300	38.01
00000380	38.04	100	00000160	37.04
00000450	38.06	110	00000200	37.06
			00000290	37.10
			00000370	38.02
			00000370	38.03

(001010) 30.00 120 00000440 30.00

CHART TITLE - FUNCTION FCODE(X,Y,K1,Y1,Z1,N1,N2,N3)

FC000095	30.02	100				
FC000100	30.03	110				
FC000115	30.04	120	FC000095	30.02		
FC000125	30.05	125	FC000135	30.07		
FC000130	30.06	130				
FC000140	30.08	150	FC000125	30.05		
FC000145	30.09	155				
FC000155	30.10	160	FC000140	30.08		
FC000160	30.11	165	FC000135	30.07		
FC000170	40.01	170	FC000155	30.10		
FC000175	40.02	200	FC000110	30.03	FC000150	30.09
FC000180	40.03		FC000195	40.05	FC000185	30.11
FC000185	40.04	300				

CHART TITLE - NON-PROCEDURAL STATEMENTS

CHART TITLE - FUNCTION CODE(X,Y,K1,Y1,N,N2)

C0010045	42.01	110	C0010030	42.04	C0010115	42.14
C0010050	42.02	140	C0010110	42.13		
C0010075	42.05	105	C0010085	42.06		
C0010065	42.06	150	C0010030	42.04		
C0010070	42.07	185				
C0010075	42.08		C0010080	42.09		
C0010080	42.09	170				
C0010090	42.10	175	C0010085	42.06		
C0010095	42.11		C0010100	42.12		
C0010100	42.12	180				
C0010105	42.13	185	C0010085	42.06	C0010145	43.02
C0010115	42.14	190	C0010075	42.08	C0010095	42.11
C0010120	42.15	210				
C0010135	43.01	220	C0010075	42.08	C0010095	42.11
C0010145	43.02	260	C0010115	42.14		
C0010150	43.03	285				
C0010165	43.04	290	C0010145	43.02		
C0010170	43.05	295	C0010130	42.15	C0010180	43.03
C0010175	43.06	290				
C0010180	43.07	295	C0010170	43.05		
C0010255	43.12	305				
C0010265	43.13	310	C0010250	43.11		
C0010300	43.15	315	C0010260	43.12		
C0010305	43.16	320	C0010300	43.15		
C0010330	44.01	330	C0010300	43.15		
C0010350	44.03	350	C0010300	43.15	C0010325	43.16
C0010365	44.05	400				
C0010375	44.06	410	C0010360	44.04		
C0010385	44.07	800	C0010060	42.02	C0010040	42.05
					C0010140	43.01
					C0010370	44.06

CHART TITLE - NON-PROCEDURAL STATEMENTS

CHART TITLE - SUBROUTINE MFLX(M,MCP,MMP,MMPF,F,YE10J,E1,GJ,CR,B02,BL05,A

MFLX010	46.01	MFLX	USPF1210	26.22-X
MFLX192	46.05	40	MFLX130	46.03
MFLX220	46.07		MFLX260	46.14
MFLX230	46.08		MFLX280	46.13
MFLX260	46.09	85		
MFLX282	46.10	160	MFLX050	46.01
MFLX340	46.17		MFLX390	46.22
MFLX350	46.18		MFLX380	46.20
MFLX380	46.19	70		
MFLX390	46.21	80		
MFLX400	46.24	90		
MFLX402	46.25		MFLX405	47.04
MFLX404	46.26		MFLX406	46.29
MFLX406	46.27	92		
MFLX406	46.27		MFLX406	46.29
MFLX420	46.31		MFLX430	46.34

CARD ID	PAGE/BOX	NAME	REFERENCES (SOURCE SEQUENCE NO. AND PAGE/BOX)
MFLN430	46.32	95	
MFLN430	46.32		MFLN430 46.33
MFLN495	47.01	100	
MFLN495	47.01		MFLN495 47.02
MFLN495	47.04	110	
MFLN430	47.12	112	MFLN470 47.06
MFLN440	47.13		MFLN421 47.23
MFLN490	47.14	114	
MFLN490	47.14		MFLN490 47.15
MFLN470	47.17		MFLN410 47.20
MFLN410	47.18	115	
MFLN421	47.22	117	

CHART TITLE - NON-PROCEDURAL STATEMENTS

CHART TITLE - SUBROUTINE FLNSIC(SICBAR,VEIGJ,ET,GJ,CR,BOR,BLBS,ANGLE,FBLERT,AND

FSIC0040	48.01	FLNSIC	MFLN150 48.04-X
FSIC0170	48.07	30	FSIC0125 48.01
FSIC0210	48.09		FSIC0200 48.13
FSIC0250	48.12	48	
FSIC0280	48.16		FSIC0305 48.19
FSIC0305	48.19	50	
FSIC0305	48.19		FSIC0302 48.17
FSIC0430	48.22	95	FSIC0307 48.20
FSIC0530	50.02	80	FSIC0425 48.21
FSIC0540	50.03		FSIC0720 50.21
FSIC0580	50.06		FSIC0600 50.08
FSIC0600	50.07	70	
FSIC0620	50.10		FSIC0720 50.20
FSIC0661	50.13		FSIC0680 50.18
FSIC0667	50.15	72	
FSIC0670	50.16	74	FSIC0680 50.14
FSIC0690	50.17	75	
FSIC0720	50.20	80	
FSIC0950	50.27	82	FSIC0755 50.23
FSIC0850	50.28		FSIC0870 50.31
FSIC0870	50.29	85	
FSIC0870	50.29		FSIC0870 50.30
FSIC0900	51.01		FSIC0950 51.03
FSIC0950	51.02	90	
FSIC1000	51.05		FSIC1030 51.11
FSIC1010	51.06		FSIC1030 51.10
FSIC1030	51.08	100	
FSIC1030	51.08		FSIC1030 51.09
FSIC1100	51.15	150	FSIC1085 51.12

CHART TITLE - NON-PROCEDURAL STATEMENTS

CHART TITLE - SUBROUTINE OLSO(A,X,IL,N,M,ALPHA,E1,E2)

OLS00020	93.01	OL50	MFLN480 47.03-X
OLS00035	93.03	60	
OLS00035	93.03		OLS00035 93.04
OLS00050	93.07		OLS00125 93.19
OLS00060	93.09		OLS00105 93.16
OLS00065	93.10	6	
OLS00095	93.12		OLS00095 93.14
OLS00095	93.13	5	
OLS00105	93.16	4	OLS00060 93.09
OLS00115	93.18	8	
OLS00125	93.19	3	OLS00110 93.17
OLS00145	93.22	35	
OLS00145	93.22		OLS00145 93.23
OLS00195	93.25		OLS00190 93.32
OLS00160	93.26	31	
OLS00180	93.28	32	
OLS00180	93.28		OLS00180 93.29
OLS00190	93.31	30	OLS00195 93.25
OLS00200	93.34	51	
OLS00210	93.35	50	OLS00195 93.33
OLS00220	93.36	52	OLS00205 93.34

CHART TITLE - NON-PROCEDURAL STATEMENTS

CHART TITLE - SUBROUTINE MATRIT (APP, NR, NC, NPMAX, NTYPE, IPRIN, HEAD)

PRIT0030	95.01	MATRIT	MFLC0475 47.00-X	MFLC0476 47.00-X	MFLC0480 47.11-X	MFLC0480 47.24-X	MFLC0480 47.25-X	MFLC0480 47.25-X
			MFLC0480 47.26-X	MFLC0480 47.27-X	MFLC0480 47.28-X	FSC00175 48.04-X	FSC00137 48.05-X	FSC00137 48.05-X
			FSC00130 48.06-X	FSC00130 48.02-X	FSC00450 48.23-X	FSC00460 48.24-X	FSC00460 48.25-X	FSC00460 48.25-X
			FSC00760 90.24-X	FSC00760 90.25-X	FSC00800 90.26-X	FSC00700 91.13-X	FSC00800 91.14-X	FSC00800 91.14-X
PRIT0230	95.03	50	PRIT0150	95.02				
PRIT0250	95.05	70						
PRIT0250	95.05		PRIT0250	95.07				
PRIT0270	95.08	80	PRIT0210	95.13				
PRIT0170	95.09	10	PRIT0150	95.02				
PRIT0100	95.10		PRIT0200	95.13				
PRIT0200	95.11	30						

CHART TITLE - NON-PROCEDURAL STATEMENTS

CHART TITLE - SUBROUTINE BNLOSF

BNLOF002	57.01	BNLOSF	BFCNT010	11.02-X				
BNLOF035	57.03	1						
BNLOF055	57.05	2						
BNLOF055	57.05		BNLOF055	57.06				
BNLOF085	57.07	3	BNLOF030	57.02				
BNLOF085	57.09	4						
BNLOF085	57.09		BNLOF085	57.10				
BNLOF095	57.11	5	BNLOF060	57.08				
BNLOF170	57.17	6						
BNLOF105	57.18	7	BNLOF105	57.18				
BNLOF200	57.19	8	BNLOF180	57.17				
BNLOF340	58.08	9	BNLOF330	58.07	BNLOF330	58.07		
BNLOF350	58.10	10						
BNLOF360	58.11	11	BNLOF345	58.09				
BNLOF370	58.12	12	BNLOF355	58.10				
BNLOF400	58.15	13						
BNLOF405	58.16	14						
BNLOF405	58.16		BNLOF405	58.17				
BNLOF407	58.18	15	BNLOF395	58.14				
BNLOF480	59.01	16	BNLOF330	58.07				
BNLOF500	59.03	17	BNLOF480	59.02				
BNLOF505	59.04	18	BNLOF490	59.02				
BNLOF530	59.06	19	BNLOF330	58.07				
BNLOF545	59.07	20	BNLOF330	58.07				
BNLOF565	59.09	21	BNLOF330	58.07	BNLOF520	59.05	BNLOF535	59.06
BNLOF570	59.10	22	BNLOF470	58.23				
BNLOF575	59.11	23						
BNLOF580	59.12	24	BNLOF570	59.10				
BNLOF900	59.28	25	BNLOF575	59.11				

CHART TITLE - NON-PROCEDURAL STATEMENTS

CHART TITLE - SUBROUTINE SPABF

SPABF002	61.01	SPABF	BFCNT020	11.03-X		
SPABF010	61.02	32				
SPABF010	61.02		SPABF010	61.03		
SPABF025	61.05	1				
SPABF033	61.06	2	SPABF020	61.04	SPABF025	61.05
SPABF050	61.08	3				
SPABF230	61.09	10	SPABF025	61.05	SPABF575	63.15
SPABF235	61.10	11				
SPABF065	61.11	4	SPABF045	61.07		
SPABF075	61.12	5	SPABF060	61.08		
SPABF095	61.14		SPABF105	61.16		
SPABF105	61.15	6				
SPABF315	61.18	14	SPABF235	61.10	SPABF575	63.15
SPABF320	61.19	15				
SPABF327	61.20	16	SPABF315	61.18	SPABF320	61.19
SPABF145	62.01	7	SPABF575	63.15		
SPABF175	62.02	8	SPABF575	63.15		
SPABF205	62.03	9	SPABF575	63.15		

02/24/75 TABLE OF CONTENTS AND REFERENCES

AUTOFLIGHT CHART SET - B/C/N/L
REFERENCES (SOURCE SEQUENCE NO. AND PAGE/BOX)

CARD ID	PAGE/BOX	NAME	REFERENCES (SOURCE SEQUENCE NO. AND PAGE/BOX)
SPAF245	02.04 12		SPAF230 01.00
SPAF250	02.07		SPAF230 02.00
SPAF255	02.08 13		
SPAF265	02.11 17		SPAF335 01.01
SPAF266	02.12 18		SPAF335 01.01
SPAF268	02.13 19		SPAF335 01.01
SPAF269	02.14 20		SPAF335 02.11
SPAF270	02.15 21		SPAF370 02.10
SPAF410	02.17		SPAF430 02.10
SPAF420	02.18 22		
SPAF430	02.22 23		SPAF440 02.21
SPAF435	03.01 24		SPAF430 02.02
SPAF470	03.02 25		SPAF440 02.21
SPAF485	03.04		SPAF515 03.07
SPAF495	03.05 26		SPAF495 03.04
SPAF505	03.06 27		SPAF495 03.04
SPAF515	03.07 28		SPAF495 03.05
SPAF525	03.08 29		SPAF175 01.17 SPAF440 02.21
SPAF530	03.11		SPAF570 03.14
SPAF570	03.13 30		
SPAF580	03.16 31		SPAF330 01.10
SPAF585	03.17 32		SPAF570 03.15
SPAF590	03.18 34		SPAF570 03.15
SPAF595	03.24 35		SPAF570 03.15
SPAF610	04.01 36		
SPAF615	04.02 37		SPAF605 03.24
SPAF630	04.03 38		SPAF610 04.01
SPAF635	04.03 39		
SPAF640	04.10 40		SPAF630 04.03
SPAF655	04.16 41		SPAF635 04.03

CHART TITLE - NON-PROCEDURAL STATEMENTS

CHART TITLE - INTRODUCTORY COMMENTS

BFCNTL IS THE STAND ALONE FLEXIBLE LOADS CONTROL PROGRAM.
DETERMINES BASIC AIRLOAD CONDITIONS TO BE COMPUTED FOR A SPECIFIED
SPEED-ALTITUDE CASE.
IT PROVIDES LOGIC AND CONTROL FOR THE AIRLOAD SUBROUTINES.

CHART TITLE - PROCEDURES



CHART TITLE - PROCEDURES

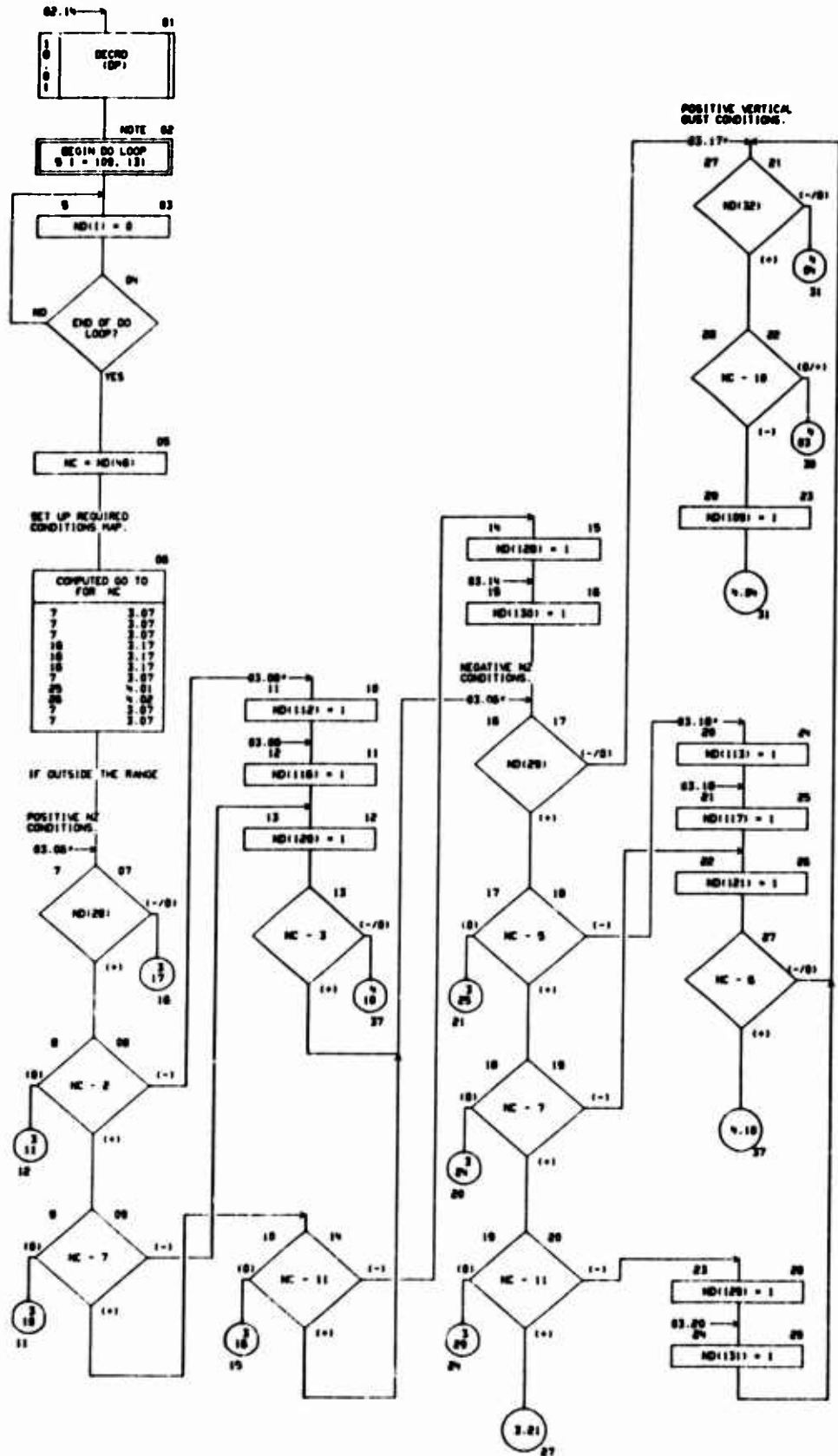


CHART TITLE - PROCEDURES

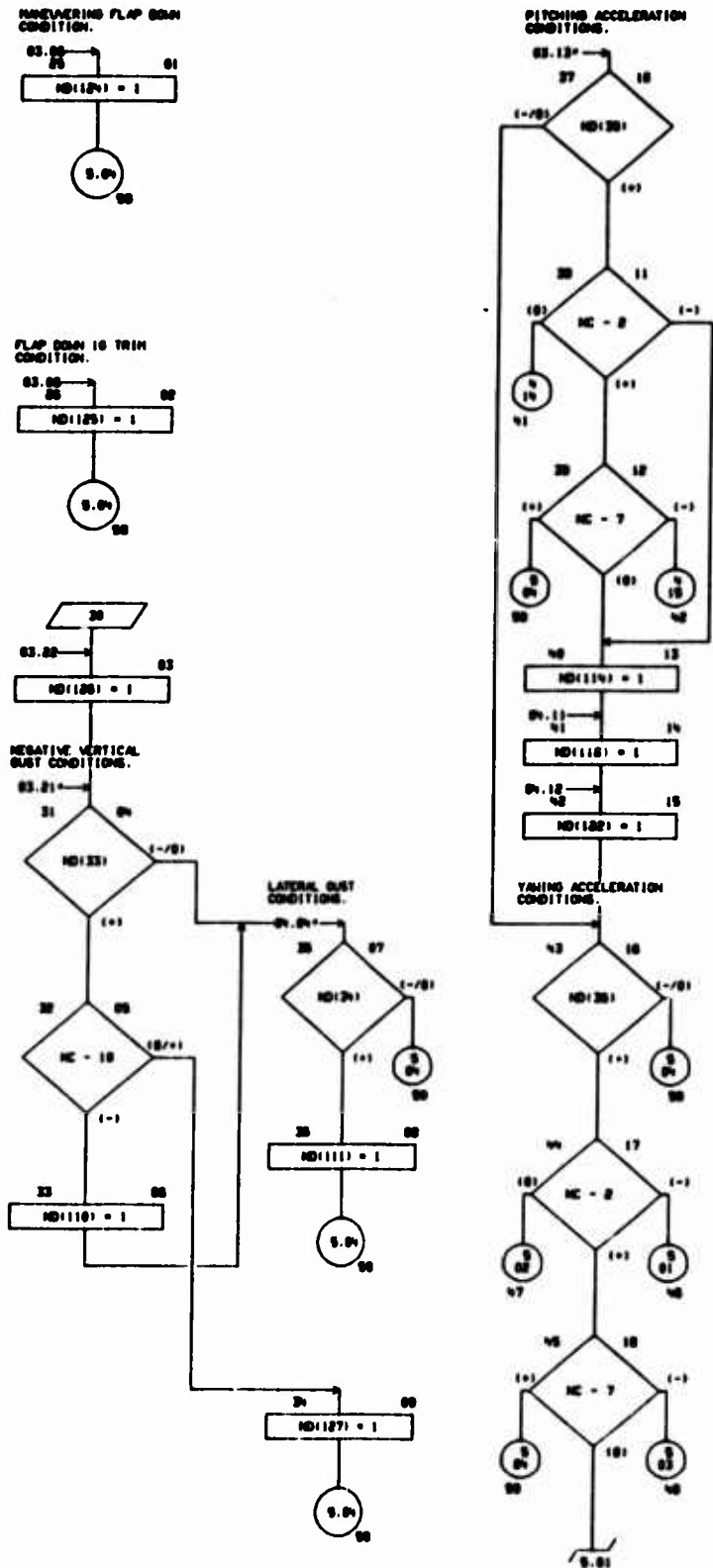


CHART TITLE - PROCEDURES

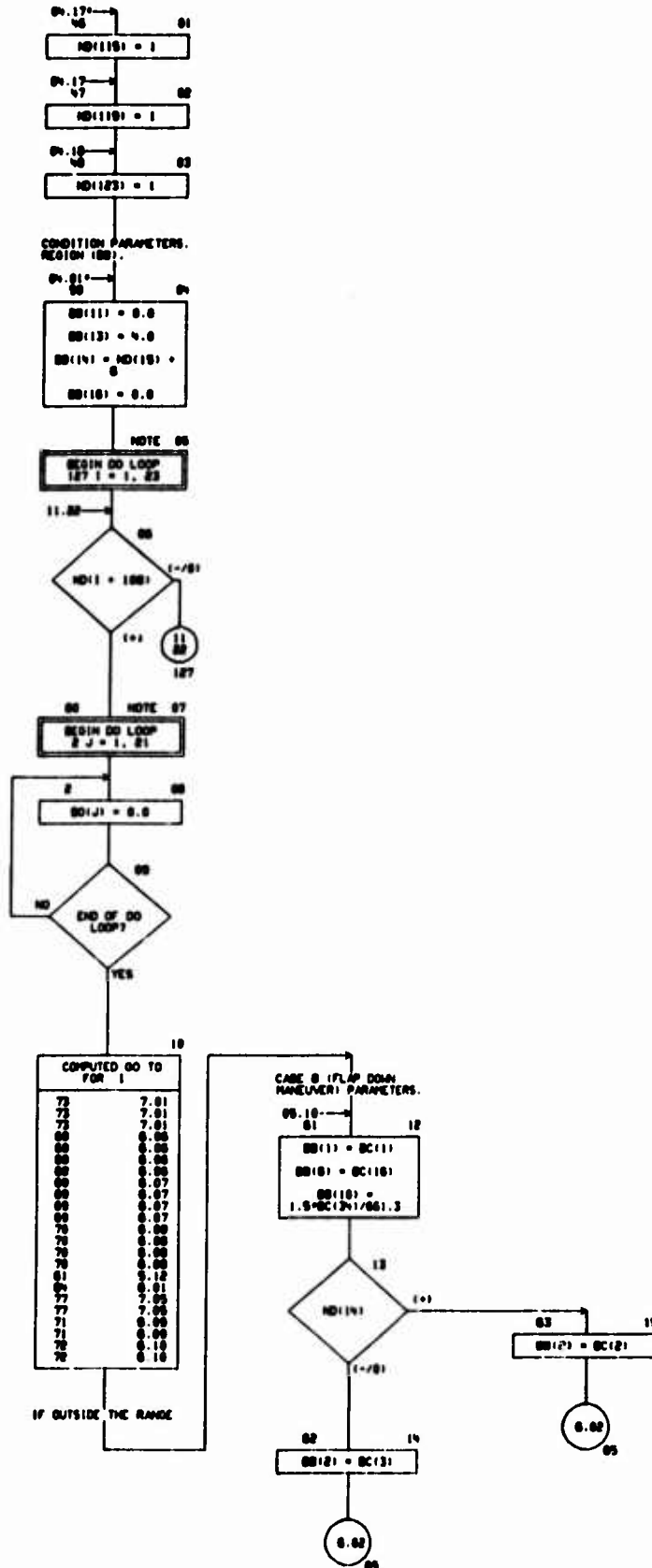
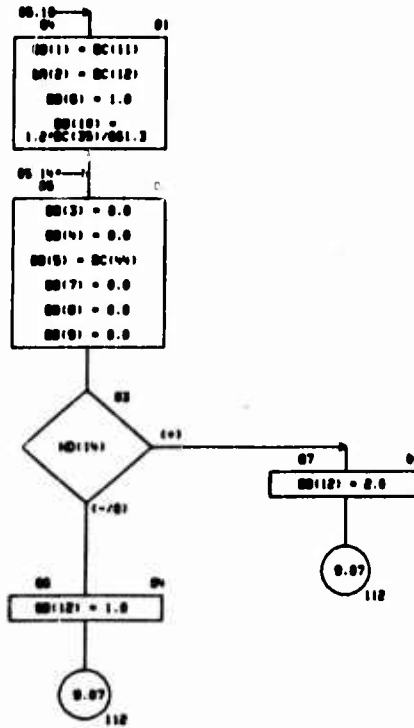


CHART TITLE - PROCEDURES

CASE 0 (FLAPS DOWN
100 YRHS)
PARAMETERS.



FLAPS UP CONDITION
ALTITUDE.

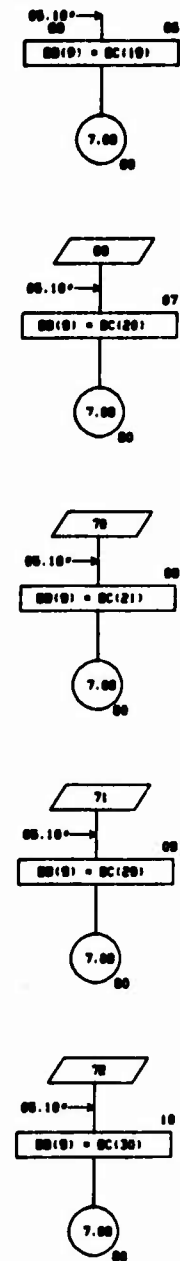


CHART TITLE - PROCEDURES

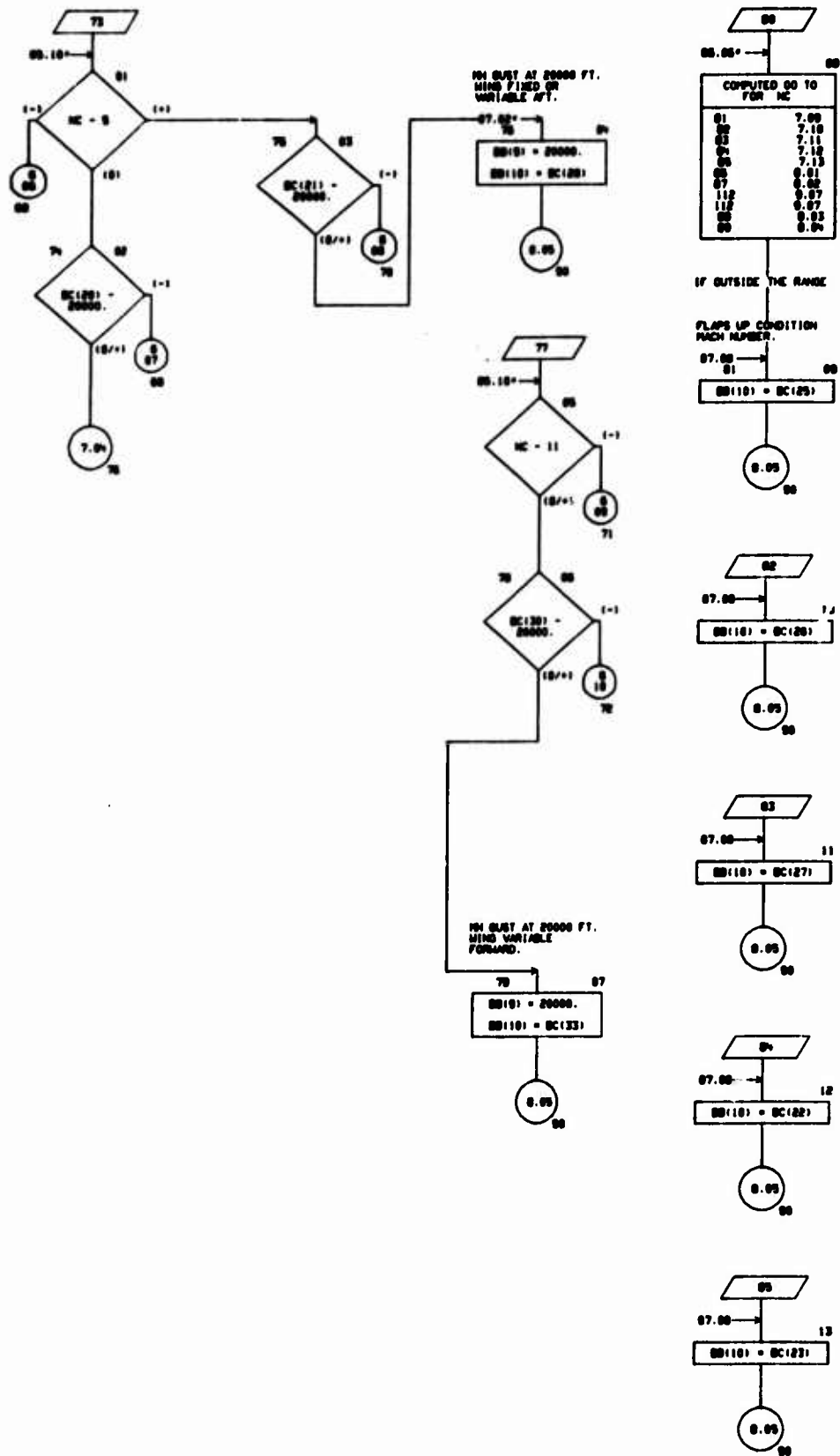


CHART TITLE - PROCEDURES

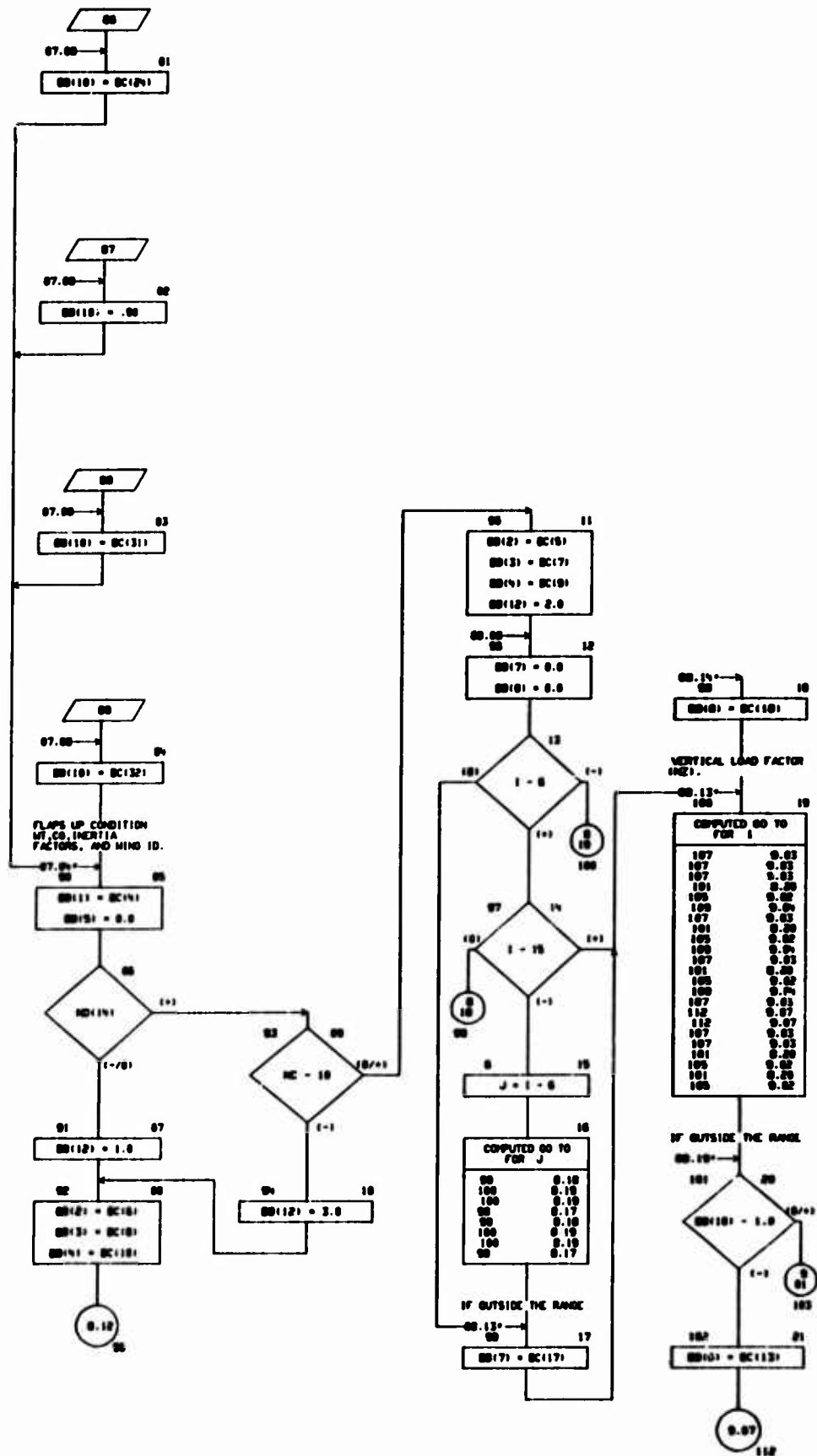


CHART TITLE - PROCEDURES

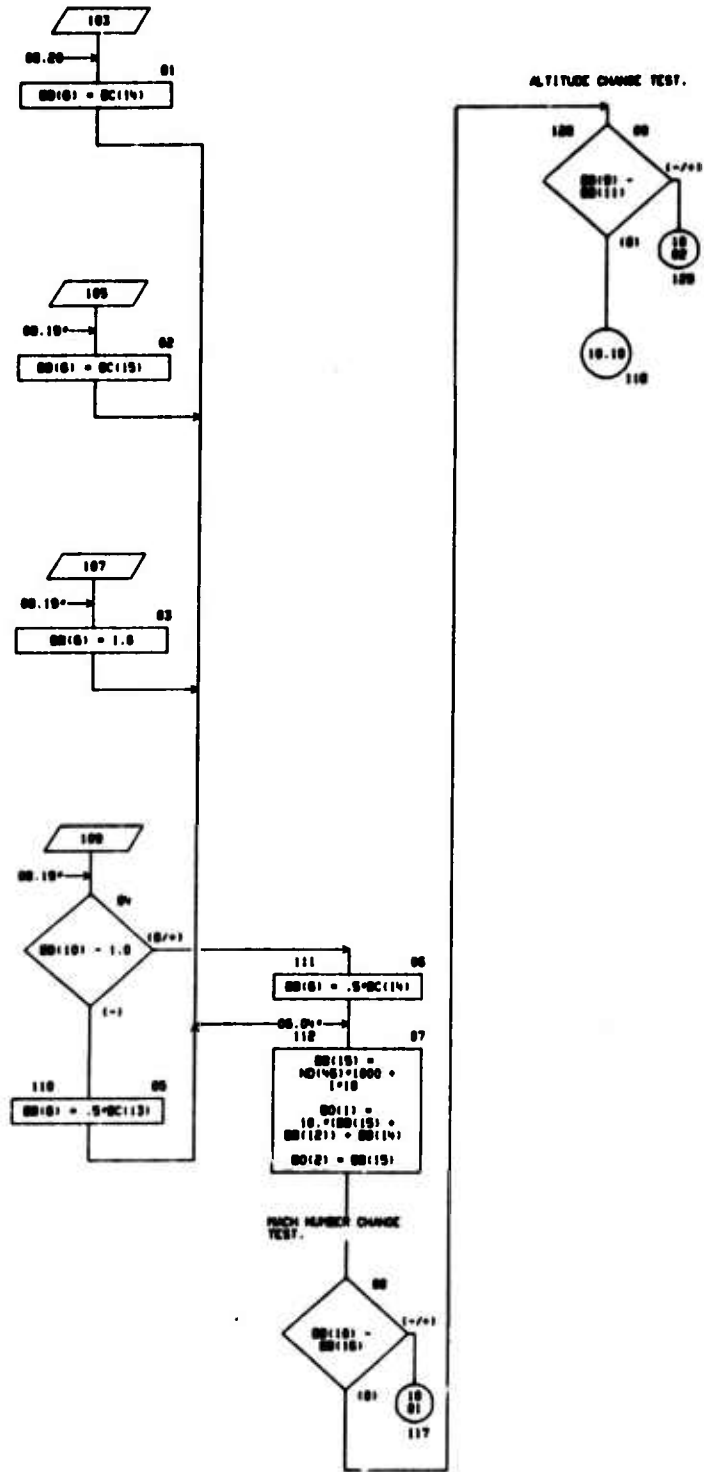


CHART 117 - PROCEDURES

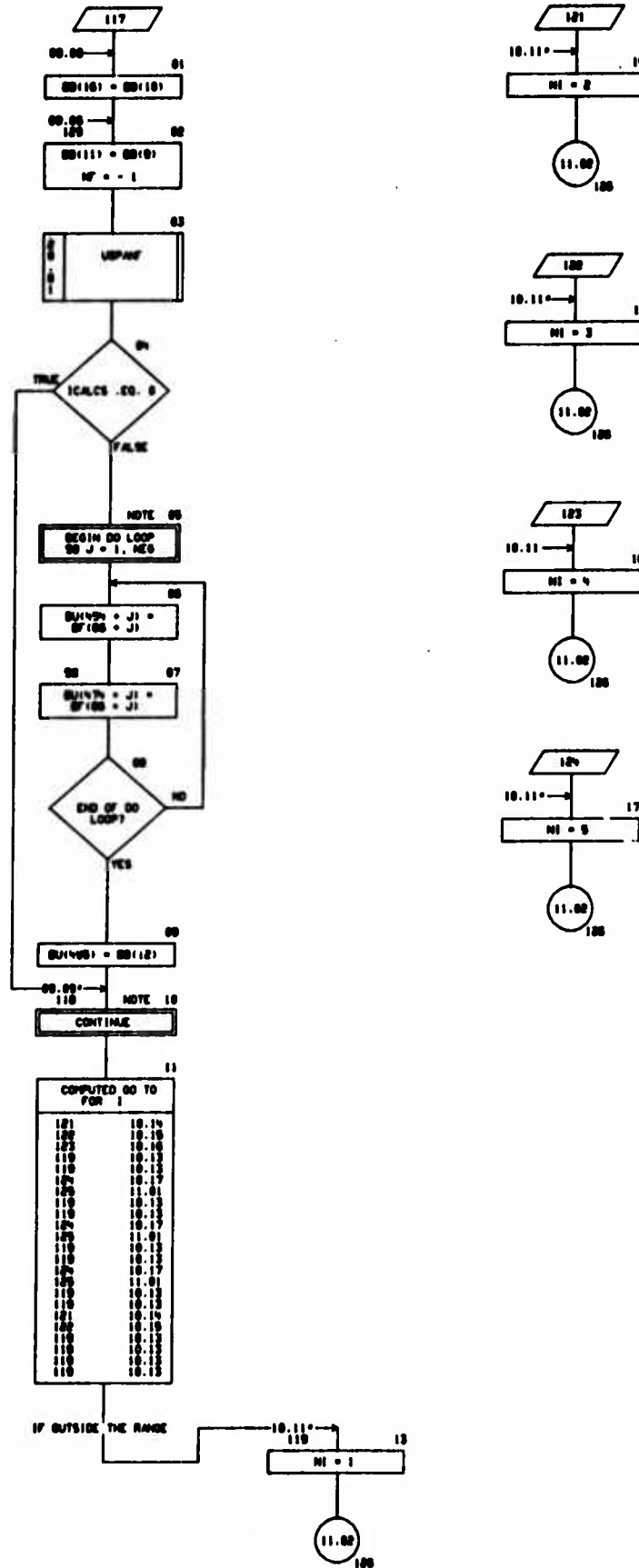


CHART TITLE - PROCEDURES

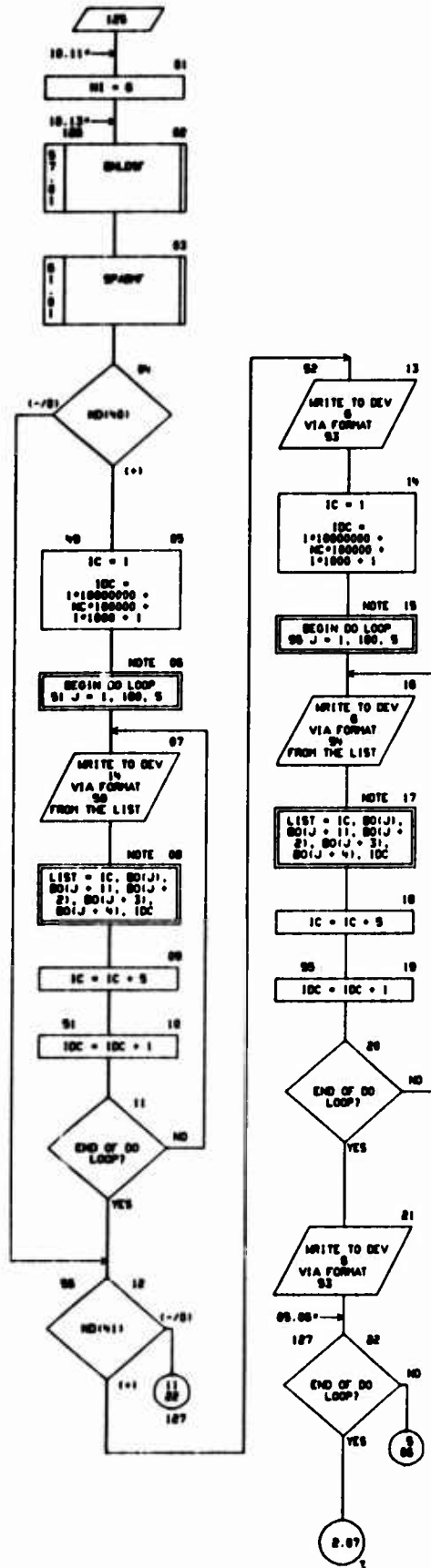


CHART TITLE - NON-PROCEDURAL STATEMENTS

```

COMMON TCDM4001
DIMENSION ND(200),SD(20),EC(100),SD(20),DT(50),LD(50),BT(140),BT
(70),BT(200),SM(500)
SUBROUTINE (ND(1),TCDM4001(1),TCDM(1),TCDM(200),EC(1),TCDM(270)
),SD(1),TCDM(200),BT(1),TCDM4001(1),BT(1),TCDM(100),TCDM(1)
,TCDM(100),BT(1),TCDM(100),BT(1),TCDM(100),TCDM(100),TCDM(100)
),SD(1),EC(ND(100)),TCDM(ND(100)),TCDM(ND(100)),TCDM(ND(100))
),SD(1),TCDM(100),TCDM(100),TCDM(100),TCDM(100),TCDM(100)
),SD(1),TCDM(100),TCDM(100),TCDM(100),TCDM(100),TCDM(100)
),SD(1),TCDM(100),TCDM(100),TCDM(100),TCDM(100),TCDM(100)
)

```

- 4 FORMAT(2I2)
- 50 FORMAT(11Z,1PE12.5,10)
- 53 FORMAT(1H)
- 54 FORMAT(1H 2I12,2X1PE15.5,2X10)

CHART TITLE - SUBROUTINE RERDAT

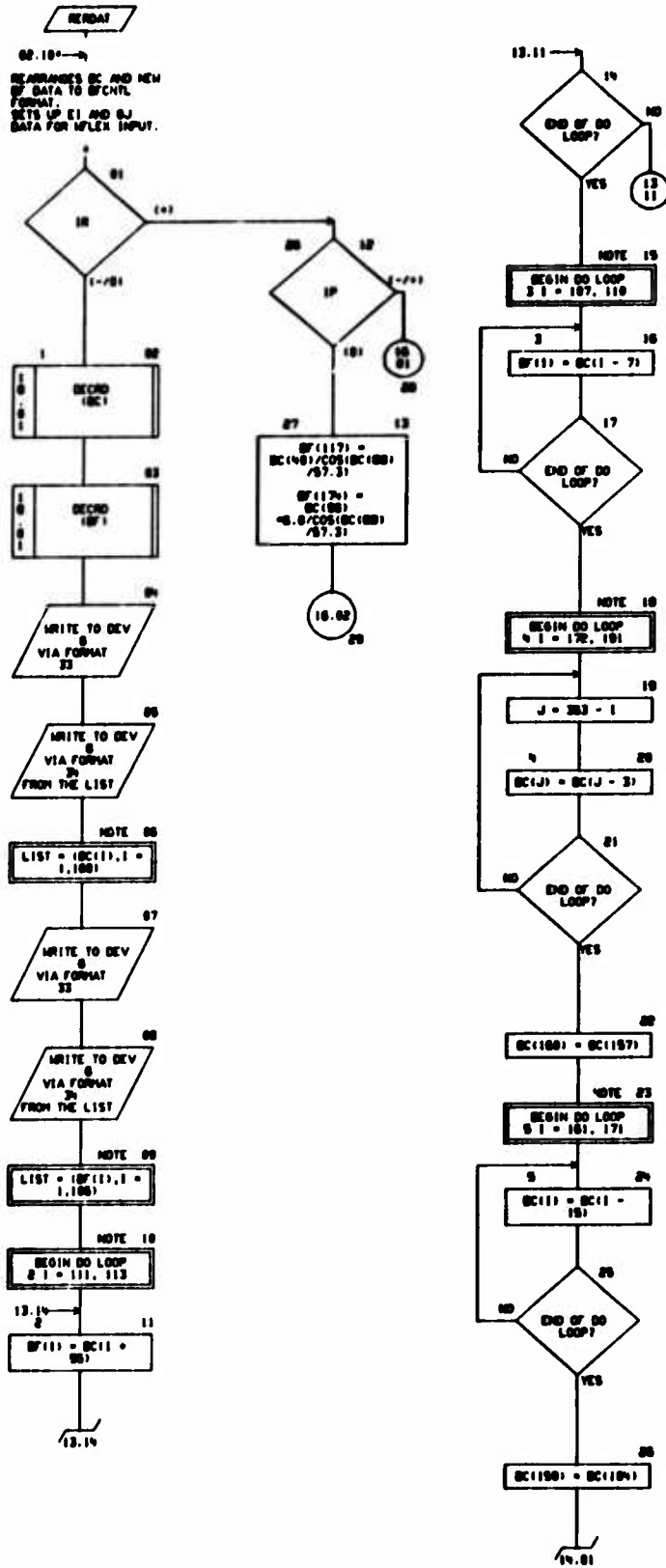


CHART TITLE - SUBROUTINE READ

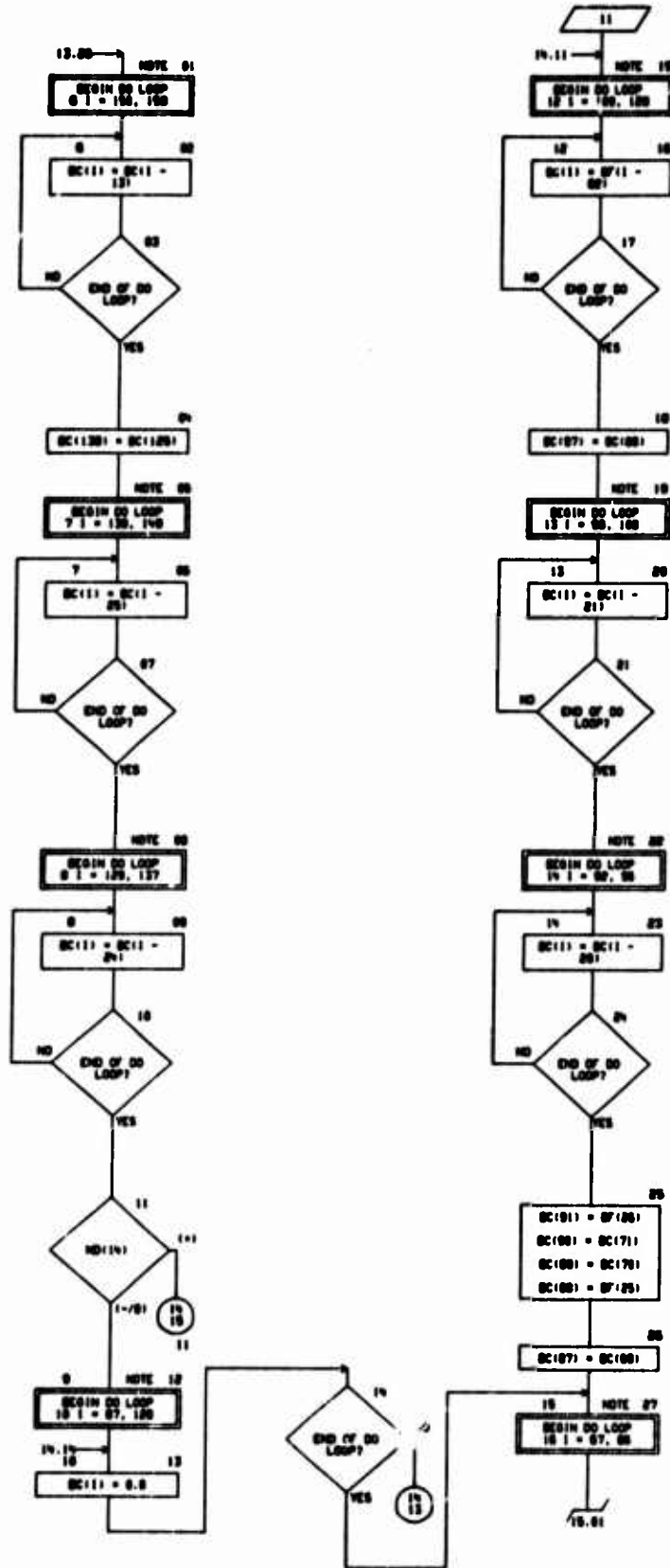


CHART TITLE - SUBROUTINE RERBAT

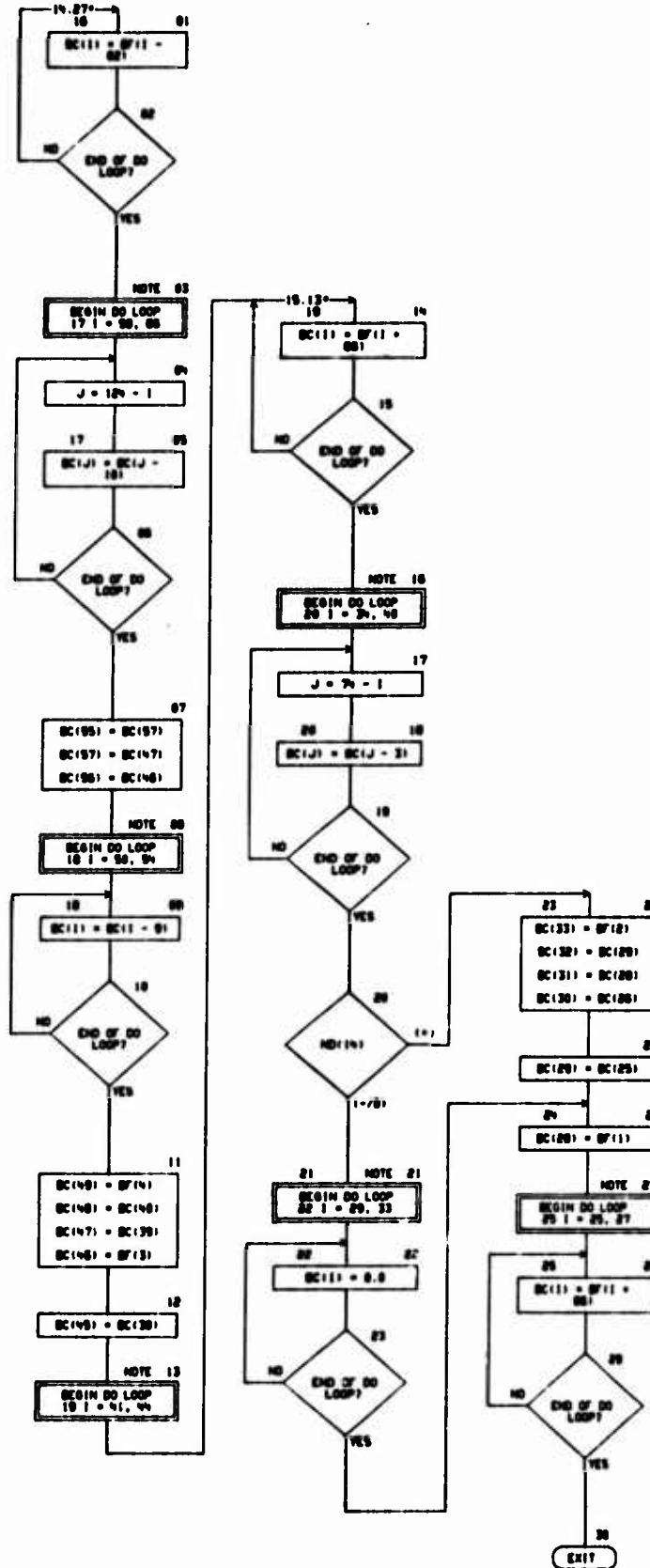


CHART TITLE - SUBROUTINE RENDAT

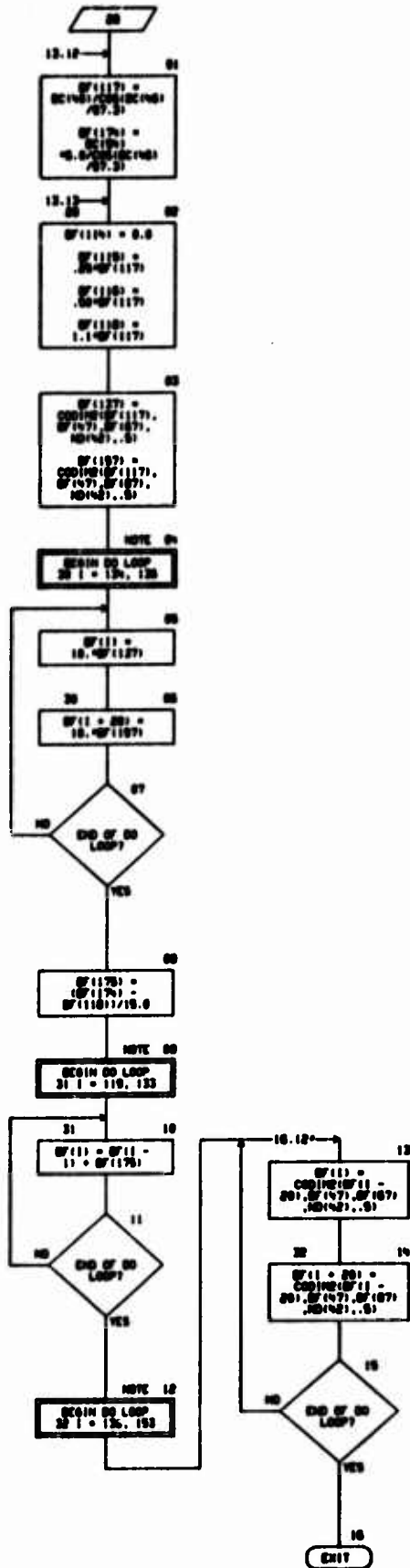


CHART TITLE - NON-PROCEDURAL STATEMENTS

```
CONVEN TCON(400)  
DIMENSION BC(100),BF(200),ND(200)  
EQUIVALENCE (BC(1),TCON(270)),(BF(1),TCON(400)),(ND(1),TCON(400))  
), (1,ND(137)),(J,ND(133)),(IR,ND(187)),(IP,ND(137))  
33 FORMAT(1H)  
34 FORMAT(1H,5XPE(15,0))
```

CHART TITLE - SUBROUTINE SECRO(V)

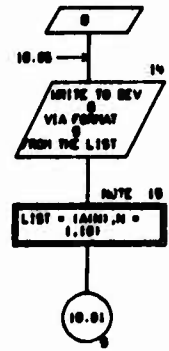
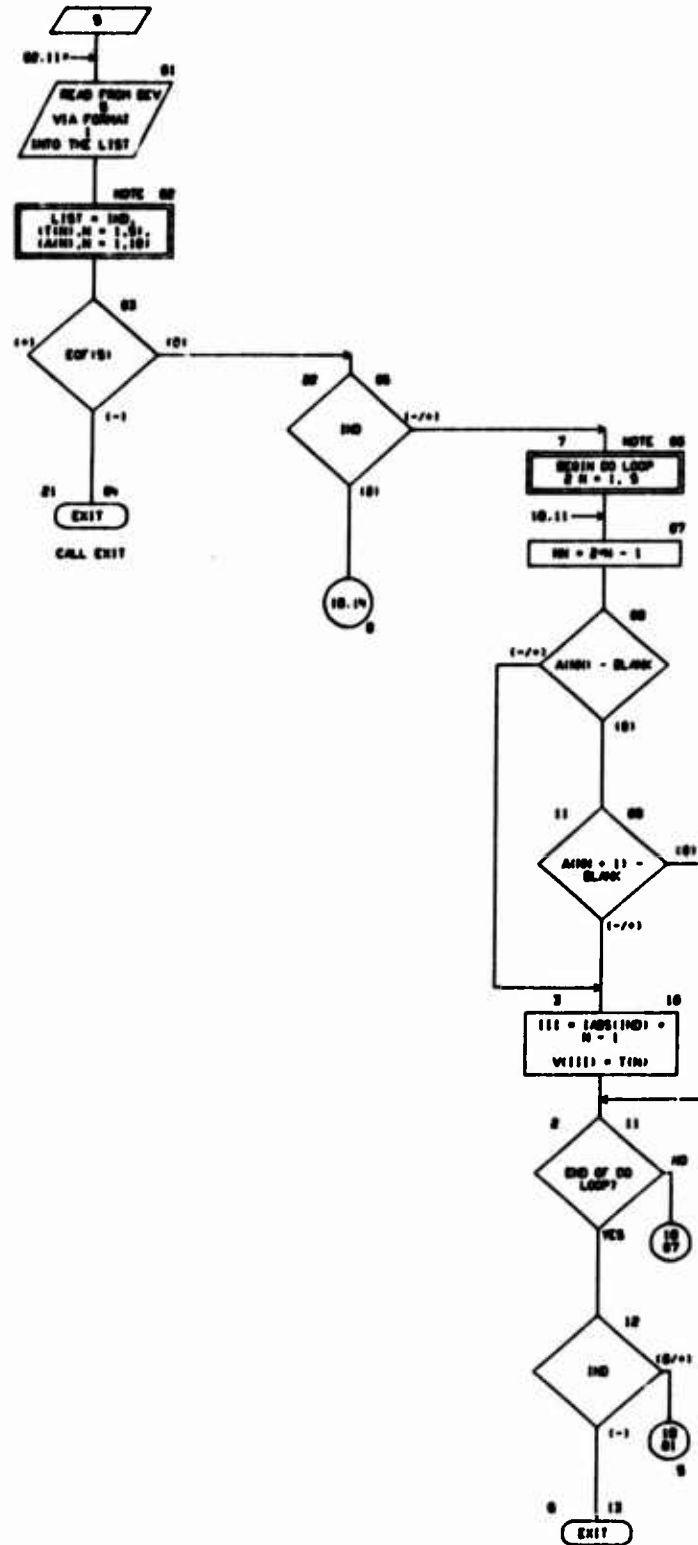


CHART TITLE - NON-PROCEDURAL STATEMENTS

DIMENSION V(1),T(5),A(10)
DATA BLOCK/CH /
1 FORMAT(1,112,713,9712,9,713,1048)
9 FORMAT(1,174 NO DECK LOCATION,94,1048/)

CHART TITLE - SUBROUTINE USPAW

USPAW

10.03

STAND ALONE
FLEXIBILITY
SUBROUTINE FOR SHEEP
II.
SERVES FLEXIBLE WING
AND RIGID SPANWIDE
FACTORS AND UNIT
AIRLOAD
DISTRIBUTIONS.
FLEXIBILITY INCLUDES
ANGLE OF ATTACK,
REFLECTED
FLAP AND AEROELASTIC
INERTIA EFFECTS.

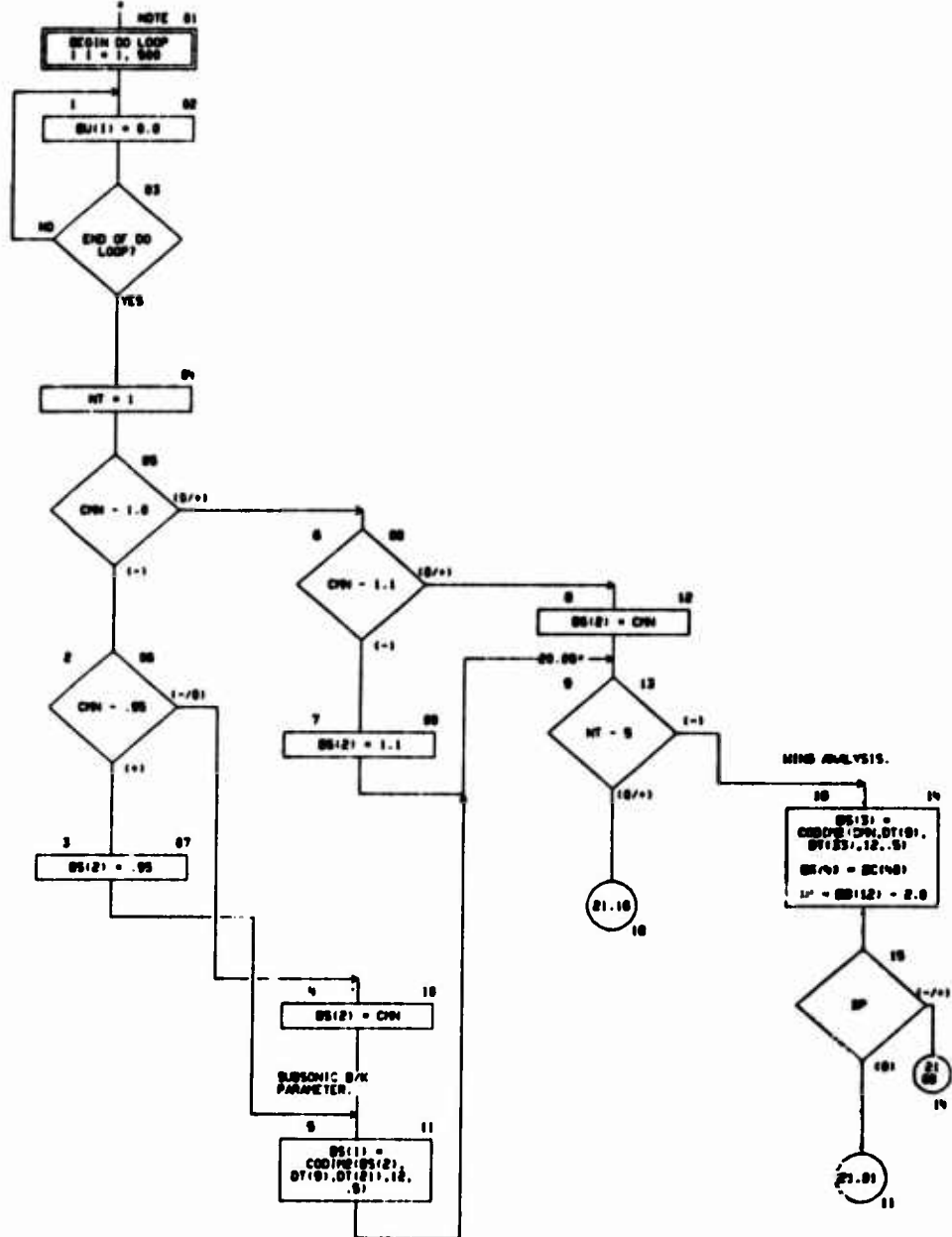


CHART TITLE - SUBROUTINE USPAW

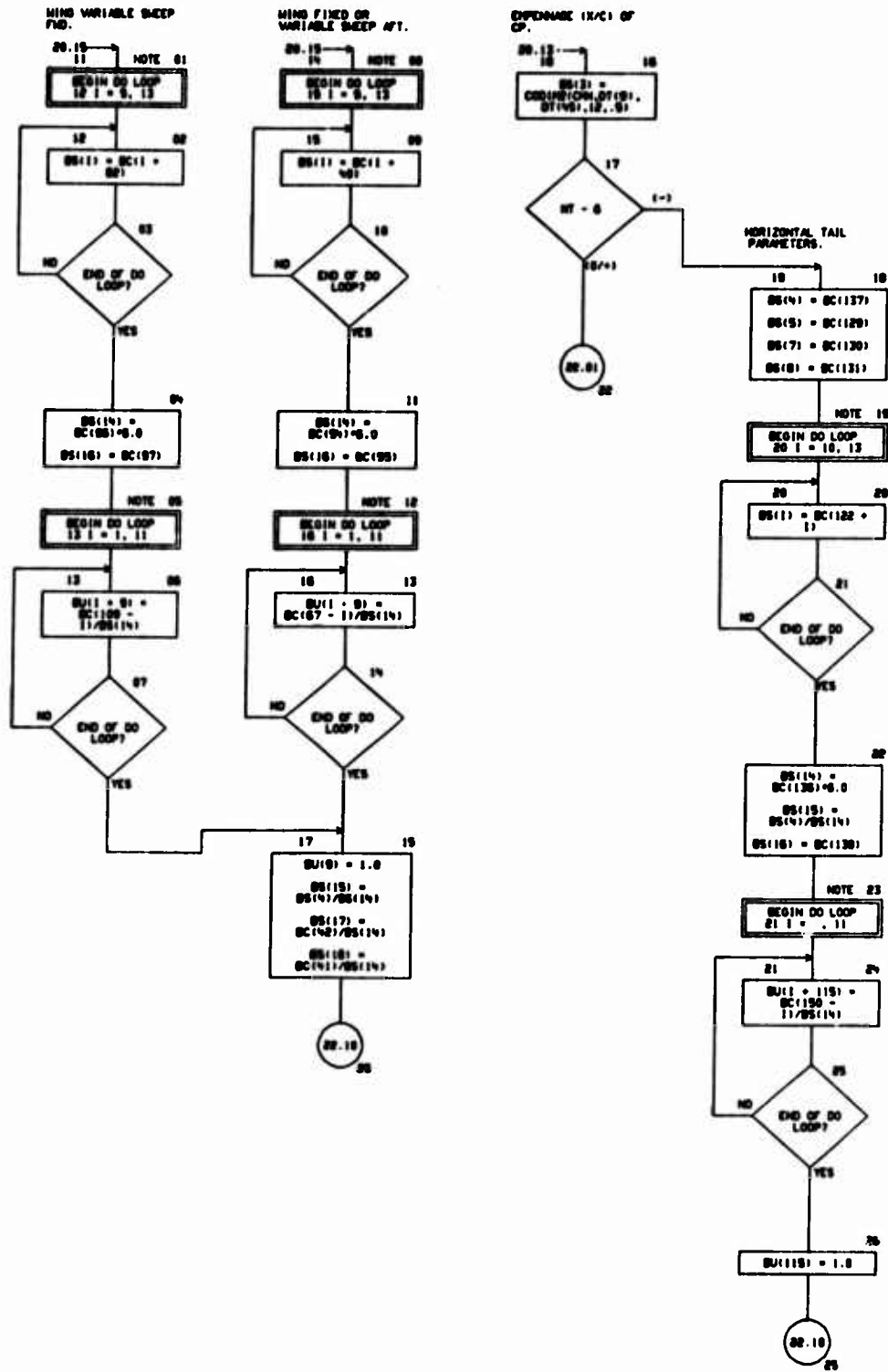


CHART TITLE - SUBROUTINE USPAW

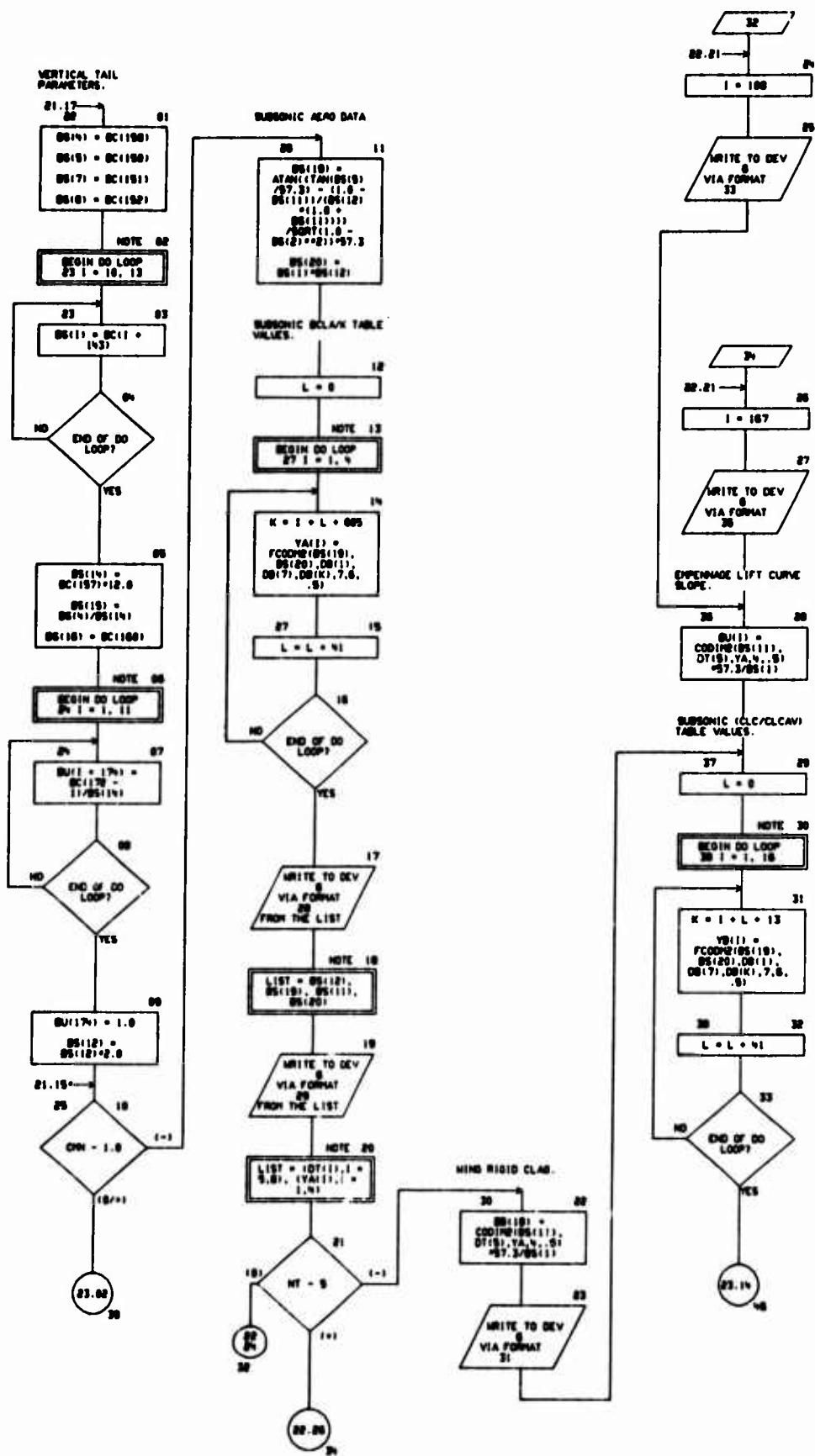


CHART TITLE - SUBROUTINE UP447

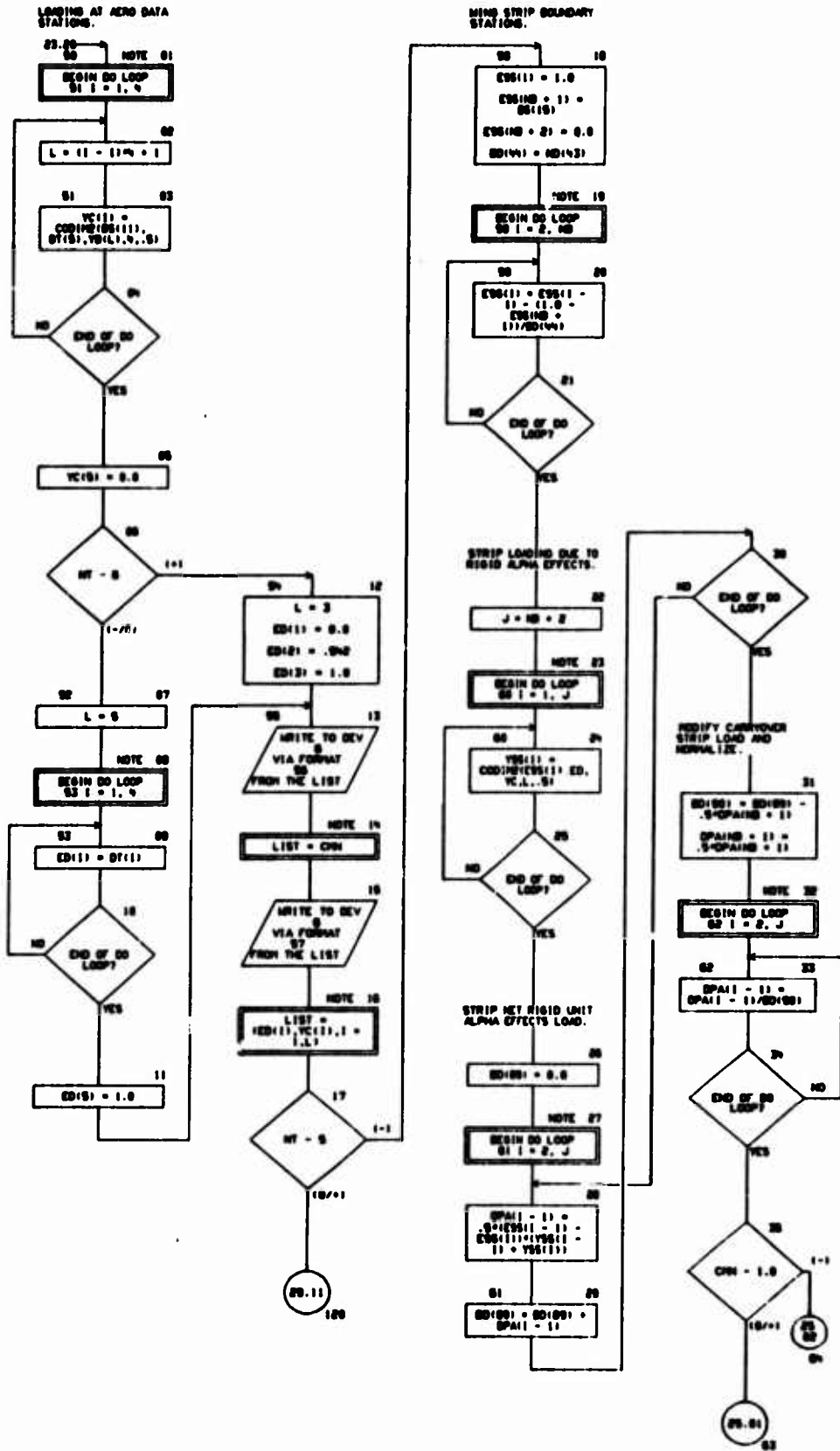


CHART TITLE - SUBROUTINE USPAR

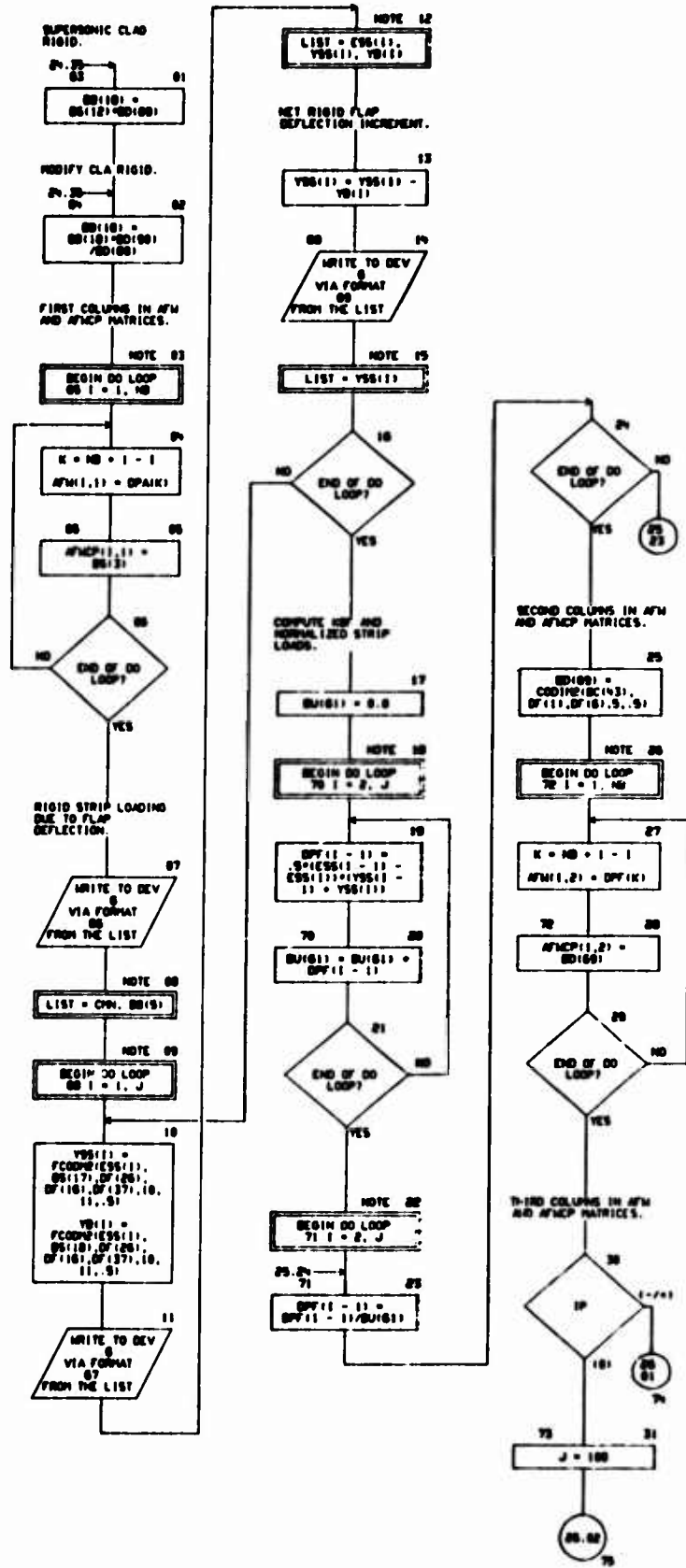


CHART TITLE - SUBROUTINE USPNT

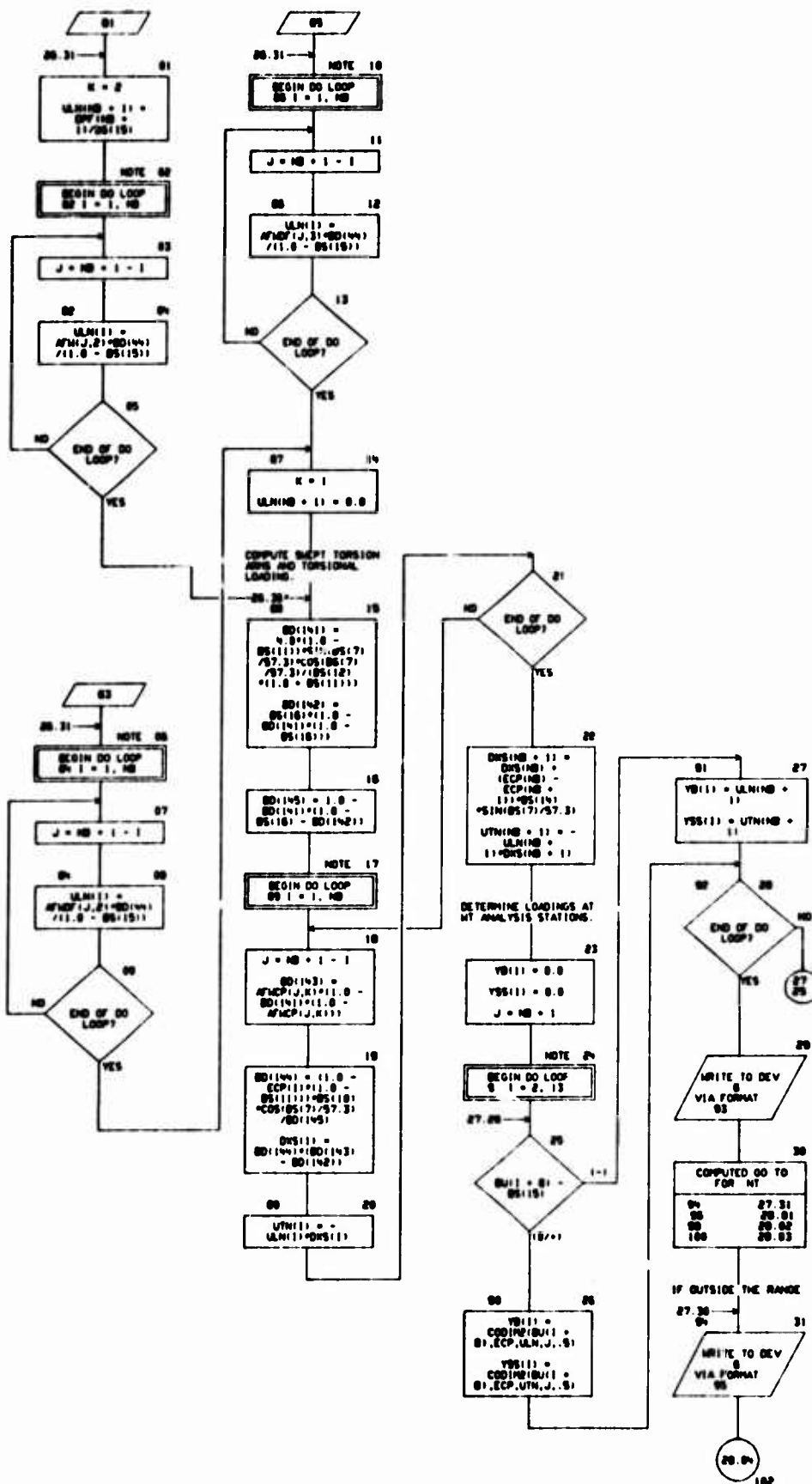


CHART TITLE - SUBROUTINE UPAAT

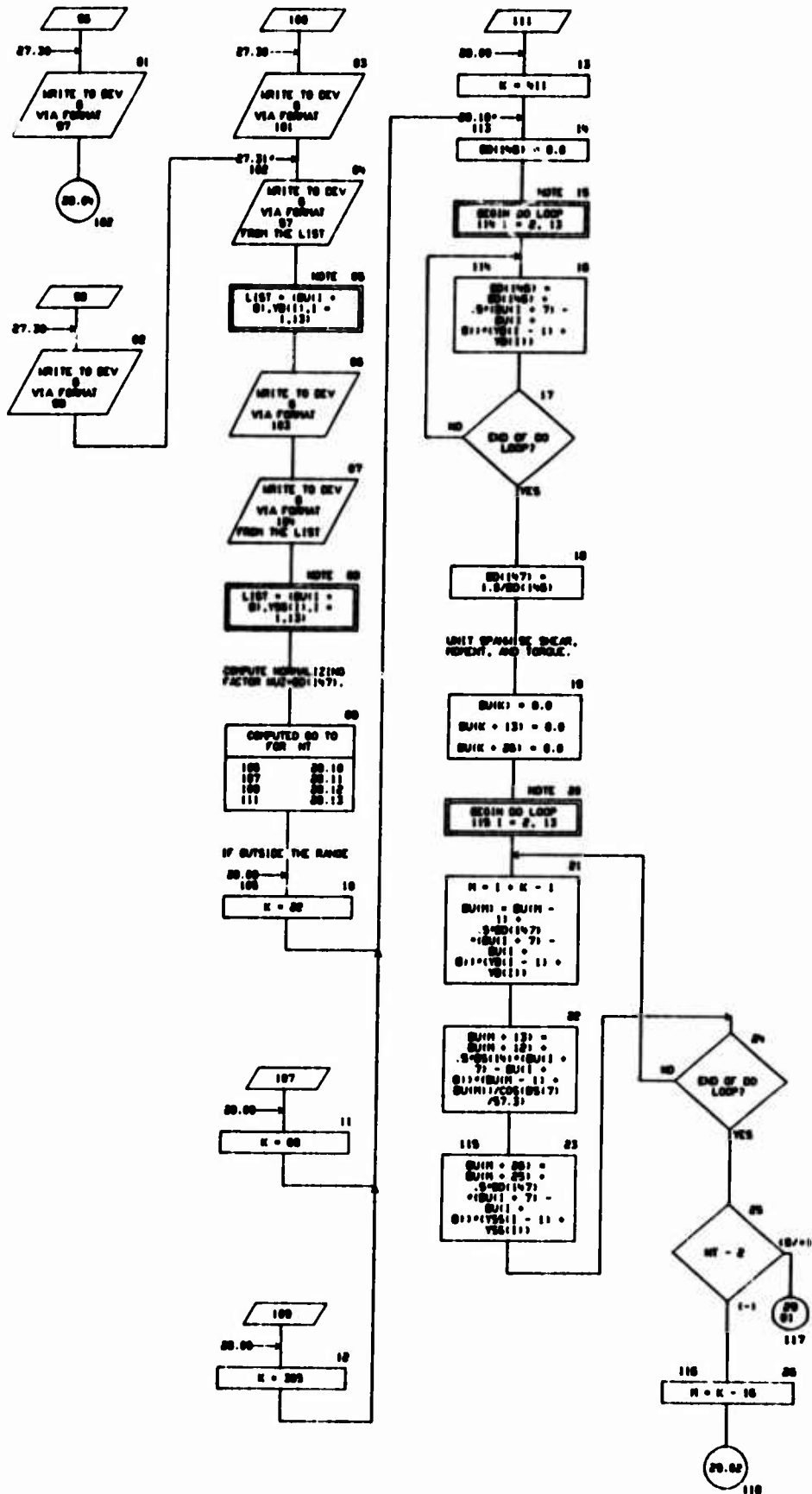


CHART TITLE - SUBROUTINE UPAW

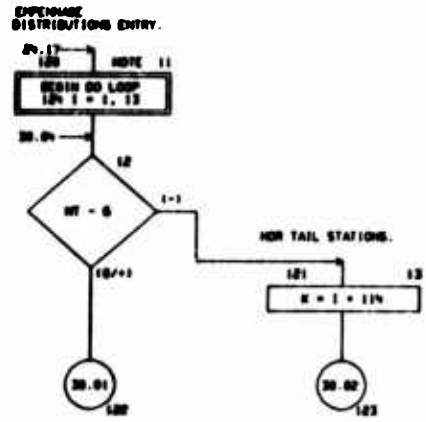
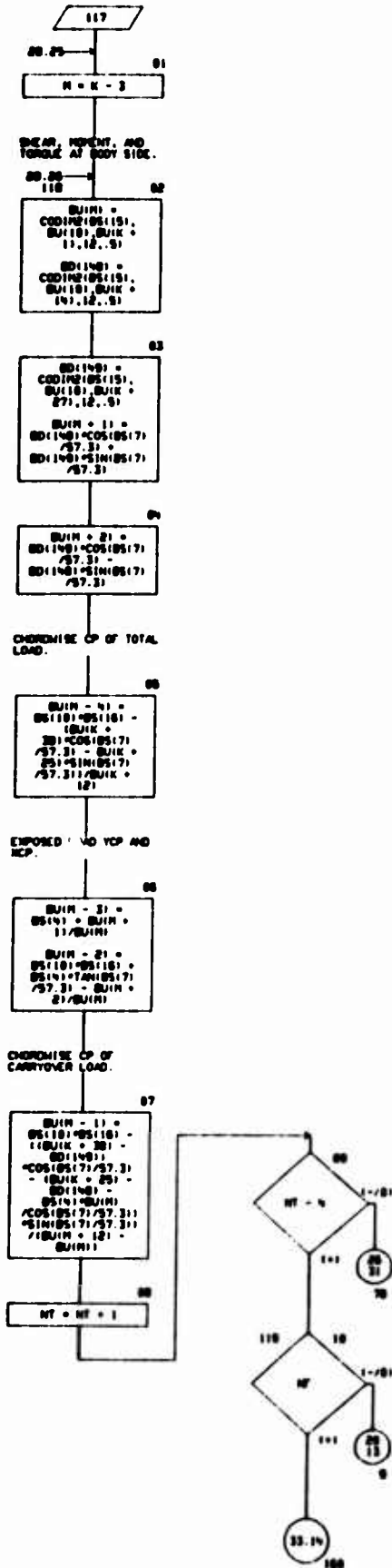


CHART TITLE - SUBROUTINE USPWAF

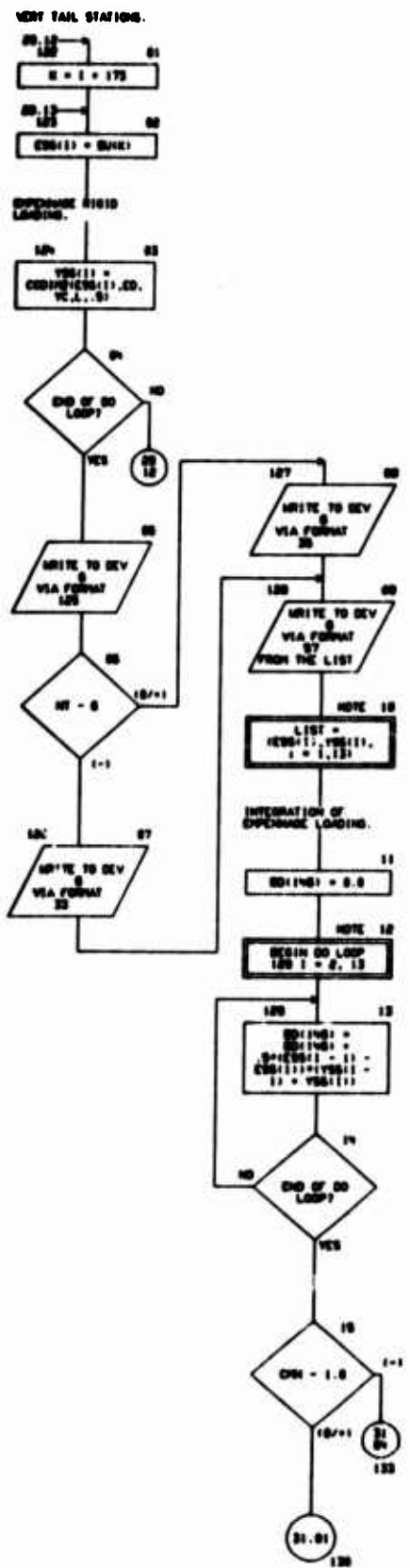


CHART TITLE - SUBROUTINE USPAW

EXPANDED SUPERSONIC
LIFT CURVE SLOPE
(CLAM OR CLOV).

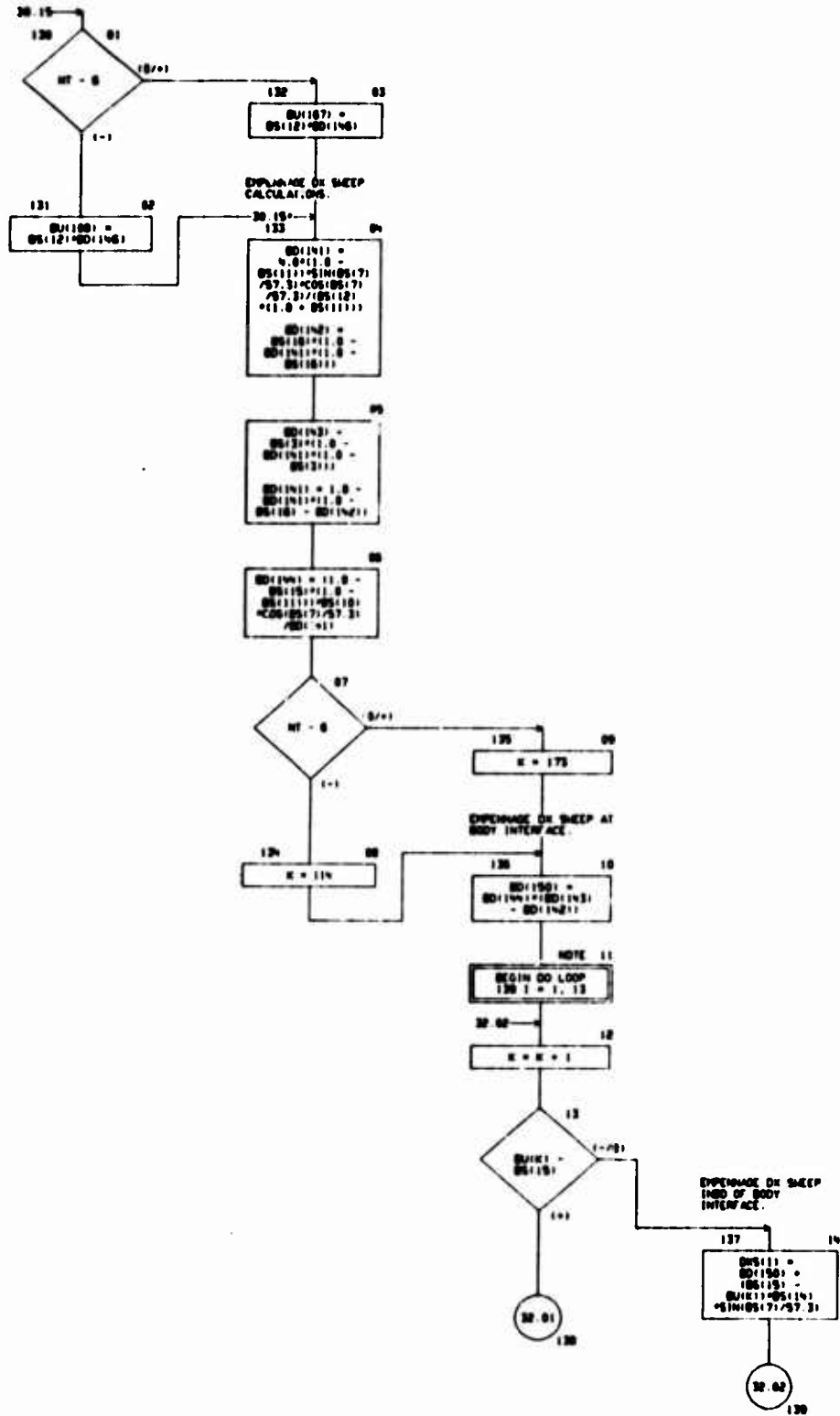


CHART TITLE - SUBROUTINE UOPNF

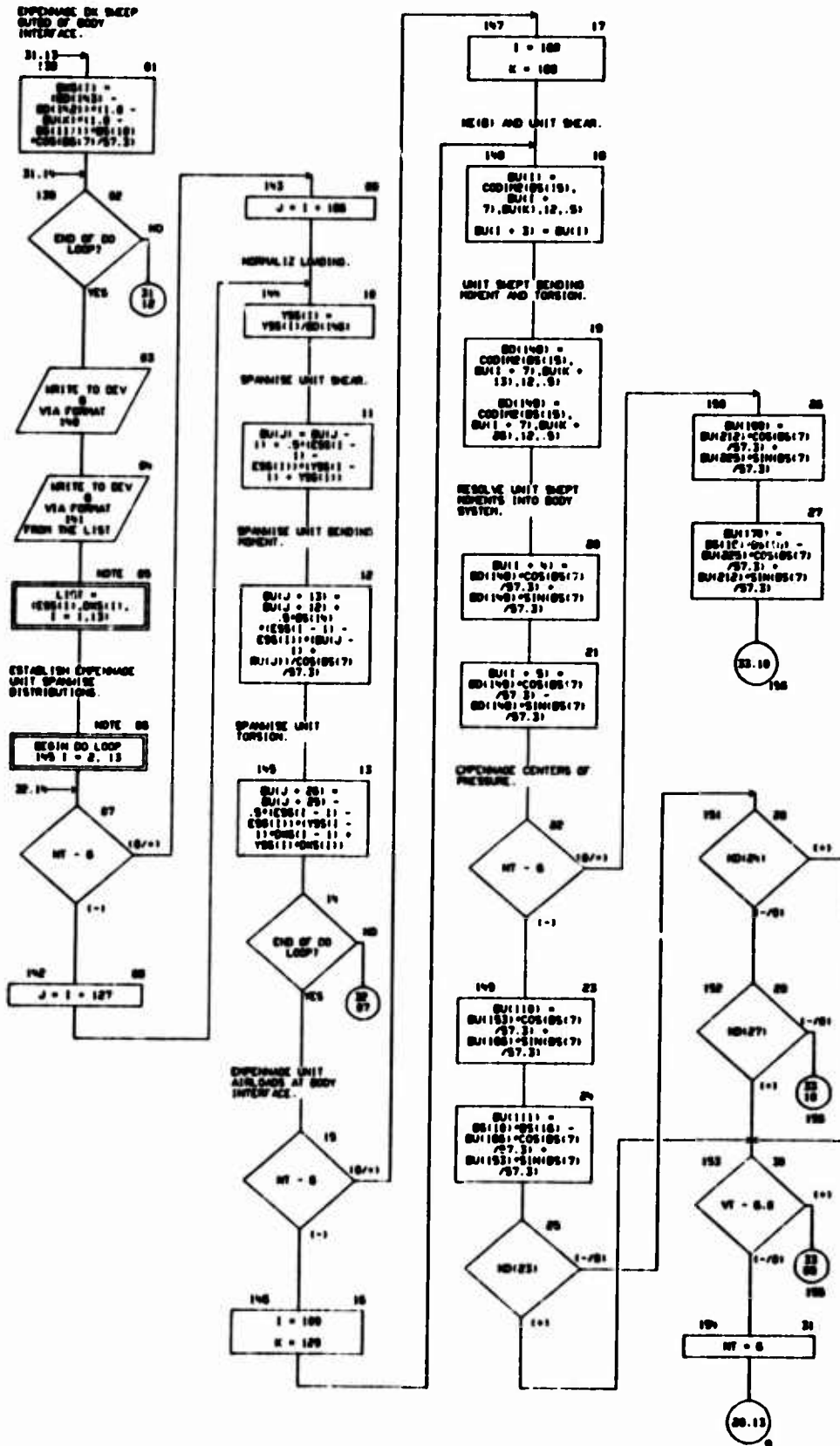


CHART TITLE - SUBROUTINE UBP4F

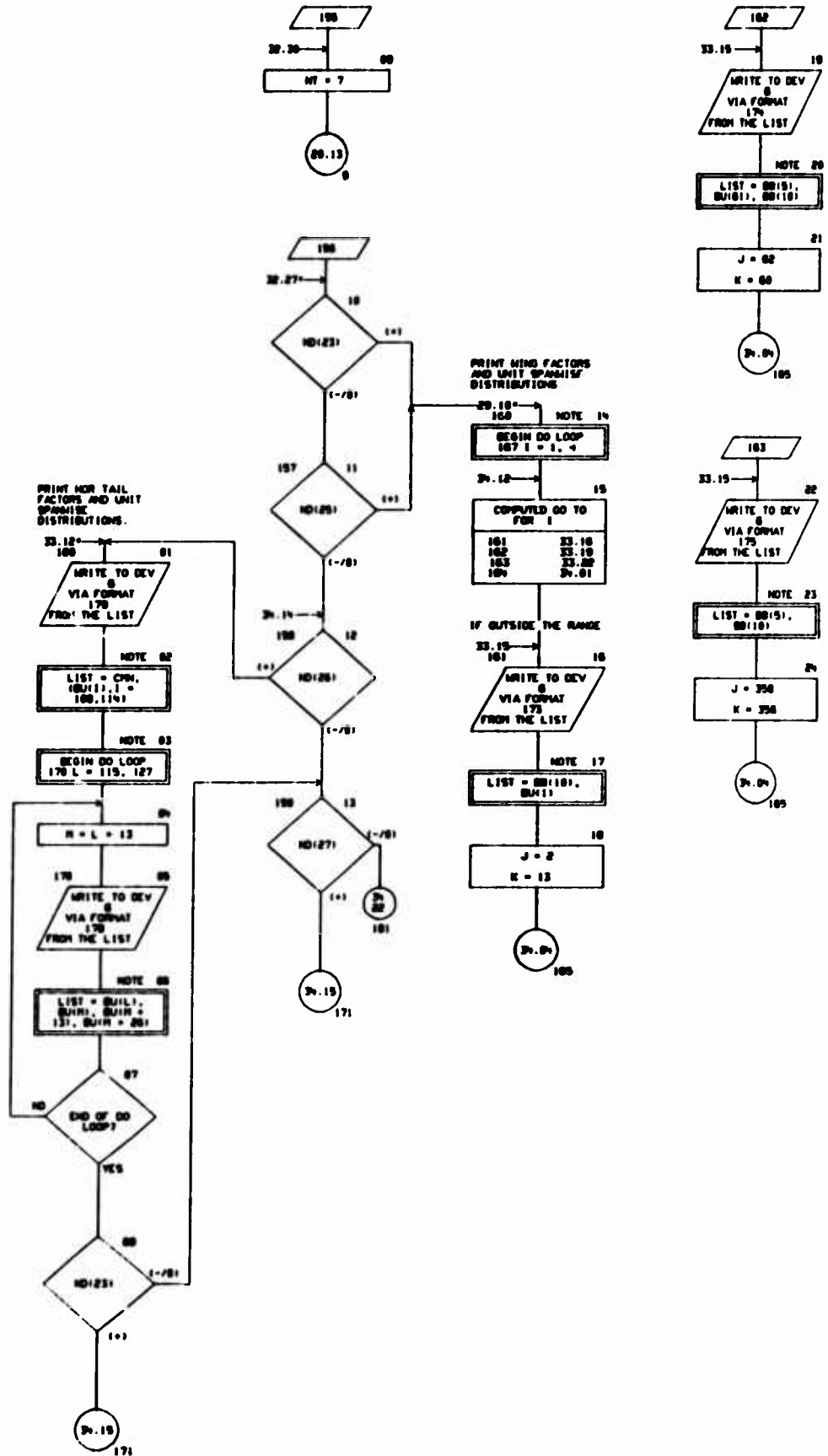


CHART TITLE - SUBROUTINE UBPAGE

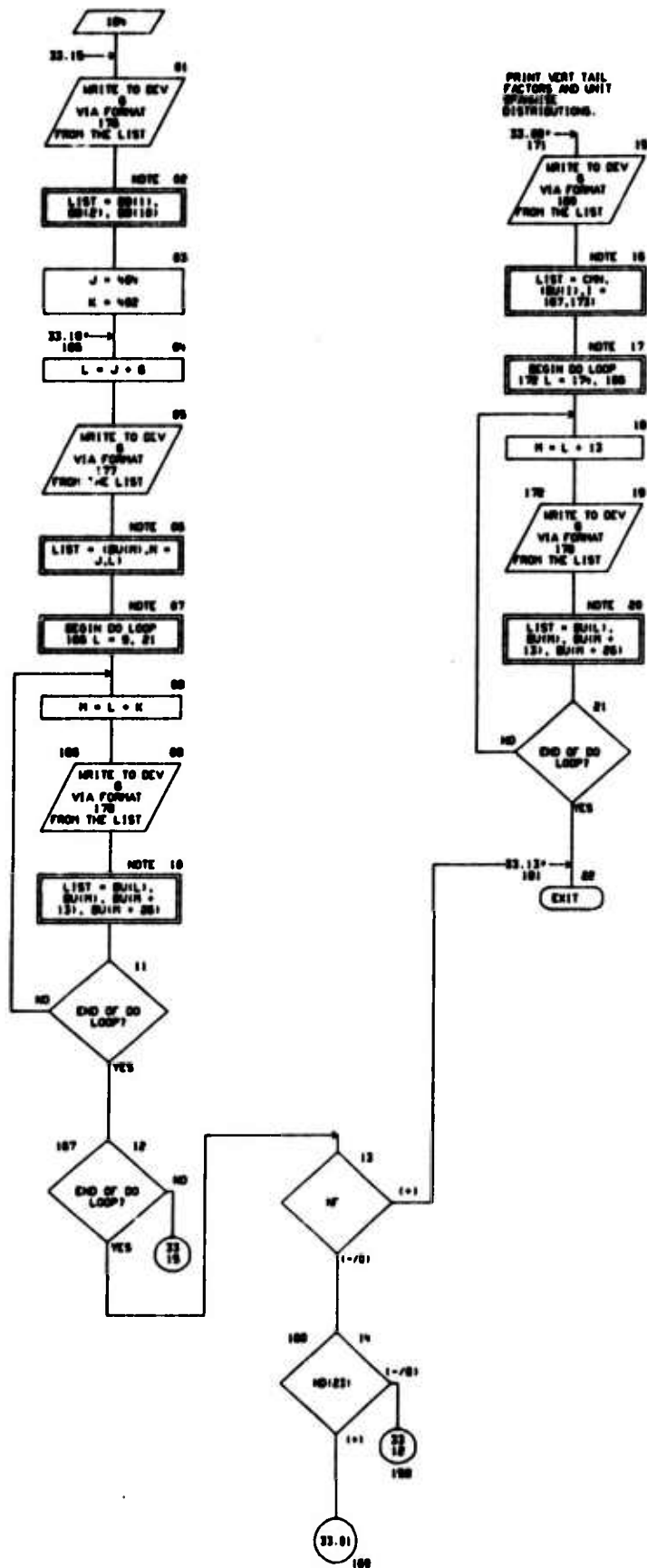


CHART TITLE - NON-PROCEDURAL STATEMENTS

SYN@FB.S,418M4PCV8-FB.3,418M4PCV8-FB.3//742748PAMISE UNIT DISTRI
BUTIONS//8X85TAT748SYVIB41X748RVID41X748RVID//8X85DEPTI8X85M
EXPAN85EEP/)

CHART TITLE - SUBROUTINE ATYDS(H,RQH,PH,4H)

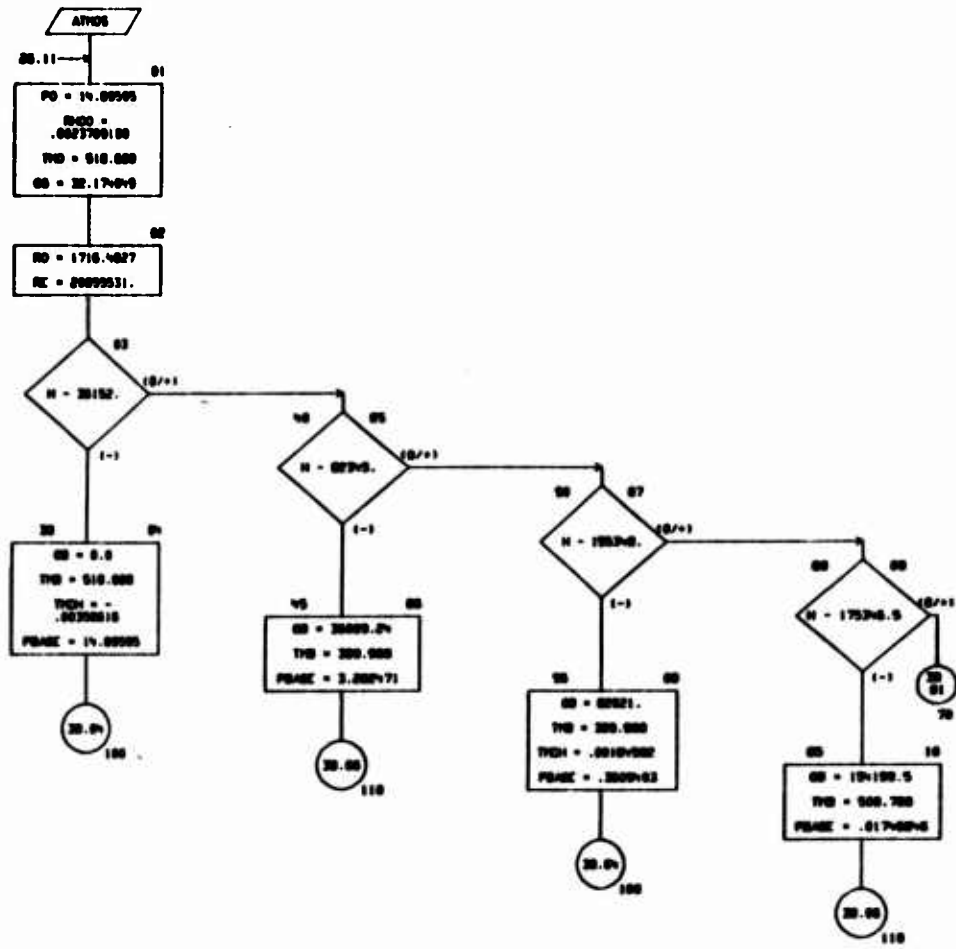


CHART TITLE - SUBROUTINE ATROSIN,RQDH,PH,AH)

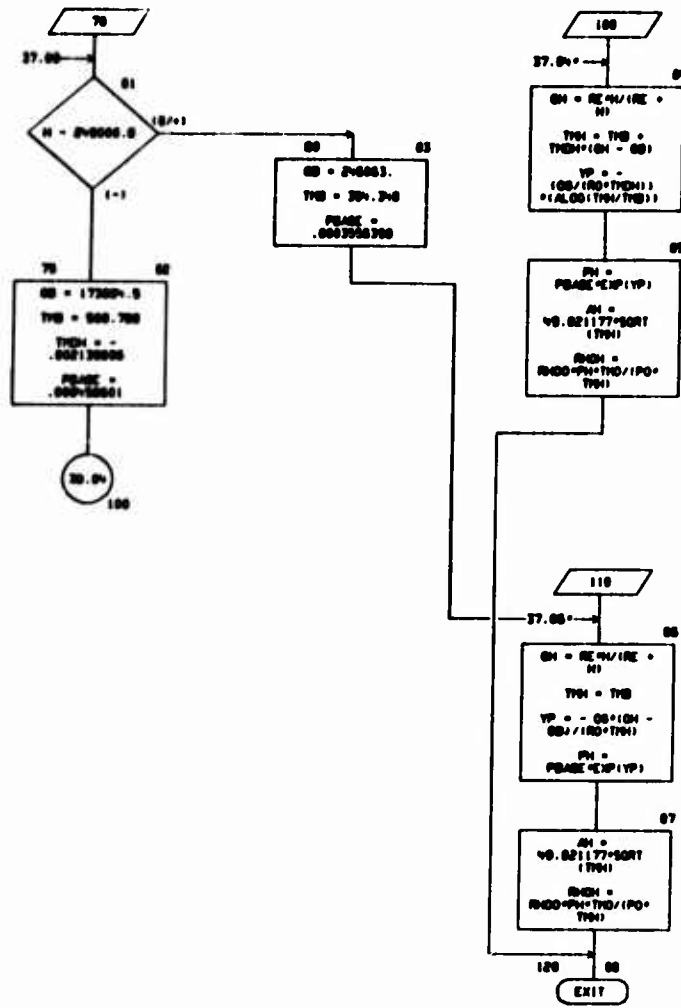


CHART TITLE - FUNCTION FCODEM(X,Y,N1,Y1,Z1,N1,N2,NK)

TWO DIMENSION CURVE
FIT
SUBPROGRAM... FCODEM
CALLING SEQUENCE
Z =
FCODEM(X,Y,N1,Y1,Z1,
N1,N2,NK)
X = ARGUMENT - 1ST
VARIABLE
Y = ARGUMENT - 2ND
VARIABLE
N1 = ARRAY OF 1ST
VARIABLE
N2 = ARRAY OF 2ND
VARIABLE
Z1 = ARRAY OF THE
DEPENDENT VARIABLE
N1 = NO. OF POINTS -
Y1
N2 = NO. OF POINTS -
X1
NK = END INTERVAL
INTERPOLATION CONTROL
CONSTANT

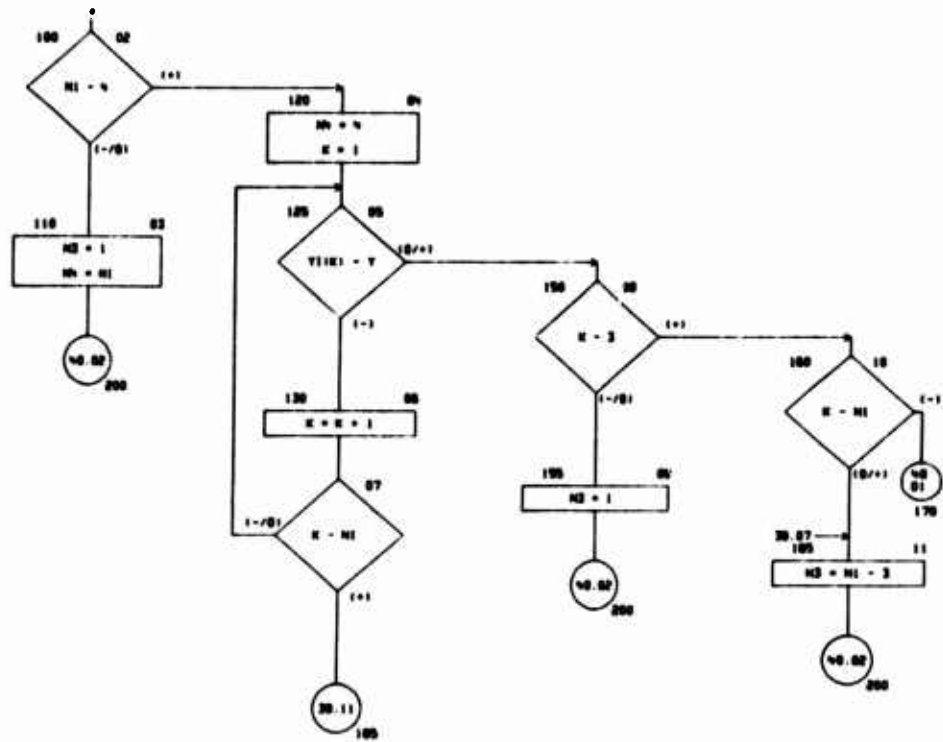


CHART TITLE - FUNCTION FCODE=I,X,Y,NI,V1,Z1,NI,NI,NI,NI

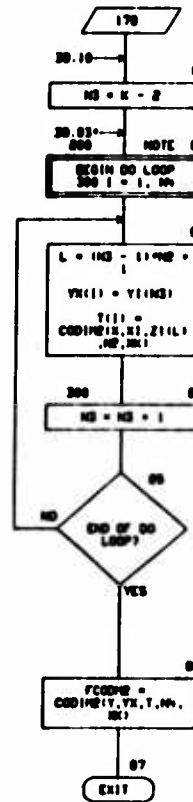


CHART TITLE - NON-PROCEDURAL STATEMENTS

```
COMMON /COMMON/
DIMENSION (D(100),AD(200),X(11),Y(11),Z(11),T(4),V(14))
EQUIVALENCE (D(11),TCOM(200)),(AD(11),TCOM(400)),(Y(11),D(11)),(Y
X(11),D(11)),(NS,AD(13)),(NA,AD(13)),(I,AD(14)),(K,AD(14)),(L,
AD(14))
```

CHART TITLE - FUNCTION CODE(M,N,NI,VI,N,NI)

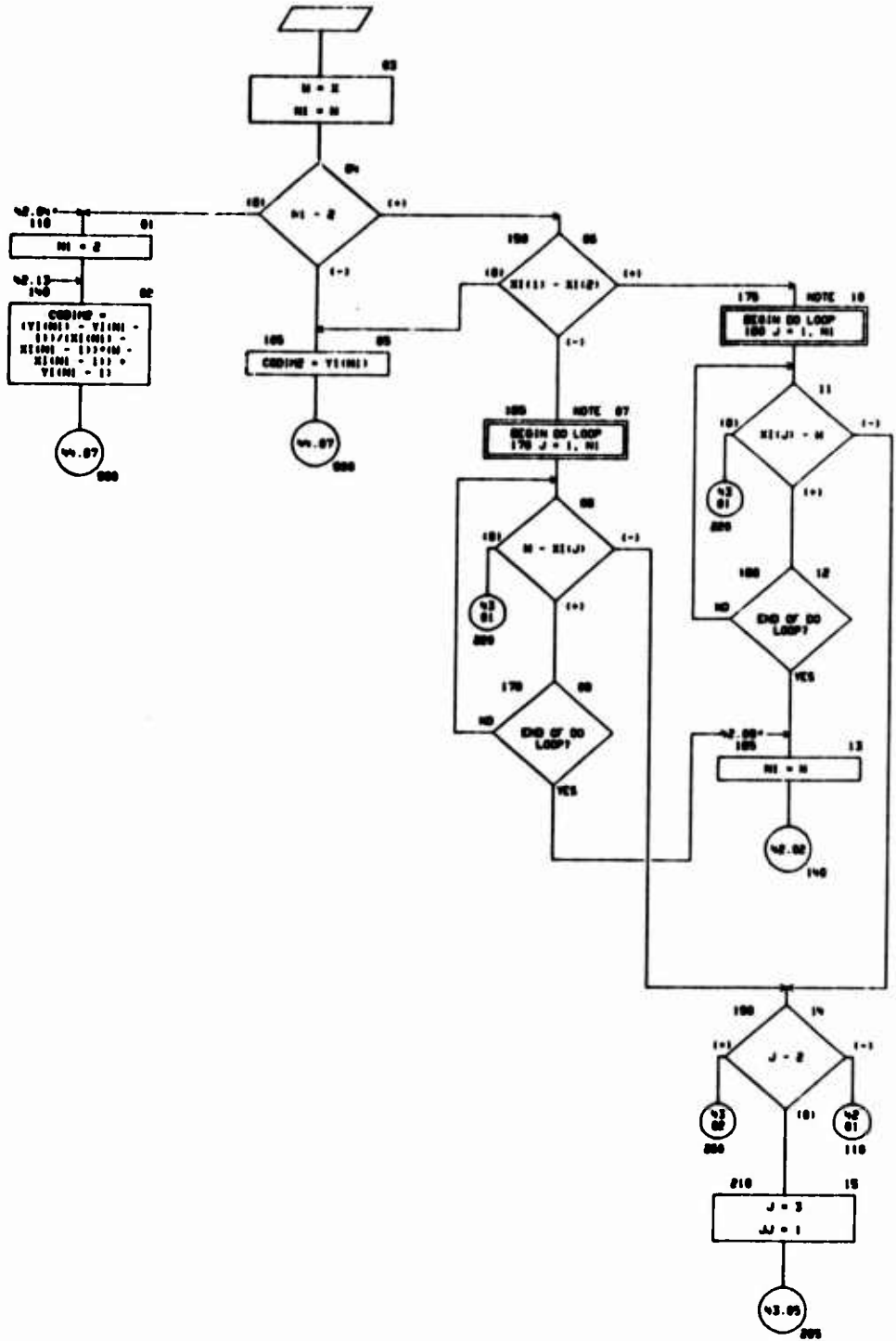


CHART TITLE - FUNCTION CODING(XI,XI,VI,M,IKI)

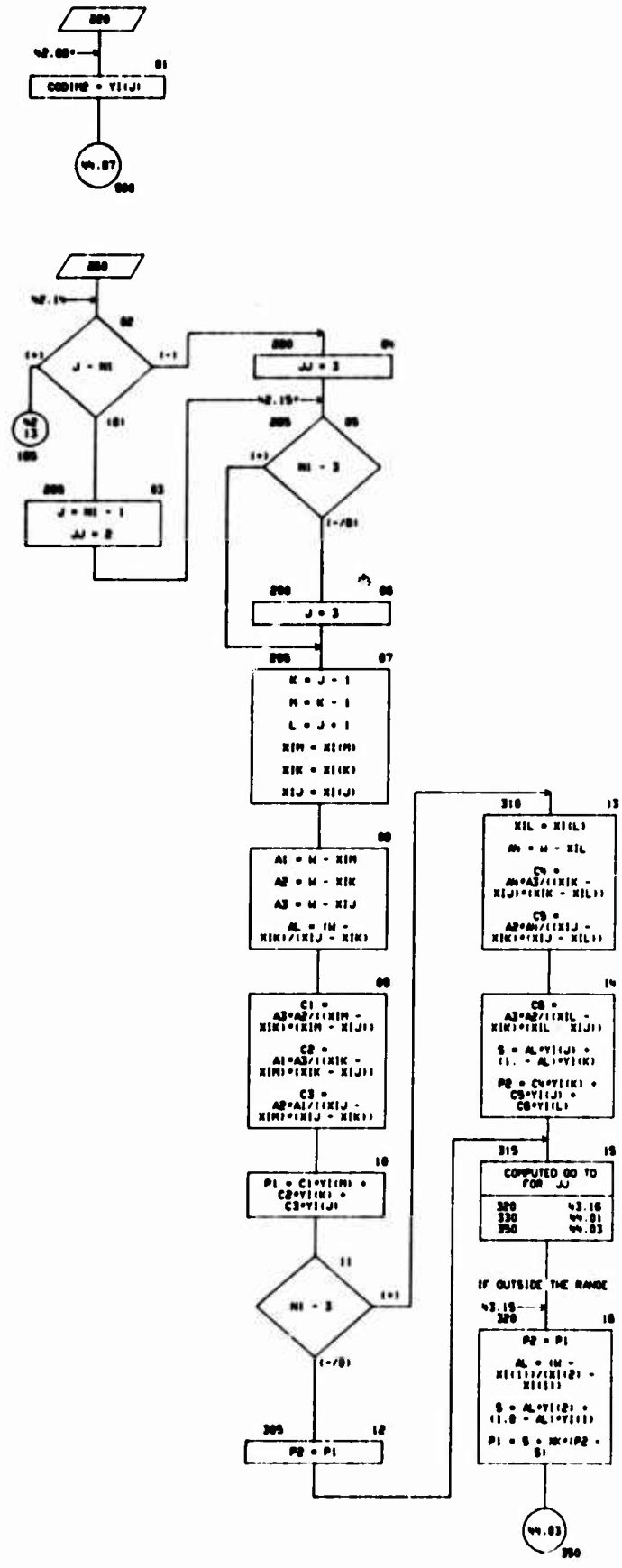


CHART TITLE - FUNCTION CODING:K,VI,VI,N,MI

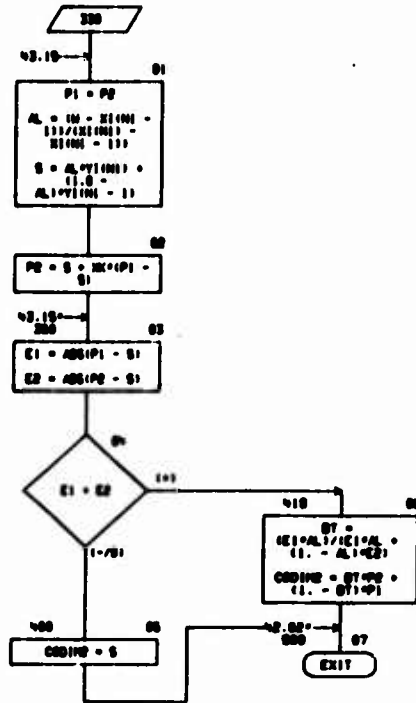


CHART TITLE - NON-PROCEDURAL STATEMENTS

COMMON FCN=400
DIMENSION ND(200),X(11),Y(11)
EQUIVALENCE (ND(1),FCN=201), (ND(14),FCN=199), (ND(14),FCN=198)
,, (ND(14),FCN=197), (ND(14),FCN=196)

CHRT TITLE - SUBROUTINE WFLX1/AFN,AFPC,AFW,AFW,F,VEIGJ,EI,GJ,CR,DD,BLGS,A

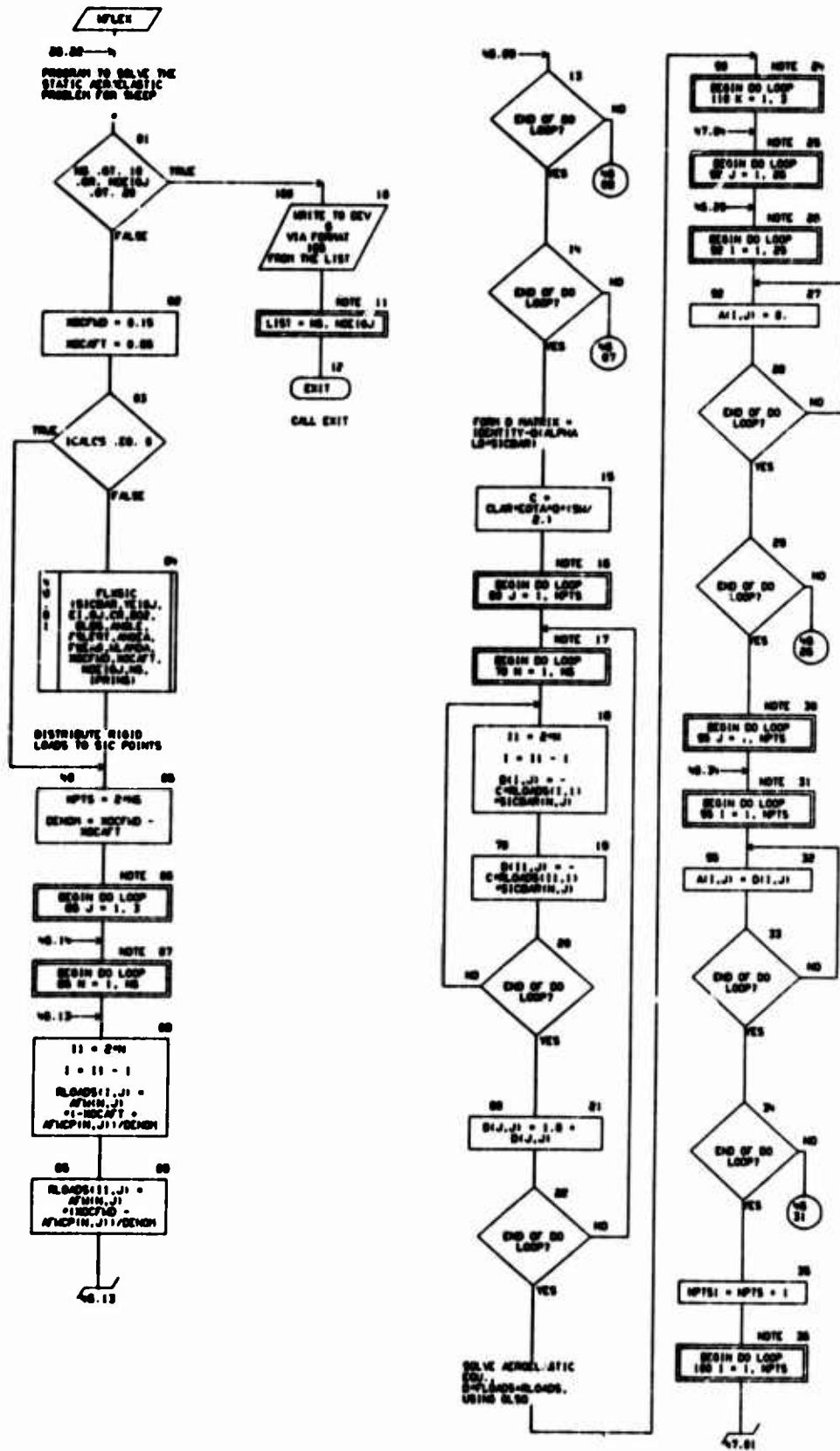


CHART TITLE - NON-PROCEDURAL STATEMENTS

```

      DIMENSION VE(6J:20) ,E1(20) ,GJ(20) ,SICBAR(10,20)
      DIMENSION A7M(10,3) ,A7MCP(10,3) ,D(20,20) ,LOADS(20,3) ,
      FLOADS(20,3) ,BLOADS(20,3) ,A(20,20) ,IL(20) ,
      A7M7(10,3) ,F(13,4) ,A7MCP(10,3)
      COMMON TCDM1400
111  FORMAT (10H 20H,27H DATA FROM SUBROUTINE WFLX, //2X, 2H NS = ,113,
      //2X, 4H 0 = ,177.2, 2H LB/FT**2, //2X, 7H CLR = ,176.3, //2X, 7H
      SOTA = ,176.4, //2X, 2H 2H = ,177.2 , 2H FT**2 )
100  FORMAT (20H PROGRAM DIMENSIONS EXCEEDED, / 2H NS = ,113,12H NS
      16J = ,113)
```

CHART TITLE - SUBROUTINE FLXISICBAR,VEIG,EI,GJ,CR,BOZ,BRS,ANGLE,FLERT,ANG

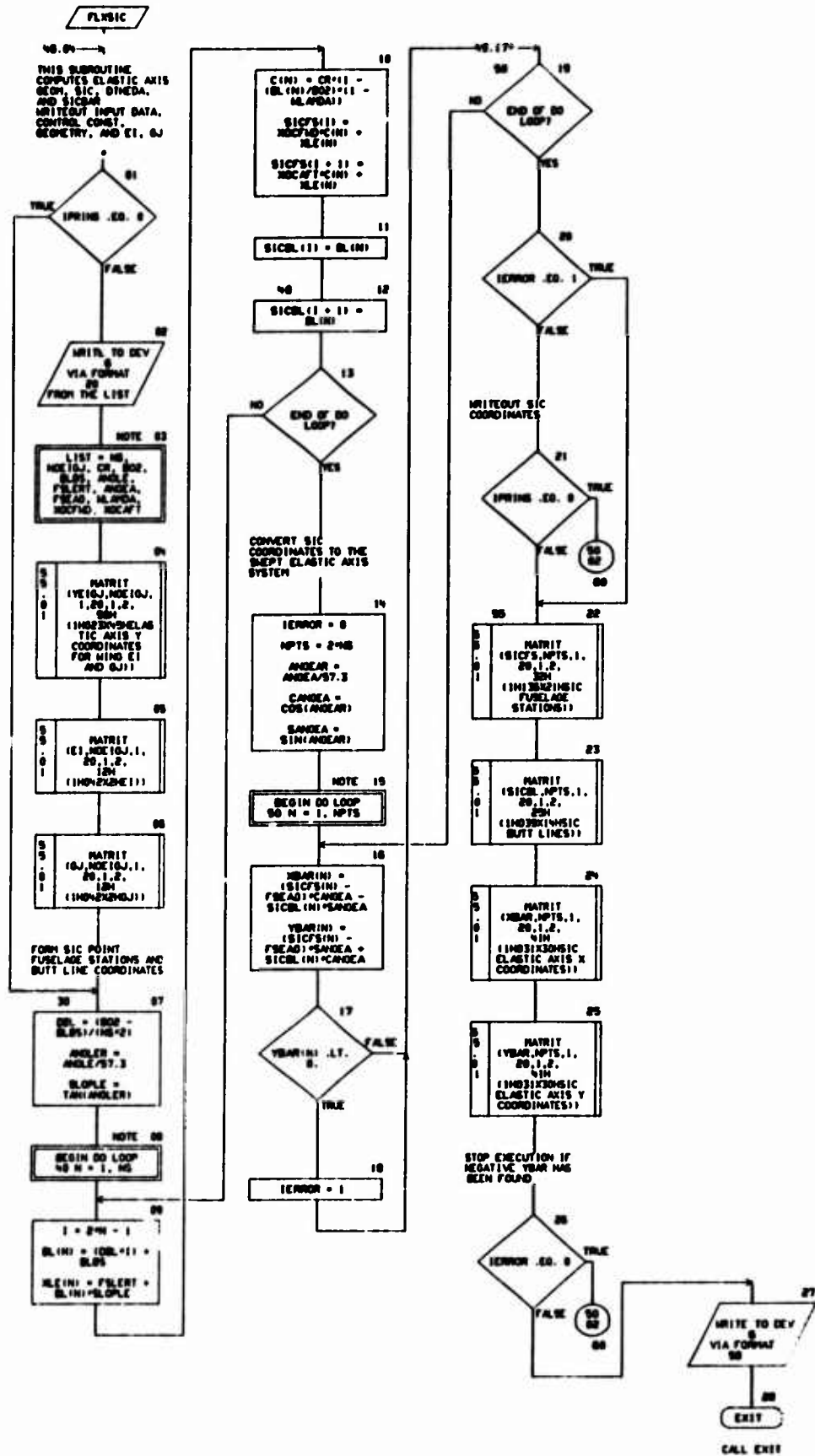


CHART TITLE - SUBROUTINE FLBICISICBAR,VEIGJ,EI,GJ,CR,B02,BL05,ANGLE,FSLERT,ANG

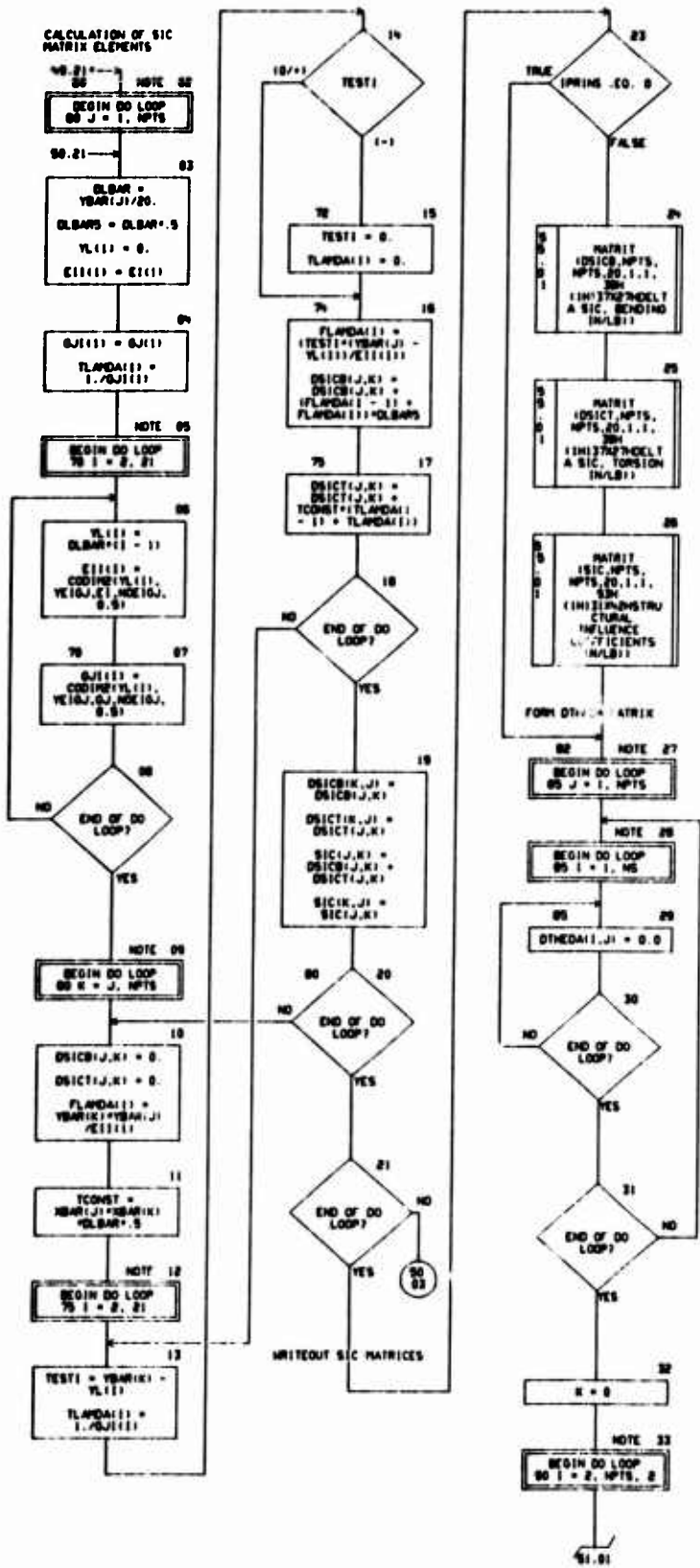


CHART TITLE - SUBROUTINE FLVBSIC/SICBAR,VEIGJ,E1,GJ,CR,BOP,BLPS,ANGLE,FLERT,ANG

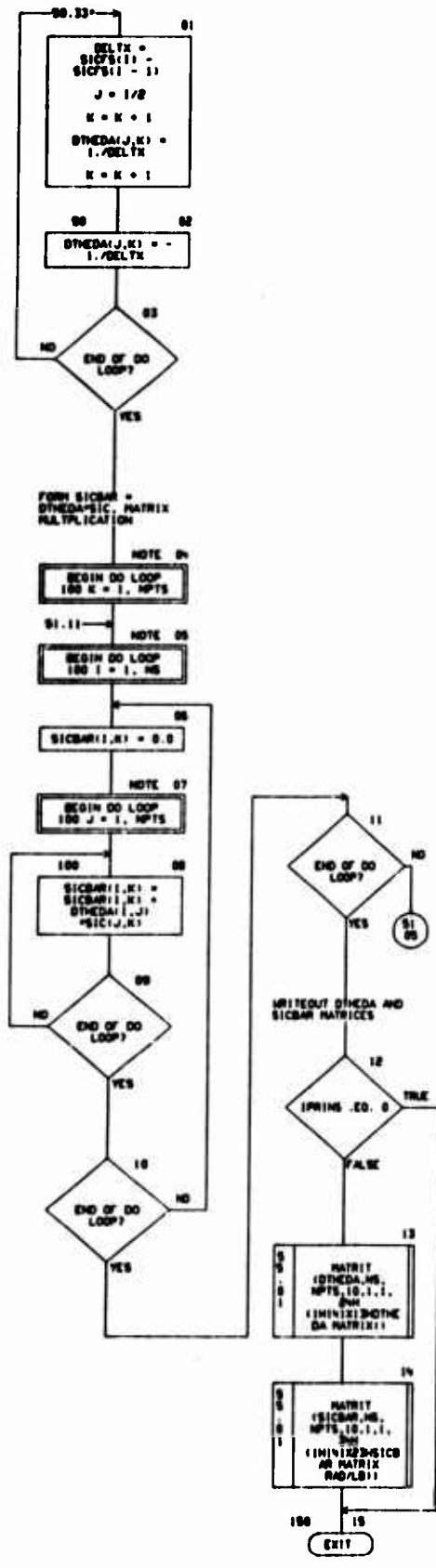


CHART TITLE - NON-PROCEDURAL STATEMENTS

```

DIMENSION XLE(20) ,XL(20) ,CL(20) ,SICFS(20) ,SICBL(20) ,
          XBAR(20) ,YBAR(20)
DIMENSION VL(21) ,E11(21) ,GJ(21) ,YEIG(20) ,E1(20) ,
          GJ(20) ,FLANDA(21),DBIC(20,20) ,DBICT(20,20) ,
          SIC(20,20),FLANDA(21)
DIMENSION DTMEDA(10,20) ,SICBAR(10,20)
COMMON TCDM(4,00)
80  FORMAT (1H) 24X,20H DATA FROM SUBROUTINE FLNSIC, / 04H  NS =,113,
      17X,04H XDC1GJ =,113, / 04H  CR =,178.2,04H IN., 7X,04H B02 =,178.
      2,04H IN., 0X,74H BLS6 =,177.2,04H IN., / 124H  ANGLE =,177.3,04H
      DEG., 4X,04H FBLE7 =,178.2,04H IN., / 124H  ANGLE =,177.3,04H DE
      G., 4X,04H FB0A8 =,178.2,04H IN., / 124H  ALANDA =,178.3,10X,04H 30
      CFND =,178.3,10X,04H H0CAFT =,178.3)
88  FORMAT (234H  EXECUTION STOPPED, / 01H NEGATIVE VALUE OF Y IN TH
      E SHEET AXIS SYSTEM HAS BEEN FOUND IN SUBROUTINE FLNSIC )

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05/04/73

AUTOFLEX CHART SET - B747-1 FLEXIBLE AIRLOADS SA PROGRAM PAGE 04

CHART TITLE - NON-PROCEDURAL STATEMENTS

DIMENSION A(25.00),X(20),L(20)

CHART TITLE - NON-PROCEDURAL STATEMENTS

DIMENSION APP11, HEAD1001
100 FORMAT(INDSHDR) COLUMN NO. =14//114 (PREC13.5)
110 FORMAT(INDSHDR) COLUMN NO. =14//114 (PREC13.5)

CHART TITLE - SUBROUTINE BLOW

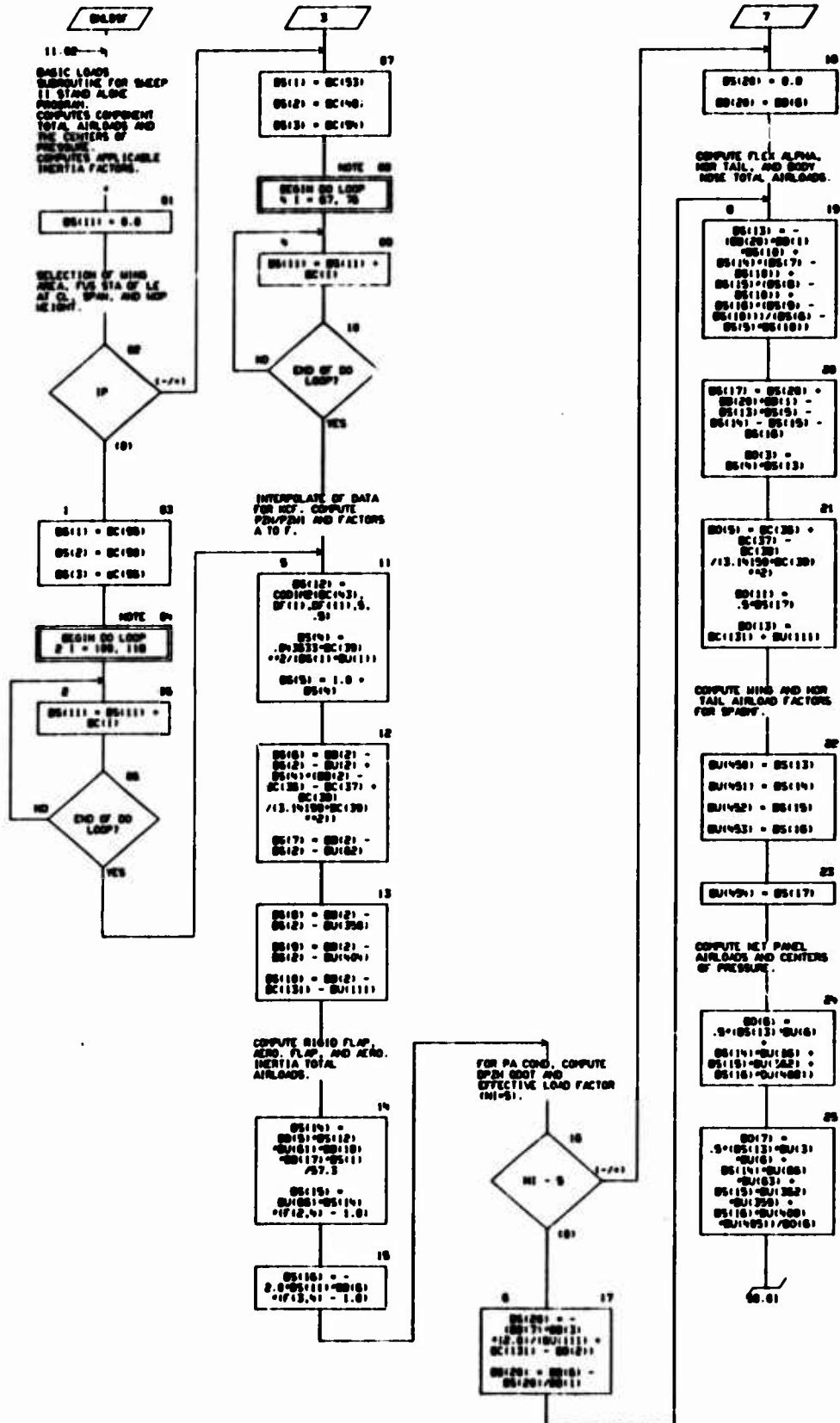


CHART TITLE - SUBROUTINE DLOAD

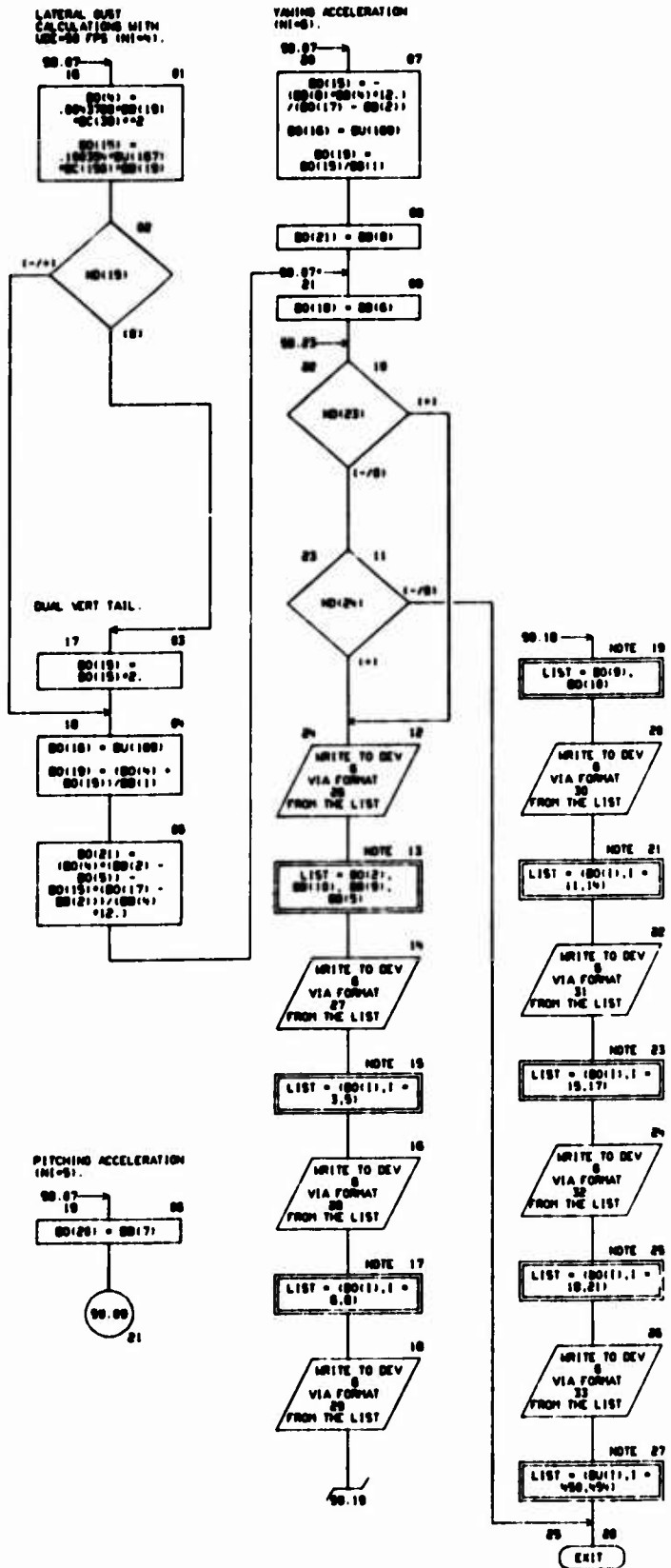


CHART TITLE - NON-PROCEDURAL STATEMENTS

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COMMON TCON(400)
DIMENSION OF(140),OC(100),OB(20),OS(20),OD(100),OU(100),OV(20),JO
(100),F(3,4)
EQUIVALENCE (OF(1),TCON(100)),(OC(1),TCON(270)),(OB(1),TCON(265)
), (OS(1),TCON(273)),(OD(1),TCON(263)),(OU(1),TCON(313)),(OV(1)
),TCON(263)),(ND(1),TCON(401)),(F(1,1),OU(120)),(MI,ND(100)),(IP,
ND(137)),(INT,ND(100)),(I,ND(151)),(J,ND(152)),(K,ND(153))
26 FORMAT(1H1H1H3CONDITION ND=77.0,SKD=475.3,SNMUL7=77.0,SKD=7
0.0)
27 FORMAT(1H3H1H3BODY LOADS/7HWPZM=75.0,4X,77=77.0,4XWPZM=75.0/)
28 FORMAT(1H3H1H4H3 PANEL LOAD/7HWPZM(1)/2=75.0,4X77(1)=77.0,4
X7HWPZM(1)=75.0/)
29 FORMAT(1H3H1H4H3H3 CARRY-OVER LOAD/7HWPZM(1)=75.0,4X7HWPZM(1)=75.
0/)
30 FORMAT(1H3H1H2H3HORIZONTAL TAIL LOADS/7HWPZM(2)=75.0,4X77(2)=75.0,4
X7HWPZM(2,4)=75.0,4X7HWPZM(2)=75.0/)
31 FORMAT(1H3H1H3H3HORIZONTAL TAIL LOAD/7HWPZM(4)=75.0,4X77(4)=75.0,4X7HWPZ
M(4)=75.0/)
32 FORMAT(1H3H1H3H3H3H3 AIRPLANE INERTIA FACTORS/7HWPZM(2)=75.0,4X77(2)=75.0,4X
7HWPZM(2,4)=75.0,4X7HWPZM(2)=75.0/)
33 FORMAT(1H3H1H3H3H3H3H3 COMPONENT SPANWISE FACTORS/7HWPZM(1)=75.0,4X77(1)=75.0,4X7HWPZM(1)
=75.0,4X77(2)=75.0,4X7HWPZM(2)=75.0,4X77(3)=75.0)

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CHART TITLE - SUBROUTINE SPADY

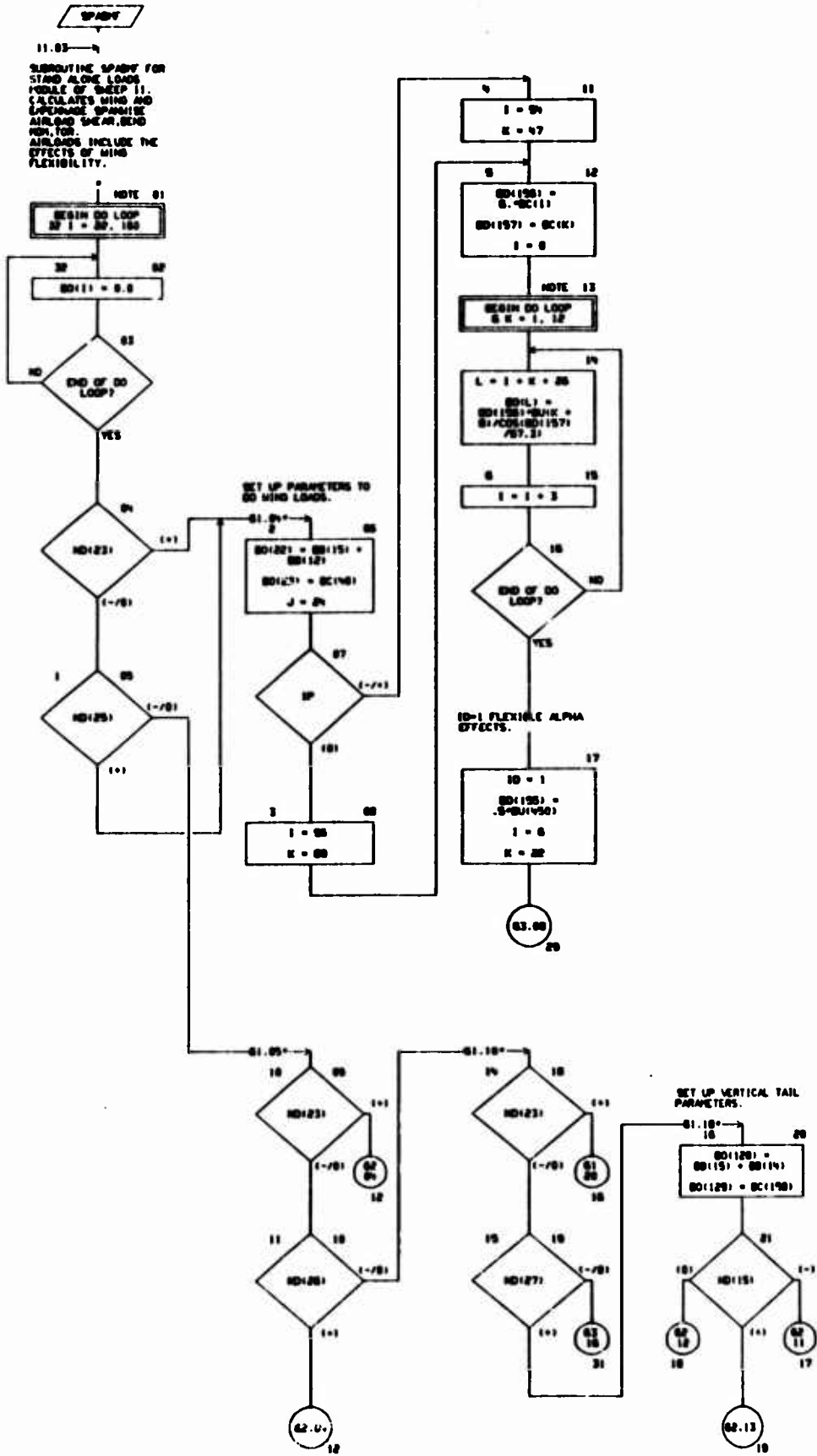


CHART TITLE - SUBROUTINE SPAD7

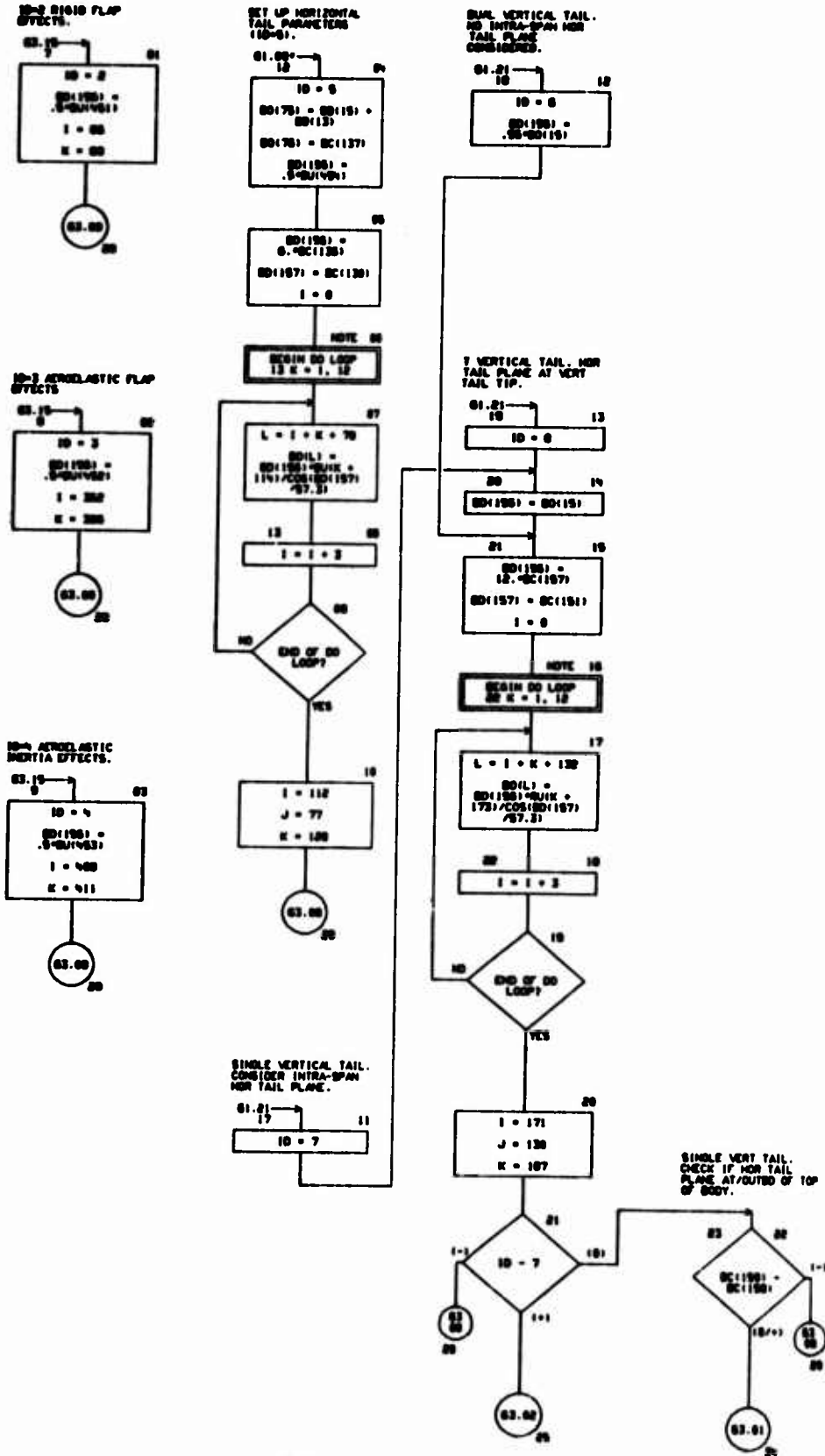


CHART TITLE - SUBROUTINE SPADVF

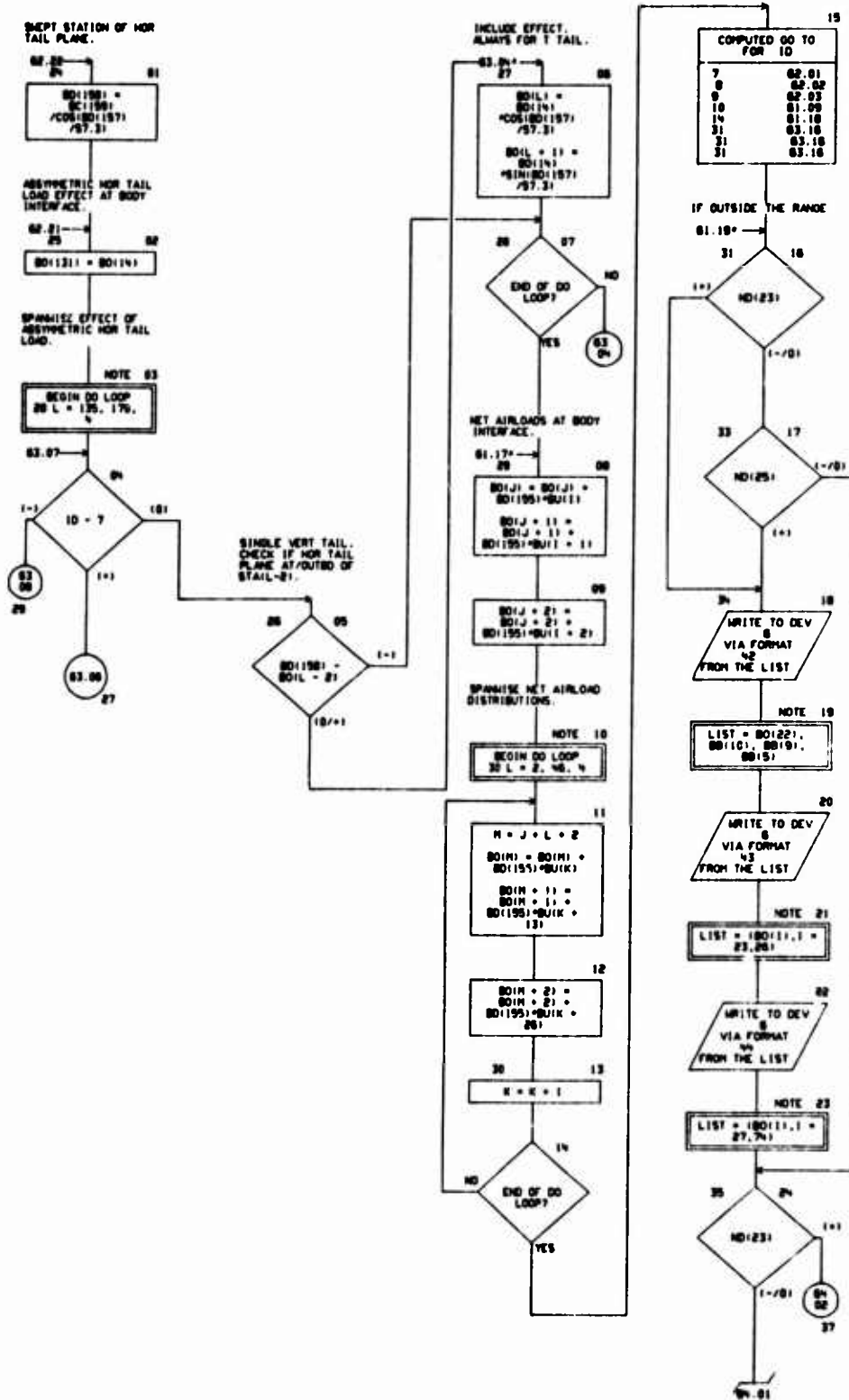


CHART TITLE - SUBROUTINE SPANF

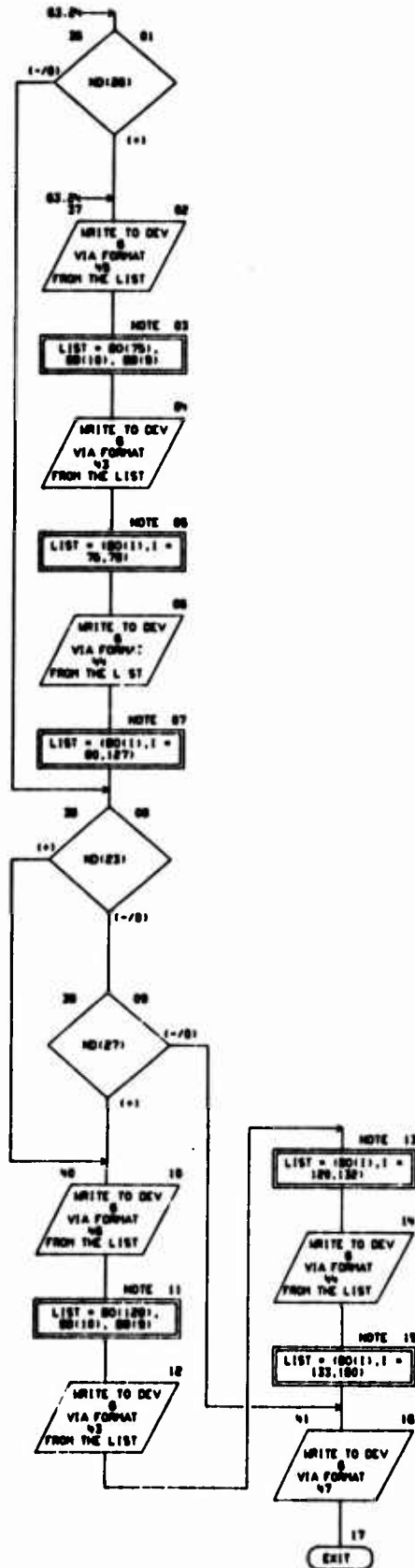


CHART TITLE - NON-PROCEDURAL STATEMENTS

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COMMON TCOM(1400)
DIMENSION BD(20),BC(105),BD(30),BD(100),BU(500),ND(200)
EQUIVALENCE (BC(1),TCOM(2750)),(BD(1),TCOM(2953)),(BD(1),TCOM(2993)
), (BU(1),TCOM(3153)),(BD(1),TCOM(3053)),(ND(1),TCOM(4201)),(IP,ND
(137)),(I0,ND(104)),(I1,ND(150)),(I2,ND(195)),(I3,ND(157)),(I4,ND(190)
), (N,ND(100))
42 FORMAT(1H)X10G4ND LOADSINHCND ND=7.0,IX300=75.3,SNMULT=77.0
,SKDEF=75.0)
43 FORMAT(1H)X10BODY INT=7.2,SHINX10SHEAR SOB=75.0,SHLX10SHEAR
SOB=710.0,SHIN-LB=X10TORSN SOB=710.0,SHIN-LB//1XTRSTATION10SH
SHEAR10SHEAR ND=10TORSN NDV14X1H(1H)10H1010X10H1010X10H1010X10H1010X10
H10-LB//)
44 FORMAT(1H)X10.2,724.0,725.0,726.0)
45 FORMAT(1H)X10HORIZONTAL TAIL LOADSINHCND ND=7.0,IX300=75.3,5
SMULT=77.0)
46 FORMAT(1H)X10VERTICAL TAIL LOADSINHCND ND=7.0,IX300=75.3,5X
MULT=77.0)
47 FORMAT(1H)

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FORTRAN MODULE (LIST,COBOL)

CARD NO	****	CONTENTS	****
1	C	BFWL IS THE STAND ALONE FLEXIBLE LOADS CONTROL PROGRAM.	BFWL001
2	C	DETERMINES BASIC AIRLOAD CONDITIONS TO BE COMPUTED FOR A SPECIFIED BFWL002	
3	C	SPEED-ALTITUDE CASE.	BFWL003
4	C	IT PROVIDES LOGIC AND CONTROL FOR THE AIRLOAD SUBROUTINES.	BFWL004
5		CONVEN TCOH(400)	BFWL005
6		DIMENSION ND(200),BD(300),BC(100),DD(20),DT(50),DD(55),DT(140),DP(BFWL010	
7		(170),DF(200),DU(500)	BFWL011
8		EQUIVALENCE (ND(1),TCOH(201)),(DD(1),TCOH(203)),(BC(1),TCOH(270)BFWL020	
9		(1),DD(1),TCOH(203)),(DF(1),TCOH(400)),(DT(1),TCOH(100)),(DU(1),BFWL021	
10		(2TCOH(100)),(DF(1),TCOH(100)),(DP(1),TCOH(110)),(1,ND(101)),(1,ND(102)	
11		(1,ND(103)),(1,ND(104)),(1,ND(105)),(1,ND(106)),(1,ND(107)),(1,ND(108)),(1,ND(109)	
12		(1,ND(110)),(1,ND(111),TCOH(310)),(1,ND(112)),(1,ND(113)),(1,ND(114)),(1,ND(115))BFWL024	
13		0)	BFWL025
14		DD 57 1=400,400	BFWL026
15		57 DU(1)=0.0	BFWL028
16		DD 1 1=1.000	BFWL030
17		1 BC(1)=0.0	BFWL032
18		3 READ(5,4)(ND(1),1=13,40)	BFWL040
19		4 FORMAT(3A12)	BFWL041
20		10=1	BFWL043
21		CALL READAT	BFWL045
22		CALL SECND (DT)	BFWL050
23		CALL SECND (DD)	BFWL055
24		CALL SECND (DF)	BFWL060
25		CALL SECND (DP)	BFWL065
26		DD 5 1=100.131	BFWL075
27		5 ND(11)=0	BFWL077
28		10=40(40)	BFWL080
29	C	FL UP REQUIRED CONDITIONS MAP.	BFWL083
30		DU TO (7,7,7,10,10,10,7,25,20,7,7),10	BFWL085
31	C	POSITIVE NZ CONDITIONS.	BFWL090
32		7 IF(ND(20))10,10,0	BFWL095
33		8 IF(ND(21))10,10,0	BFWL100
34		9 IF(ND(22))10,10,0	BFWL105
35		10 IF(ND(23))10,10,0	BFWL110
36		11 ND(112)=1	BFWL115
37		12 ND(113)=1	BFWL120
38		13 ND(120)=1	BFWL125
39		IF(ND(31))27,27,16	BFWL130
40		14 ND(120)=1	BFWL135
41		15 ND(130)=1	BFWL140
42	C	NEGATIVE NZ CONDITIONS.	BFWL145
43		16 IF(ND(20))27,27,17	BFWL150
44		17 IF(ND(21))20,21,10	BFWL155
45		18 IF(ND(22))20,20,10	BFWL160
46		19 IF(ND(23))24,27	BFWL165
47		20 ND(113)=1	BFWL170
48		21 ND(117)=1	BFWL175
49		22 ND(121)=1	BFWL176
50		IF(ND(31))27,27,37	BFWL178
51		23 ND(120)=1	BFWL180
52		24 ND(131)=1	BFWL183
53		DD TO 27	BFWL184
54	C	RECOVERING FLAP DOWN CONDITION.	BFWL188
55		25 ND(124)=1	BFWL190
56		DD TO 50	BFWL193
57	C	FLAP DOWN IS TRIM CONDITION.	BFWL195
58		26 ND(125)=1	BFWL198
59		DD TO 50	BFWL200
60	C	POSITIVE VERTICAL GUST CONDITIONS.	BFWL203
61		27 IF(ND(32))31,31,20	BFWL205
62		28 IF(ND(33))30,30,30	BFWL208
63		29 ND(100)=1	BFWL210
64		DD TO 31	BFWL213
65		30 ND(100)=1	BFWL215
66	C	NEGATIVE VERTICAL GUST CONDITIONS.	BFWL218
67		31 IF(ND(33))35,35,32	BFWL220
68		32 IF(ND(34))34,34,34	BFWL223
69		33 ND(110)=1	BFWL225
70		DD TO 35	BFWL228

05/04/73	INPUT LISTING	AUTOFLY CHART SET - BFCNL	FLEXIBLE AIRLOADS SA PROGRAM
CARD NO	****	CONTENTS	****
71	34 ND1271=1		BFCNT230
72	00 TO 00		BFCNT233
73	C LATERAL GUST CONDITIONS.		BFCNT236
74	35 IF(ND124)150,00,35		BFCNT239
75	35 ND1111=1		BFCNT242
76	00 TO 00		BFCNT245
77	C PITCHING ACCELERATION CONDITIONS.		BFCNT248
78	37 IF(ND135)143,43,30		BFCNT251
79	38 IF(ND136)140,41,30		BFCNT254
80	38 IF(ND137)142,40,00		BFCNT257
81	40 ND1114=1		BFCNT260
82	41 ND1110=1		BFCNT263
83	42 ND1107=1		BFCNT266
84	C YAWING ACCELERATION CONDITIONS.		BFCNT269
85	43 IF(ND138)150,00,44		BFCNT272
86	44 IF(ND139)148,47,45		BFCNT275
87	45 IF(ND140)146,46,00		BFCNT278
88	46 ND1115=1		BFCNT281
89	47 ND1110=1		BFCNT284
90	44 ND1123=1		BFCNT287
91	C CONDITION PARAMETERS. REGION 1001.		BFCNT290
92	00 001111=0.0		BFCNT293
93	00 001131=4.0		BFCNT296
94	00 001141=0.0151=0		BFCNT299
95	00 001161=0.0		BFCNT302
96	00 127 1=1.23		BFCNT305
97	IF(ND11100)127,127,00		BFCNT310
98	00 00 2 1=1.21		BFCNT312
99	2 00111=0.0		BFCNT314
100	00 TO 175,73,73,00,00,00,00,00,00,00,00,00,70,70,70,61,04,77,77,71		BFCNT316
101	1,71,70,70,1		BFCNT318
102	C CASE 0 (FLAP DOWN HANGLER) PARAMETERS.		BFCNT320
103	01 00111=0C111		BFCNT322
104	00110=0C110		BFCNT324
105	001101=1.9*0C124/001.3		BFCNT326
106	IF(ND114)102,02,03		BFCNT328
107	02 00121=0C121		BFCNT330
108	00 TO 00		BFCNT332
109	03 00121=0C121		BFCNT334
110	00 TO 00		BFCNT336
111	C CASE 0 (FLAPS DOWN 1.00 TRIM) PARAMETERS.		BFCNT340
112	04 00111=0C111		BFCNT342
113	00110=0C110		BFCNT344
114	00110=1.0		BFCNT346
115	001101=1.2*0C120/001.3		BFCNT348
116	00 00121=0.0		BFCNT350
117	00141=0.0		BFCNT352
118	00151=0C144		BFCNT354
119	00171=0.0		BFCNT356
120	00181=0.0		BFCNT358
121	00191=0.0		BFCNT360
122	IF(ND114)105,00,07		BFCNT362
123	00 001121=1.0		BFCNT364
124	00 TO 112		BFCNT366
125	07 001121=2.0		BFCNT368
126	00 TO 112		BFCNT370
127	C FLAPS UP CONDITION ALTITUDE.		BFCNT372
128	00 00101=0C110		BFCNT374
129	00 TO 00		BFCNT376
130	00 00101=0C120		BFCNT378
131	00 TO 00		BFCNT380
132	70 00101=0C121		BFCNT382
133	00 TO 00		BFCNT384
134	71 00101=0C120		BFCNT386
135	00 TO 00		BFCNT388
136	72 00101=0C130		BFCNT390
137	00 TO 00		BFCNT392
138	73 IF(ND130)100,74,75		BFCNT394
139	74 IF(0C120)1-20000,100,70,70		BFCNT396
140	75 IF(0C121)1-20000,170,70,70		BFCNT398
141	C 104 GUST AT 20000 FT. WIND FIXED OR VARIABLE AFT.		BFCNT400

05/04/75	INPUT LISTING	AUTOFLEX CHART SET - BFCNTL	FLEXIBLE AIRLOADS SA PROGRAM
CARD NO	****	CONTENTS	****
013		00(2)=00(10)	BFCNT000
014	C	MAX NUMBER CHANGE TEST.	BFCNT002
015		IF(00(10)-00(10)1117,120,117	BFCNT004
016	C	ALTITUDE CHANGE TEST.	BFCNT006
017		100 IF(00(10)-00(11)1120,110,120	BFCNT008
018		117 00(10)-00(10)	BFCNT010
019		120 00(11)-00(10)	BFCNT012
020		MF=1	BFCNT014
021		CALL SUBP07	BFCNT016
022		IF(ICALS.E0.0) 00 TO 110	BFCNT018
023		00 00 J=1,NE0	BFCNT020
024		00(14)=J1=0F(00+J)	BFCNT022
025		00 00(14)=J1=0F(00+J)	BFCNT024
026		00(14)=00(12)	BFCNT026
027		110 CONTINUE	BFCNT028
028		00 TO 110,122,123,110,110,124,125,110,110,124,125,110,110,124,125	BFCNT030
029		1,110,110,121,122,110,110,110,110,1	BFCNT032
030		110 N1=1	BFCNT034
031		00 TO 120	BFCNT036
032		121 N1=2	BFCNT038
033		00 TO 120	BFCNT040
034		122 N1=3	BFCNT042
035		00 TO 120	BFCNT044
036		123 N1=4	BFCNT046
037		00 TO 120	BFCNT048
038		124 N1=5	BFCNT050
039		00 TO 120	BFCNT052
040		125 N1=6	BFCNT054
041		126 CALL SUBP07	BFCNT056
042		CALL SUBP07	BFCNT058
043		IF(IND(4)100,00,40	BFCNT060
044		40 IC=1	BFCNT062
045		IC=1+1000000+IC+10000+1+1000+1	BFCNT064
046		00 01 J=1,100,5	BFCNT066
047		WRITE(14,00(1C,00(1J),00(1J+1),00(1J+2),00(1J+3),00(1J+4),IC	BFCNT068
048		00 FORMAT(112,1PSE12.0,10)	BFCNT070
049		IC=IC+5	BFCNT072
050		01 IC=IC+1	BFCNT074
051		00 IF(IND(4)1127,127,02	BFCNT076
052		02 WRITE(0,53)	BFCNT078
053		03 FORMAT(1M1)	BFCNT080
054		IC=1	BFCNT082
055		IC=1+1000000+IC+10000+1+1000+1	BFCNT084
056		00 00 J=1,100,5	BFCNT086
057		WRITE(0,0+IC,00(1J),00(1J+1),00(1J+2),00(1J+3),00(1J+4),IC	BFCNT088
058		04 FORMAT(1M 5X112,3X1PSE15.5,3X10)	BFCNT090
059		IC=IC+5	BFCNT092
060		05 IC=IC+1	BFCNT094
061		WRITE(0,53)	BFCNT096
062		127 CONTINUE	BFCNT100
063		00 TO 3	BFCNT000
064		END	BFCNT000
065		SUBROUTINE REORDAT	REORDA01
066	C	REARRANGES BC AND NEV BF DATA TO BFCNTL FORMAT.	REORDA05
067	C	SETS UP EI AND OJ DATA FOR MFLX INPUT.	REORDA07
068		COMMON TCOM(400)	REORDA10
069		DIMENSION BC(105),BF(200),ND(200)	REORDA15
070		EQUIVALENCE (BC(1),TCOM(2750)),(BF(1),TCOM(400)),(ND(1),TCOM(401)REORDA20	
071		1),1,ND(132)),(J,ND(133)),(IR,ND(107)),(IP,ND(137))	REORDA25
072		IF(IR)1,1,00	REORDA27
073		1 CALL DECRO (BC)	REORDA30
074		CALL *ECRO (BF)	REORDA32
075		WRITE(0,33)	REORDA34
076		WRITE(0,34) (BC(1),1=1,100)	REORDA36
077		WRITE(0,33)	REORDA38
078		WRITE(0,34) (BF(1),1=1,100)	REORDA40
079		00 2 1=11,113	REORDA43
080		2 BF(1)=BC(1)+95)	REORDA46
081		00 3 1=107,110	REORDA50
082		3 BF(1)=BC(1)-7)	REORDA55
083		00 4 1=170,101	REORDA60

CARD NO	****	CONTENTS	****
284	J=283-1		REDA283
285	4 BC(1J)+BC(1J-3)		REDA285
286	BC(180)+BC(157)		REDA276
287	00 5 1=161,171		REDA275
288	5 BC(11)+BC(1-15)		REDA288
289	BC(199)+BC(104)		REDA285
290	00 6 1=150,160		REDA286
291	6 BC(11)+BC(1-13)		REDA286
292	BC(138)+BC(125)		REDA180
293	00 7 1=138,148		REDA185
294	7 BC(11)+BC(1-25)		REDA119
295	00 8 1=129,137		REDA119
296	8 BC(11)+BC(1-24)		REDA120
297	IF(ND(14))0,0,11		REDA125
298	9 00 10 1=87,120		REDA130
299	10 BC(11)+0,0		REDA135
300	00 10 15		REDA140
301	11 00 12 1=109,120		REDA145
302	12 BC(11)+BF(1-82)		REDA150
303	BC(87)+BC(80)		REDA155
304	00 13 1=80,100		REDA160
305	13 BC(11)+BC(1-21)		REDA165
306	00 14 1=82,95		REDA170
307	14 BC(11)+BC(1-20)		REDA175
308	BC(81)+BF(25)		REDA180
309	BC(80)+BC(71)		REDA185
310	BC(80)+BC(70)		REDA190
311	BC(80)+BF(25)		REDA195
312	BC(87)+BC(80)		REDA200
313	15 00 16 1=87,88		REDA205
314	16 BC(11)+BF(1-82)		REDA210
315	00 17 1=88,88		REDA212
316	J=124-1		REDA214
317	17 BC(1J)+BC(1J-10)		REDA216
318	BC(195)+BC(157)		REDA218
319	BC(157)+BC(147)		REDA220
320	BC(196)+BC(146)		REDA225
321	00 18 1=90,94		REDA230
322	18 BC(11)+BC(1-9)		REDA235
323	BC(149)+BF(14)		REDA240
324	BC(148)+BC(140)		REDA245
325	BC(147)+BC(139)		REDA250
326	BC(146)+BF(13)		REDA255
327	BC(145)+BC(130)		REDA260
328	00 19 1=41,44		REDA265
329	19 BC(11)+BF(1-86)		REDA270
330	00 20 1=24,40		REDA275
331	J=74-1		REDA278
332	20 BC(1J)+BC(1J-3)		REDA280
333	IF(ND(14))21,21,23		REDA285
334	21 00 22 1=29,33		REDA290
335	22 BC(11)+0,0		REDA295
336	00 20 24		REDA300
337	23 BC(131)+BF(2)		REDA305
338	BC(132)+BF(20)		REDA310
339	BC(131)+BC(20)		REDA315
340	BC(130)+BC(20)		REDA320
341	BC(129)+BC(25)		REDA325
342	24 BC(20)+BF(11)		REDA330
343	00 25 1=25,27		REDA335
344	25 BC(11)+BF(1-85)		REDA340
345	RETURN		REDA345
346	26 IF(IP)20,27,20		REDA355
347	27 BF(117)+BC(148)/COS(BC(80)/57.3)		REDA360
348	BF(174)+BC(196)+6.0/COS(BC(80)/57.3)		REDA365
349	00 20 20		REDA370
350	28 BF(117)+BC(148)/COS(BC(146)/57.3)		REDA375
351	BF(174)+BC(194)+6.0/COS(BC(146)/57.3)		REDA380
352	29 BF(114)+0,0		REDA385
353	BF(118)+.25*BF(117)		REDA390
354	BF(116)+.50*BF(117)		REDA395

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05/04/73      INPUT LISTING      AUTOFLON CHART SET - B/CNVL      FLEXIBLE AIRLOADS SA PROGRAM

CARD NO      ****      COMMENTS      ****

305          BF(110)=1.1*BF(117)      READ400
306          BF(117)=CODINE(BF(117),BF(47),BF(67),ND(42),.5)      READ405
307          BF(107)=CODINE(BF(117),BF(47),BF(67),ND(42),.5)      READ410
308          DD 30 1=120,135      READ415
309          BF(11)=10.*BF(137)      READ420
310          DD BF(11+20)=10.*BF(137)      READ425
311          BF(170)=BF(170)-BF(110)/15.0      READ430
312          DD 31 1=110,135      READ435
313          DD 31 BF(11)-BF(11)-BF(170)      READ440
314          DD 32 1=120,135      READ445
315          BF(11)=CODINE(BF(11-20),BF(47),BF(67),ND(42),.5)      READ450
316          DD BF(11-20)=CODINE(BF(11-20),BF(47),BF(67),ND(42),.5)      READ455
317          RETURN      READ460
318          DD FORMAT(1H)      READ465
319          DD FORMAT(1H) SKIP(5,5)      READ470
320          END      READ480

371          SUBROUTINE BECDIV
372          DIMENSION V(1),T(5),A(10)
373          DATA BLANK/0 /
374          G READ(5,1)ND,IT(N),N=1,5,(AIN),M=1,10)
375          I FORMAT(1,112,713,8712,0,713,1048)
376          IF(EOF(5))GOTO 377
377          G CALL EXIT
378          C
379          DD IF(IND)7,0,7
380          C
381          G WRITE(6,9) (AIN),M=1,10)
382          G FORMAT(17H NO BECK LOCATION,54,1048/1
383          DD TO 5
384          C
385          DD 2 N=1,5
386          NN = 2*N - 1
387          IF(AIN) - BLANK(3,1),3
388          II IF(AIN) - BLANK(3,2),3
389          III = (ABS(IND) + N - 1
390          V(1) = T(1)
391          G CONTINUE
392          IF(IND)6,0,0
393          G RETURN
394          END
395          SUBROUTINE USPAF      USPF001
396          C STAND ALONE FLEXIBILITY SUBROUTINE FOR SHEEP 11.      USPF002
397          C DERIVES FLEXIBLE MING AND RIGID EXPENADRE FACTORS AND UNIT AIRLOADS      USPF003
398          C DISTRIBUTIONS. FLEXIBILITY INCLUDES ANGLE OF ATTACK, REFLECTED      USPF004
399          C FLAP, AND AEROELASTIC INERTIA EFFECTS.      USPF005
400          COMMON TCON(400)      USPF006
401          DIMENSION ND(200),DT(50),DD(50),BF(140),DP(70),BC(105),DD(20),SUSPF0020
402          I(20),BD(100),BU(500),DD(30),YAI(4),YB(10),VC(5),ED(5),EBS(13),YBS(USPF0021
403          21),DPA(11),DP(11),AFM(10,3),AFMP(10,3),AFM(10,3),AFMP(10,3),FUSPF0022
404          3(3,4),VE(16),E(120),G(120),ECP(11),ULN(11),DMS(13),UTN(11),BF(USPF0023
405          400)      USPF0024
406          EQUIVALENCE (DT(1),TCON(100)),(DD(1),TCON(150)),(BF(1),TCON(100))USPF0030
407          I,(DP(1),TCON(110)),(ND(1),TCON(120)),(BC(1),TCON(170)),(DD(1),TUSPF0031
408          2CON(200)),(DD(1),TCON(270)),(DD(1),TCON(290)),(BU(1),TCON(315))USPF0032
409          3),(DD(1),TCON(350)),(BF(1),TCON(400)),(AFM(1,1),BU(200)),(AFMP(USPF0033
410          41,1),BU(250)),(AFM(1,1),BU(200)),(AFMP(1,1),BU(310)),(F(1,1),BU(USPF0034
411          50),VE(16)),(E(11),BF(13)),(E(11),BF(13)),(G(11),BF(13)),(TCON,DD(USPF0035
412          00)),(VT,DD(14)),(YAI(1),DD(1)),(YB(1),DD(5)),(VC(1),DD(2)),(ED(1),USPF0036
413          70),DD(5)),(EBS(1),DD(3)),(YBS(1),DD(4)),(DPA(1),DD(5)),(DP(1),DD(USPF0037
414          91)),(ECP(1),DD(9)),(ULN(1),DD(10)),(DMS(1),DD(11)),(UTN(1),DD(USPF0038
415          0130)),(ND,ND(43)),(ICALCS,ND(105)),(INCLG,ND(103)),(IR,ND(107)) USPF0039
416          EQUIVALENCE (NF,ND(100)),(I,ND(132)),(J,ND(133)),(K,ND(134)),(L,ND(USPF0040
417          1130)),(M,ND(130)),(IP,ND(137)),(NF,ND(140))      USPF0041
418          DD I =1,500      USPF0050
419          I BU(1)=0.0      USPF0055
420          NT=1      USPF0060
421          IF(TCON-1.0)2,0,0      USPF0065
422          G IF(TCON-0.014,4,3      USPF0070
423          3 DD(2)=.05      USPF0075
424          DD TO 5      USPF0080
425          4 DD(2)=CON      USPF0085

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05/04/75	INPUT LISTING	AUTOFLON CHART SET - BFCNTL	FLEXIBLE AIRLOADS SA PROGRAM
CARD NO	****	CONTENTS	****
425	C	SUBSONIC Q/K PARAMETER.	USPF0000
427	6	05(11)=CDBIN(05(2),07(0),07(2),12,.5)	USPF0005
428		00 TO 9	USPF0100
429	6	IF(CM=1.117,0.0	USPF0105
430	7	05(2)=1.1	USPF0110
431		00 TO 9	USPF0115
432	6	05(2)=CM	USPF0120
433	9	IF(NT=010,10,10	USPF0125
434	C	MIND ANALYSIS.	USPF0130
435	10	05(3)=CDBIN(CM,07(0),07(3),12,.5)	USPF0135
436		05(4)=05(40)	USPF0140
437		IF(05(12)=2.0	USPF0145
438		IF(1P(14,11,14	USPF0150
439	C	MIND VARIABLE SHEEP FND.	USPF0155
440	11	00 12 1=0,13	USPF0160
441	12	05(11)=05(1102)	USPF0165
442		05(14)=05(140.0	USPF0170
443		05(16)=05(167)	USPF0175
444		00 13 1=1,11	USPF0180
445	13	05(11)=05(109-11/05(14)	USPF0185
446		00 TO 17	USPF0190
447	C	MIND FIXED OR VARIABLE SHEEP AT.	USPF0195
448	14	00 15 1=0,13	USPF0200
449	15	05(11)=05(1140)	USPF0205
450		05(14)=05(140.0	USPF0210
451		05(16)=05(165)	USPF0215
452		00 16 1=1,11	USPF0220
453	16	05(11)=05(107-11/05(14)	USPF0225
454		17 05(10)=1.0	USPF0230
455		05(15)=05(15/05(14)	USPF0235
456		05(17)=05(172/05(14)	USPF0240
457		05(18)=05(181/05(14)	USPF0245
458		00 TO 25	USPF0250
459	C	EXPONENTIAL (X/C) OF CP.	USPF0255
460	18	05(3)=CDBIN(CM,07(0),07(5),12,.5)	USPF0260
461		IF(NT=010,20,20	USPF0265
462	C	HORIZONTAL TAIL PARAMETERS.	USPF0270
463	19	05(4)=05(137)	USPF0275
464		05(5)=05(139)	USPF0280
465		05(7)=05(130)	USPF0285
466		05(8)=05(131)	USPF0290
467		00 20 1=10,13	USPF0295
468	20	05(11)=05(120+1)	USPF0300
469		05(14)=05(133)+0.0	USPF0305
470		05(15)=05(14/05(14)	USPF0310
471		05(16)=05(132)	USPF0315
472		00 21 1=1,11	USPF0320
473	21	05(11)=05(1150-11/05(14)	USPF0325
474		05(115)=1.0	USPF0330
475		00 TO 25	USPF0335
476	C	VERTICAL TAIL PARAMETERS.	USPF0340
477	22	05(4)=05(150)	USPF0345
478		05(5)=05(150)	USPF0350
479		05(7)=05(151)	USPF0355
480		05(8)=05(152)	USPF0360
481		00 23 1=10,13	USPF0365
482	23	05(11)=05(1143)	USPF0370
483		05(14)=05(157)+12.0	USPF0375
484		05(15)=05(14/05(14)	USPF0380
485		05(16)=05(160)	USPF0385
486		00 24 1=1,11	USPF0390
487	24	05(11)=05(1170-11/05(14)	USPF0395
488		05(174)=1.0	USPF0400
489		05(12)=05(12)+0.0	USPF0405
490		25 IF(CM=1.0)26,30,30	USPF0410
491	C	SUBSONIC AERO DATA.	USPF0415
492	26	05(10)=ATAN(ATAN(05(0)/07.3)+11.0-05(11)/05(12)+11.0-05(11)/05(12)/05(10)+20	USPF0420
493		10RT(1.0-05(2)+0.1)+07.3	USPF0425
494		05(20)=05(11)+05(12)	USPF0430
495	C	SUBSONIC CLARK TABLE VALUES.	USPF0435
496		L=0	USPF0440

06/04/73	INPUT LISTING	AUTOFLW CHART SET - BFCNTL	FLEXIBLE AIRLOADS SA PROGRAM
CARD NO	****	CONTENTS	****
007		DD 27 I=1,4	UBPF 0445
008		K=14.005	UBPF 0450
009		YA(1)=CODIME(05(10),05(20),00(11),00(7),00(K),7,0.,5)	UBPF 0455
010		27 L=441	UBPF 0460
011		WRITE(0,20)05(12),05(10),05(11),05(20)	UBPF 0465
012		WRITE(0,20)DT(1),1=5,0),YA(1),1=1,4)	UBPF 0470
013		IF INT=0)30,32,34	UBPF 0475
014	C	MIND RIGID CLAS.	UBPF 0480
015		30 DD(10)=CODIME(05(11),DT(0),YA,4.,5)*57.3/05(1)	UBPF 0500
016		WRITE(0,31)	UBPF 0505
017		GO TO 37	UBPF 0515
018		30 I=100	UBPF 0520
019		WRITE(0,33)	UBPF 0525
020		GO TO 36	UBPF 0535
021		34 I=107	UBPF 0540
022		WRITE(0,35)	UBPF 0545
023	C	EXPANDED LIFT CURVE SLOPE.	UBPF 0555
024		36 BU(1)=CODIME(05(11),DT(0),YA,4.,5)*57.3/05(1)	UBPF 0560
025	C	SUBSONIC (CLC/CLCAV) TABLE VALUES.	UBPF 0565
026		37 L=0	UBPF 0570
027		DD 30 I=1,10	UBPF 0575
028		K=14.013	UBPF 0580
029		YB(1)=CODIME(05(10),05(20),00(11),00(7),00(K),7,0.,5)	UBPF 0585
030		30 L=441	UBPF 0590
031		GO TO 40	UBPF 0595
032	C	SUPERSONIC AERO DATA.	UBPF 0600
033		30 05(10)=05(12)*SQRT(05(2)**2-1.0)	UBPF 0605
034		05(20)=SQRT(05(2)**2-1.0)/TAN(05(5)/57.3)	UBPF 0610
035	C	SUPERSONIC (2T/VAR) TABLE VALUES.	UBPF 0615
036		L=0	UBPF 0620
037		DD 40 I=1,10	UBPF 0625
038		K=14.014	UBPF 0630
039		YB(1)=CODIME(05(20),05(10),0P(0),0P(1),0P(K),5,0.,5)	UBPF 0635
040		40 L=444	UBPF 0640
041		WRITE(0,41)05(12),05(11),05(10),05(20)	UBPF 0645
042		WRITE(0,42)DT(1),1=5,0)	UBPF 0650
043		IF INT=0)43,44,46	UBPF 0655
044		43 WRITE(0,31)	UBPF 0670
045		GO TO 46	UBPF 0675
046		44 WRITE(0,33)	UBPF 0680
047		GO TO 46	UBPF 0685
048		45 WRITE(0,35)	UBPF 0690
049		46 WRITE(0,47)CM	UBPF 0695
050		J=1	UBPF 0705
051		K=4	UBPF 0710
052		L=1	UBPF 0715
053		40 WRITE(0,40)YB(1),1=J,K,DT(L)	UBPF 0720
054		J=J+4	UBPF 0730
055		K=K+4	UBPF 0735
056		L=L+1	UBPF 0740
057		IF L=4)40,46,50	UBPF 0745
058	C	LOADING AT AERO DATA STATIONS.	UBPF 0750
059		50 DD 51 I=1,4	UBPF 0755
060		L=(I-1)*4+1	UBPF 0760
061		51 YC(1)=CODIME(05(11),DT(0),YB(L),4.,5)	UBPF 0765
062		YC(5)=0.0	UBPF 0770
063		IF INT=0)52,52,54	UBPF 0775
064		52 L=5	UBPF 0780
065		DD 53 I=1,4	UBPF 0785
066		53 ED(1)=DT(1)	UBPF 0790
067		ED(5)=1.0	UBPF 0795
068		GO TO 56	UBPF 0800
069		54 L=3	UBPF 0805
070		ED(1)=0.0	UBPF 0810
071		ED(2)=.042	UBPF 0815
072		ED(3)=1.0	UBPF 0820
073		55 WRITE(0,50)CM	UBPF 0825
074		WRITE(0,57)ED(1),YC(1),1=1,L)	UBPF 0835
075		IF INT=0)58,120,120	UBPF 0845
076	C	MIND STRIP BOUNDARY STATIONS.	UBPF 0850
077		58 E55(1)=1.0	UBPF 0855

CARD NO	****	CONTENTS	****
068		ESS(ND+1)=SS(15)	USP7068
069		ES(ND+2)=0.0	USP7069
070		SD(ND+ND(43))	USP7070
071		DO 00 I=2,ND	USP7071
072		00 ESS(1)=ESS(1)-1+11.0-ESS(ND+1)/SD(ND)	USP7072
073	C	STRIP LOADING DUE TO RIGID ALPHA EFFECTS.	USP7073
074		J=ND+2	USP7074
075		DO 00 I=1,J	USP7075
076		00 YSS(1)=CODING(ESS(1),CD,TC,L..S)	USP7076
077	C	STRIP NET RIGID UNIT ALPHA EFFECTS LOAD.	USP7077
078		SD(00)=0.0	USP7078
079		DO 01 I=0,J	USP7079
080		00 PAI(1)=0.0+ESS(1)-ESS(11)+YSS(1)-YSS(11)	USP7080
081		01 SD(00)=SD(00)+PAI(1-1)	USP7081
082	C	MODIFY CARRYOVER STRIP LOAD AND NORMALIZE.	USP7082
083		SD(00)=SD(00)-S*SD(ND+1)	USP7083
084		SD(ND)=1+S*SD(ND+1)	USP7084
085		DO 02 I=0,J	USP7085
086		02 SD(1-1)=SD(1-1)/SD(00)	USP7086
087		IF(ND=1.0)ND,03,03	USP7087
088	C	SUPERSONIC CLAD RIGID.	USP7088
089		03 SD(10)=SD(12)+SD(00)	USP7089
090	C	MODIFY CLA RIGID.	USP7090
091		04 SD(10)=SD(10)+SD(00)/SD(00)	USP7091
092	C	FIRST COLUMN IN AFM AND AFMCP MATRICES.	USP7092
093		DO 06 I=1,ND	USP7093
094		K=ND+1-1	USP7094
095		AFM(1,1)=OPAK(K)	USP7095
096		06 AFMCP(1,1)=SS(13)	USP7096
097	C	RIGID STRIP LOADING DUE TO FLAP DEFLECTION.	USP7097
098		WRITE(6,06)CHN,SD(5)	USP7098
099		DO 00 I=1,J	USP7099
100		00 YSS(1)=CODING(ESS(1),SS(17),DF(20),DF(10),DF(37),10,11..S)	USP7100
101		01 YB(1)=CODING(ESS(1),SS(10),DF(26),DF(10),DF(37),10,11..S)	USP7101
102		WRITE(6,07)ESS(1),YSS(1),YB(1)	USP7102
103	C	NET RIGID FLAP DEFLECTION INCREMENT.	USP7103
104		YSS(1)=YSS(1)-YB(1)	USP7104
105		00 WRITE(6,08)YSS(1)	USP7105
106	C	COMPUTE MBF AND NORMALIZED STRIP LOADS.	USP7106
107		BU(0)=0.0	USP7107
108		DO 70 I=2,J	USP7108
109		00 DF(1-1)=0.0+ESS(1)-ESS(11)+YSS(1)-YSS(11)	USP7109
110		70 BU(0)=BU(0)+DF(1-1)	USP7110
111		DO 71 I=2,J	USP7111
112		71 DF(1-1)=DF(1-1)/BU(0)	USP7112
113	C	SECOND COLUMN IN AFM AND AFMCP MATRICES.	USP7113
114		SD(00)=CODING(BC(43),DF(1),DF(0),S..S)	USP7114
115		DO 72 I=1,ND	USP7115
116		K=ND+1-1	USP7116
117		AFM(1,2)=DF(K)	USP7117
118		72 AFMCP(1,2)=SD(00)	USP7118
119	C	THIRD COLUMN IN AFM AND AFMCP MATRICES.	USP7119
120		IF(1P)74,73,74	USP7120
121		73 J=100	USP7121
122		00 70 75	USP7122
123		74 J=00	USP7123
124		75 SD(0)=0.0	USP7124
125		DO 100 I=1,ND	USP7125
126		K=I+J	USP7126
127		100 SD(0)=SD(0)+BC(K)	USP7127
128		DO 76 I=1,ND	USP7128
129		K=I+J	USP7129
130		M=K+10	USP7130
131		AFM(1,3)=BC(K)/SD(0)	USP7131
132		76 AFMCP(1,3)=BC(M)	USP7132
133	C	COMPUTE DYNAMIC PRESSURE, PERCENT OF EXPOSED LOAD, AND CALL MFLX.	USP7133
134		CALL ATMS (SD(0),SD(02),SD(03),SD(04))	USP7134
135		SD(17)=S*SD(02)+100*(0+1)**2+100*(0+2)**2	USP7135
136		SD(10)=SQRT(200.*SD(17))	USP7136
137		SD(0)=1.0	USP7137
138		IF(ND(14))110,110,100	USP7138

CARD NO	INPUT LISTING	AUTOFLEX CHART SET - B/CNTL FLEXIBLE AIRLOADS SA PROGRAM
CARD NO	CONTENTS	****
030	100 IF(BD(12)-BU(495)+102,110,102	USPF1100
040	110 GO 112 1-1,40	USPF1102
041	IF(BD(65)-BU(494)+1102,110,102	USPF1104
042	112 CONTINUE	USPF1106
043	ICALCS=0	USPF1108
044	GO TO 103	USPF1200
045	103 ICALCS=1	USPF1202
046	103 NDEIG=20	USPF1204
047	IR=1	USPF1206
048	CALL RETDAT	USPF1208
049	CALL MFLX (AFM,AFMCP,AFM,AFMDF,F,VEIG,C1,CJ,BS(10),BS(14),BS(14)USPF1210	
050	1,BS(5),BS(6),BS(6),BS(6),BS(11),BD(17),BD(18),BD(17),BS(13),NDEIG)USPF1211	
051	2,ND(43),ICALCS,ND(44),ND(45))	USPF1212
052	C COMPUTE STRIP CP STATIONS AND FLEXIBLE CLA.	USPF1214
053	BD(89)=0.0	USPF1216
054	BD(90)=0.0	USPF1218
055	ECP(ND+1)=.9*BS(15)	USPF1220
056	GO 77 1-1,40	USPF1230
057	BD(93)=0-1	USPF1235
058	ECP(1)+BS(15)*.9*(1.0-BS(15))/BD(44)+BD(93)*(1.0-BS(15))/BD(44)	USPF1240
059	BD(91)=BD(90)+AFM(1,1)	USPF1245
060	77 BD(90)=BD(90)+AFM(1,1)	USPF1250
061	BU(1)+BD(18)*(DPA(ND+1)+BD(90))/(DPA(ND+1)+BD(90))	USPF1255
062	C COMPUTE RUNNING NORMAL LOAD.	USPF1260
063	C NT=1 (FLEXIBLE ALPHA EFFECT).	USPF1265
064	C NT=2 (RIGID FLAP EFFECT).	USPF1270
065	C NT=3 (FLAP AEROELASTIC INCREMENT).	USPF1275
066	C NT=4 (INERTIA AEROELASTIC INCREMENT).	USPF1280
067	70 GO TO (70,81,83,85),NT	USPF1285
068	70 K=1	USPF1290
069	ULN(ND+1)=DPA(ND+1)/BS(15)	USPF1295
070	GO 80 1-1,40	USPF1300
071	J=ND+1-1	USPF1303
072	80 ULN(1)=AFM(J,1)*BD(44)/(1.0-BS(15))	USPF1305
073	GO TO 80	USPF1310
074	81 K=2	USPF1315
075	ULN(ND+1)=OFF(ND+1)/BS(15)	USPF1320
076	GO 82 1-1,40	USPF1325
077	J=ND+1-1	USPF1327
078	82 ULN(1)=AFM(J,2)*BD(44)/(1.0-BS(15))	USPF1330
079	GO TO 80	USPF1335
080	83 GO 84 1-1,40	USPF1340
081	J=ND+1-1	USPF1343
082	84 ULN(1)=AFM(J,2)*BD(44)/(1.0-BS(15))	USPF1345
083	GO TO 87	USPF1350
084	85 GO 86 1-1,40	USPF1355
085	J=ND+1-1	USPF1357
086	86 ULN(1)=AFM(J,3)*BD(44)/(1.0-BS(15))	USPF1360
087	87 K=1	USPF1365
088	ULN(ND+1)=0.0	USPF1370
089	C COMPUTE SHEET TORSION ARMS AND TORSIONAL LOADING.	USPF1375
090	88 BD(141)=.0*(1.0-BS(11))*SIN(BS(7)/57.3)*COS(BS(7)/57.3)/BS(12)+USPF1380	
091	11.0-BS(11))	USPF1381
092	BD(142)=BS(16)*(1.0-BD(141))*(1.0-BS(16))	USPF1385
093	BD(143)=1.0-BD(141)*(1.0-BS(16)-BD(142))	USPF1390
094	GO 89 1-1,40	USPF1395
095	J=ND+1-1	USPF1397
096	BD(143)=AFMCP(J,K)*(1.0-BD(141))*(1.0-AFMCP(J,K))	USPF1400
097	BD(144)=(1.0-ECP(1))*(1.0-BS(11))*BS(18)*COS(BS(7)/57.3)/BD(143)	USPF1405
098	OXS(1)=BD(144)+BD(143)-BD(142)	USPF1415
099	89 UTH(1)=ULN(1)*OXS(1)	USPF1420
100	OXS(ND+1)=OXS(ND+1)+ECP(ND+1)-ECP(ND+1)*BS(14)*SIN(BS(7)/57.3)	USPF1425
101	UTH(ND+1)=ULN(ND+1)*OXS(ND+1)	USPF1430
102	C DETERMINE LOADINGS AT NT ANALYSIS STATIONS.	USPF1435
103	YS(1)=0.0	USPF1440
104	YS(1)=0.0	USPF1445
105	J=ND+1	USPF1447
106	GO 92 1-2,13	USPF1450
107	IF(BU(1)+0)-BS(15)+91,90,90	USPF1455
108	90 YS(1)=COD(1)*BU(1)+0,ECP,ULN,J,.5)	USPF1460
109	YS(1)=COD(1)*BU(1)+0,ECP,UTH,J,.5)	USPF1465

05/24/73	INPUT LISTING	AUTOFLEX CHART SET - BFCNL	FLEXIBLE AIRLOADS SA PROGRAM
CARD NO	CONTENTS		
710	GO TO 82		USPF 1470
711	01 YB(1)=ALANB*11		USPF 1475
712	YB(1)=UTNIB*11		USPF 1480
713	GO CONTINUE		USPF 1485
714	WRITE(6,95)		USPF 1490
715	GO TO (94,95,99,100),NT		USPF 1500
716	04 WRITE(6,95)		USPF 1505
717	GO TO 102		USPF 1515
718	05 WRITE(6,97)		USPF 1520
719	GO TO 102		USPF 1530
720	06 WRITE(6,99)		USPF 1535
721	GO TO 102		USPF 1545
722	100 WRITE(6,101)		USPF 1550
723	102 WRITE(6,97)(BU(1+0),YB(1),1=1,13)		USPF 1560
724	WRITE(6,103)		USPF 1565
725	WRITE(6,104)(BU(1+0),YB(1),1=1,13)		USPF 1575
726	C COMPUTE NORMALIZING FACTOR K12=80(147).		USPF 1580
727	GO TO (105,107,100,111),NT		USPF 1585
728	105 K=82		USPF 1590
729	GO TO 113		USPF 1595
730	107 K=88		USPF 1625
731	GO TO 113		USPF 1645
732	109 K=200		USPF 1650
733	GO TO 113		USPF 1655
734	111 K=111		USPF 1670
735	113 ED(146)=0.0		USPF 1685
736	DO 114 1=2,13		USPF 1690
737	114 ED(146)=ED(146)+.5*(BU(1+7)-BU(1+0))*(YB(1-1)+YB(1))		USPF 1695
738	ED(147)=1.0/ED(146)		USPF 1700
739	C UNIT SPANWISE SHEAR, MOMENT, AND TORQUE.		USPF 1705
740	BUK(1)=0.0		USPF 1710
741	BUK(13)=0.0		USPF 1715
742	BUK(25)=0.0		USPF 1720
743	DO 115 1=2,13		USPF 1725
744	M=14E-1		USPF 1730
745	BUIN(1)=BUIN(1)+.5*ED(147)*(BU(1+7)-BU(1+0))*(YB(1-1)+YB(1))		USPF 1735
746	BUIN(13)=BUIN(13)+.5*ED(147)*(BU(1+7)-BU(1+0))*(BUIN(1)-BUIN(1))/COS(USPF 1740		
747	105(7)/57.3)		USPF 1745
748	115 BUIN(25)=BUIN(25)+.5*ED(147)*(BU(1+7)-BU(1+0))*(YB(1-1)+YB(1))		USPF 1750
749	IF(NT=2)116,117,117		USPF 1755
750	116 M=K-10		USPF 1760
751	GO TO 118		USPF 1765
752	117 M=K-3		USPF 1770
753	C SHEAR, MOMENT, AND TORQUE AT BODY SIDE.		USPF 1775
754	118 BUIN(1)=CODINE(95(15),BU(10),BUK(1),12,.5)		USPF 1780
755	ED(148)=CODINE(95(15),BU(10),BUK(14),12,.5)		USPF 1785
756	ED(149)=CODINE(95(15),BU(10),BUK(27),12,.5)		USPF 1790
757	BUIN(1)=ED(148)*COS(95(7)/57.3)+ED(149)*SIN(95(7)/57.3)		USPF 1795
758	BUIN(2)=ED(148)*COS(95(7)/57.3)-ED(149)*SIN(95(7)/57.3)		USPF 1800
759	C CHERNISE CP OF TOTAL LOAD.		USPF 1805
760	BUIN(4)=95(10)*95(10)-(BUK(20)*COS(95(7)/57.3)-BUK(25)*SIN(95(7)/57.3)/		USPF 1810
761	(/57.3)/BUK(12)		USPF 1815
762	C EXPOSED LOAD YCP AND MCP.		USPF 1820
763	BUIN(3)=95(14)*BUIN(1)/BUIN(1)		USPF 1825
764	BUIN(2)=95(10)*95(10)+TAN(95(7)/57.3)-BUIN(2)/BUIN(1)		USPF 1830
765	C CHERNISE CP OF CARRYOVER LOAD.		USPF 1835
766	BUIN(1)=95(10)*95(10)-(BUK(20)-ED(148))*COS(95(7)/57.3)-(BUK(25)USPF 1840		
767	1)-ED(148)-95(14)*BUIN(1)/COS(95(7)/57.3)-SIN(95(7)/57.3)/(BUIN(12)-USPF 1845		
768	BUIN(1))		USPF 1850
769	NT=NT+1		USPF 1855
770	IF(NT=170,70,110)		USPF 1860
771	110 IF(NT=0,0,100)		USPF 1865
772	C EXPONENTIAL DISTRIBUTIONS ENTRY.		USPF 1870
773	120 DO 124 1=1,13		USPF 1875
774	IF(NT=0)121,122,122		USPF 1880
775	C HOR TAIL STATIONS.		USPF 1885
776	121 K=1+114		USPF 1890
777	GO TO 123		USPF 1895
778	C VERT TAIL STATIONS.		USPF 1900
779	122 K=1+175		USPF 1905
780	123 COS(1)=BUK(1)		USPF 1910

05/04/73	INPUT LISTING	AUTOFLOW CHART SET - BFCNCL	FLEXIBLE AIRLOADS SA PROGRAM
CARD NO	****	CONTENTS	****
701	C	EMPNENAGE RIGID LOADING.	USPF1010
702	124	YSS(1)=CODIMP(ESS(1),ED,VC,L,,0)	USPF1020
703		WRITE(6,125)	USPF1025
704		IF INT=0:126,127,127	USPF1035
705	126	WRITE(6,33)	USPF1040
706		GO TO 126	USPF1045
707	127	WRITE(6,35)	USPF1050
708	128	WRITE(6,57)(ESS(1),YSS(1),1=1,13)	USPF1055
709	C	INTEGRATION OF EMPNENAGE LOADING.	USPF1060
710		BD(146)=0.0	USPF1065
711		DO 129 1=2,13	USPF1070
712	129	BD(146)=BD(146)+.5*(ESS(1)-ESS(1))*YSS(1)+YSS(1)	USPF1075
713		IF CN=1:0:133,130,130	USPF1080
714	C	EMPNENAGE SUPERSONIC LIFT CURVE SLOPE (CLAM OR CYBV).	USPF1085
715	130	IF INT=0:131,132,132	USPF1090
716	131	BU(100)=BS(12)*BD(146)	USPF1095
717		GO TO 133	USPF2000
718	132	BU(107)=BS(12)*BD(146)	USPF2005
719	C	EMPNENAGE DX SHEEP CALCULATIONS.	USPF2010
800	133	BD(141)=4.0*(1.0-BS(11))*SIN(BS(7)/57.3)+COS(5(7)/57.3)/(BS(12)+USPF2015	
801		11.0-BS(11))	USPF2020
802		BD(142)=BS(10)*(1.0-BD(141))*(1.0-BS(10))	USPF2025
803		BD(143)=BS(13)*(1.0-BD(141))*(1.0-BS(13))	USPF2030
804		BD(144)=1.0-BD(141)*(1.0-BS(10)-BD(142))	USPF2035
805		BD(145)=1.0-BS(15)*(1.0-BS(11))*BS(10)*COS(5(7)/57.3)/BD(141)	USPF2040
806		IF INT=0:134,135,135	USPF2045
807	134	K=114	USPF2050
808		GO TO 134	USPF2055
809	135	K=173	USPF2060
810	C	EMPNENAGE DX SHEEP AT BODY INTERFACE.	USPF2065
811	136	BD(150)=BD(144)*(BD(143)-BD(142))	USPF2070
812		DO 139 1=1,13	USPF2075
813		K=K+1	USPF2080
814		IF(BU(K)-BS(15))137,137,138	USPF2085
815	C	EMPNENAGE DX SHEEP INBD OF BODY INTERFACE.	USPF2090
816	137	DXS(1)=BD(150)+BS(15)*(BU(K)-BS(14))*SIN(5(7)/57.3)	USPF2095
817		GO TO 139	USPF2100
818	C	EMPNENAGE DX SHEEP OUTDO OF BODY INTERFACE.	USPF2105
819	138	DXS(1)=(BD(143)-BD(142))*(1.0-BU(K)*(1.0-BS(11))*BS(10)*COS(5(7)/57.3)	USPF2110
820		1/57.3)	USPF2115
821	139	CONTINUE	USPF2120
822		WRITE(6,140)	USPF2125
823		WRITE(6,141)(ESS(1),DXS(1),1=1,13)	USPF2130
824	C	ESTABLISH EMPNENAGE UNIT SPANNISE DISTRIBUTIONS.	USPF2145
825		DO 145 1=2,13	USPF2150
826		IF INT=0:142,143,143	USPF2155
827	142	J=1+127	USPF2160
828		GO TO 144	USPF2165
829	143	J=1+106	USPF2170
830	C	NORMALIZ LOADING.	USPF2175
831	144	YSS(1)=YSS(1)/BD(146)	USPF2180
832	C	SPANNISE UNIT SHEAR.	USPF2185
833		BU(J)=BU(J)-.5*(ESS(1)-ESS(1))*YSS(1)+YSS(1)	USPF2190
834	C	SPANNISE UNIT BENDING MOMENT.	USPF2195
835		BU(J+1)=BU(J+1)+.5*(BS(14)*(ESS(1)-ESS(1))*(BU(J)+BU(J+1))/COS(5(7)/57.3)	USPF2200
836		105(7)/57.3)	USPF2205
837	C	SPANNISE UNIT TORSION.	USPF2210
838	145	BU(J+20)=BU(J+20)-.5*(ESS(1)-ESS(1))*YSS(1)+DXS(1)+YSS(1)*DUJPF2215	
839		1X5(11)	USPF2220
840	C	EMPNENAGE UNIT AIRLOADS AT BODY INTERFACE.	USPF2225
841		IF INT=0:146,147,147	USPF2230
842	146	I=109	USPF2235
843		K=129	USPF2240
844		GO TO 148	USPF2245
845	147	I=108	USPF2250
846		K=108	USPF2255
847	C	ME(0) AND UNIT SHEAR.	USPF2260
848	148	BU(1)=CODIMP(BS(15),BU(1+7),BU(K),12,,5)	USPF2265
849		BU(1+3)=BU(1)	USPF2270
850	C	UNIT SHEET BENDING MOMENT AND TORSION.	USPF2275
851		BD(140)=CODIMP(BS(15),BU(1+7),BU(K+3),12,,5)	USPF2280

05/04/73	INPUT LISTING	AUTOFLOW CHART SET - BYCNL	FLEXIBLE AIRLOADS SA PROGRAM
CARD NO	****	CONTENTS	****
002		BD(140)=CODINE(0510),BU(147),BUK(051,12..5)	USPF2295
003	C	RESOLVE UNIT SHEPT MOMENTS INTO BODY SYSTEM.	USPF2296
004		BU(149)=BD(140)*COS(0517)/07.3+BD(140)*SIN(0517)/07.3	USPF2295
005		BU(149)=BD(140)*COS(0517)/07.3-BD(140)*SIN(0517)/07.3	USPF2300
006	C	EXPANAGE CENTERS OF PRESSURE.	USPF2305
007		IF(NT=0)190,190	USPF2310
008		190 BU(110)=BU(103)*COS(0517)/07.3+BU(106)*SIN(0517)/07.3	USPF2315
009		BU(111)=05(10)+05(10)-BU(105)*COS(0517)/07.3+BU(103)*SIN(0517)/07.3	USPF2320
010		1.3)	USPF2325
011		IF(ND(23))191,191,193	USPF2330
012		190 BU(100)=BU(212)*COS(0517)/07.3+BU(220)*SIN(0517)/07.3	USPF2335
013		BU(170)=05(10)+05(10)-BU(225)*COS(0517)/07.3+BU(212)*SIN(0517)/07.3	USPF2340
014		1.3)	USPF2345
015		GO TO 190	USPF2350
016		191 IF(ND(24))192,192,193	USPF2355
017		192 IF(ND(27))196,196,193	USPF2360
018		193 IF(VT=0.0)194,194,195	USPF2365
019		194 NT=6	USPF2370
020		GO TO 9	USPF2375
021		195 NT=7	USPF2380
022		GO TO 9	USPF2385
023		196 IF(ND(23))197,197,190	USPF2390
024		197 IF(ND(25))198,198,190	USPF2395
025		198 IF(ND(26))199,199,190	USPF2400
026		199 IF(ND(27))101,101,171	USPF2405
027	C	PRINT MIND FACTORS AND UNIT SPANWISE DISTRIBUTIONS.	USPF2410
028		100 DO 107 I=1,4	USPF2415
029		GO TO (101,102,103,104),I	USPF2420
030		101 WRITE(6,173)00(10),BU(1)	USPF2425
031		J=2	USPF2430
032		K=13	USPF2435
033		GO TO 105	USPF2440
034		102 WRITE(6,174)00(15),BU(10),00(10)	USPF2445
035		J=02	USPF2450
036		K=00	USPF2455
037		GO TO 105	USPF2460
038		103 WRITE(6,175)00(15),00(10)	USPF2465
039		J=300	USPF2470
040		K=350	USPF2475
041		GO TO 105	USPF2480
042		104 WRITE(6,176)00(1),00(2),00(10)	USPF2485
043		J=404	USPF2490
044		K=402	USPF2495
045		105 L=J+6	USPF2500
046		WRITE(6,177)(BU(I),M=J,L)	USPF2505
047		DO 106 L=0,21	USPF2510
048		M=L+K	USPF2515
049		106 WRITE(6,178)BU(L),BU(M),BU(M+13),BU(M+25)	USPF2520
050		107 CONTINUE	USPF2525
051		IF(NT)100,100,101	USPF2530
052		100 IF(ND(23))190,190,100	USPF2535
053	C	PRINT HOR TAIL FACTORS AND UNIT SPANWISE DISTRIBUTIONS.	USPF2540
054		100 WRITE(6,179)CPH,(BU(1),I=100,114)	USPF2545
055		DO 170 L=115,127	USPF2550
056		M=L+13	USPF2555
057		170 WRITE(6,170)BU(L),BU(M),BU(M+13),BU(M+25)	USPF2560
058		IF(ND(23))190,190,171	USPF2565
059	C	PRINT VERT TAIL FACTORS AND UNIT SPANWISE DISTRIBUTIONS.	USPF2570
060		171 WRITE(6,180)CPH,(BU(1),I=107,173)	USPF2575
061		DO 172 L=174,186	USPF2580
062		M=L+13	USPF2585
063		172 WRITE(6,170)BU(L),BU(M),BU(M+13),BU(M+25)	USPF2590
064		181 **FORM	USPF3000
065		26 FORM=...MINDX VALUES FROM BCLAK TABLES FOR AR=0.4,IXHSH=76,ZUSFF005	USPF3005
066		1,IXHTR=77,IXHBA=78,4)	USPF3010
067		29 FORMAT(1M7X)MTR=710.2//11X710.5)	USPF3015
068		31 FORMAT(1M=5X)M(MIND)	USPF3020
069		33 FORMAT(1M=5X)M(HOR TAIL)	USPF3025
070		35 FORMAT(1M=5X)M(VERT TAIL)	USPF3030
071		41 FORMAT(1M7X)MTR=70.4,IXHTR=77.4,IXHBA=78.4,IXHSH=79.4)	USPF3035
072		42 FORMAT(1M7X)MTR=710.2)	USPF3040

CARD NO	****	CONTENT	****
004		70 GO=17204.5	0000310
005		700=500.700	0000320
006		7000=-.00130000	0000330
007		70000=.00040000	0000335
008		GO TO 100	0000340
009		80 GO=14003.	0000350
1000		700=304.340	0000360
1001		70000=.000370000	0000365
1002		GO TO 110	0000370
1003		100 0H=RE 44/RE 44)	0000380
1004		700=700+700*(0H-00)	0000390
1005		7P=-100/(00+700)***(AL00(700/700))	0000400
1006		7H=70000*(0P+7P)	0000410
1007		0H=40.021177*00RT(700)	0000420
1008		0H0H=000*7H+700/(00+700)	0000430
1009		GO TO 120	0000440
1010		110 0H=RE 44/RE 44)	0000450
1011		700=700	0000460
1012		7P=-00*(0H-00)/(00+700)	0000470
1013		7H=70000*(0P+7P)	0000480
1014		0H=40.021177*00RT(700)	0000490
1015		0H0H=000*7H+700/(00+700)	0000500
1016		120 RETURN	
1017		END	
1018		FUNCTION FCODE(X,Y,XI,YI,ZI,NI,NE,NK)	FC00001
1019	C	700 DIMENSION CURVE FIT SUBPROGRAM....FCODE	FC00010
1020	C	CALLING SEQUENCE	FC00020
1021	C	Z = FCODE(X,Y,XI,YI,ZI,NI,NE,NK)	FC00030
1022	C	X = ARGUMENT - 1ST VARIABLE	FC00040
1023	C	Y = ARGUMENT - 2ND VARIABLE	FC00050
1024	C	XI = ARRAY OF 1ST VARIABLE	FC00060
1025	C	YI = ARRAY OF 2ND VARIABLE	FC00070
1026	C	ZI = ARRAY OF THE DEPENDENT VARIABLE	FC00080
1027	C	NI = NO. OF POINTS - YI	FC00090
1028	C	NE = NO. OF POINTS - XI	FC00097
1029	C	NK = END INTERVAL INTERPOLATION CONTROL CONSTANT	FC00107
1030		COMMON TCON(4*00)	FC00105
1031		DIMENSION 00(100),00(200),X(1),Y(1),ZI(1),YI(1),YX(1)	FC00100
1032		EQUIVALENCE (00(1),TCON(200)),(00(1),TCON(400)),(YI(1),00(0)),(YCODE002	
1033		X(1),00(05)),(00,00(100)),(00,00(100)),(1,00(140)),(0,00(141)),(L,FC00093	
1034		00(142))	FC00094
1035		100 IF(NI-4)110,110,120	FC00095
1036		110 00 = 1	FC00100
1037		00 = 00	FC00105
1038		GO TO 200	FC00110
1039		120 00 = 4	FC00115
1040		00 = 1	FC00120
1041		125 IF(YI(K)-YI100,100,100	FC00125
1042		130 00 = 00+1	FC00130
1043		IF(00-1)125,125,100	FC00135
1044		100 IF(00-3)105,105,100	FC00140
1045		105 00 = 1	FC00145
1046		GO TO 200	FC00150
1047		100 IF(00-1)170,105,105	FC00155
1048		105 00 = 00-3	FC00160
1049		GO TO 200	FC00165
1050		170 00 = 00 -2	FC00170
1051		200 GO 200 I = 1,00	FC00175
1052		L = (00-1)*00 + 1	FC00180
1053		YX(L) = YI(00)	FC00185
1054		YI(L) = CODE10(X,XI,ZI(L),NE,NK)	FC00190
1055		300 00 = 00+1	FC00195
1056		FCODE = CODE10(Y,YX,T,00,NK)	FC00200
1057		RETURN	FC00205
1058		END	FC00210
1059		FUNCTION CODE10(X,XI,YI,N,NK)	CD10010
1060		COMMON TCON(4*00)	CD10015
1061		DIMENSION 00(200),X(1),Y(1)	CD10020
1062		EQUIVALENCE (00(1),TCON(400)),(00,00(143)),(0,00(144)),(0,00(145)),(00(146),	
1063		1),00(146)),(L,00(147)),(0,00(148))	CD10025
1064		00 = X	CD10027

CARD NO	****	CONTENTS	****
1000		N1 = N	COO10000
1005		IF (N1 - 2) 100,110,100	COO10030
1007	100	COOIME = Y1(N1)	COO10035
1008		GO TO 900	COO10040
1009	110	N1 = 2	COO10045
1070	140	COOIME = (Y1(N1)-Y1(N1-1))/(X1(N1)-X1(N1-1)) * (M-X1(N1-1)) +	COO10050
1071		(Y1(N1-1))	COO10055
1072		GO TO 900	COO10060
1073	150	IF (X1(I1) - X1(I2)) 100,100,170	COO10065
1074	160	DO 170 J = 1,M	COO10070
1075		IF (M - X1(J)) 100,200,170	COO10075
1076	170	CONTINUE	COO10080
1077		GO TO 100	COO10085
1078	170	DO 180 J = 1,M	COO10090
1079		IF (X1(J) - M) 100,200,100	COO10095
1080	180	CONTINUE	COO10100
1081	190	N1 = N	COO10105
1082		GO TO 140	COO10110
1083	190	IF (J - 2) 110,210,250	COO10115
1084	210	J = 3	COO10120
1085		JJ = 1	COO10125
1086		GO TO 205	COO10130
1087	200	COOIME = Y1(J)	COO10135
1088		GO TO 900	COO10140
1089	200	IF (J - M) 100,200,100	COO10145
1090	200	J = M-1	COO10150
1091		JJ = 2	COO10155
1092		GO TO 205	COO10160
1093	200	JJ = 3	COO10165
1094	200	IF (M1 - 3) 200,200,295	COO10170
1095	200	J = 3	COO10175
1096	200	K = J-1	COO10180
1097		M = K-1	COO10185
1098		L = J+1	COO10190
1099		X1M = X1(M)	COO10195
1100		X1K = X1(K)	COO10200
1101		X1J = X1(J)	COO10205
1102		A1 = M-X1M	COO10210
1103		A2 = M-X1K	COO10215
1104		A3 = M-X1J	COO10220
1105		AL = (M-X1K)/(X1J-X1K)	COO10225
1106		C1 = A2*A2/(X1M-X1K)*(X1M-X1J)	COO10230
1107		C2 = A1*A3/(X1K-X1M)*(X1K-X1J)	COO10235
1108		C3 = A2*A1/(X1J-X1M)*(X1J-X1K)	COO10240
1109		P1 = C1*Y1(M)+C2*Y1(K)+C3*Y1(J)	COO10245
1110		IF (M1 - 3) 305,305,310	COO10250
1111	305	P2 = P1	COO10255
1112		GO TO 305	COO10260
1113	310	X1L = X1(L)	COO10265
1114		M = M-X1L	COO10270
1115		C4 = A3*A3/(X1K-X1J)*(X1K-X1L)	COO10275
1116		C5 = A2*A3/(X1J-X1K)*(X1J-X1L)	COO10280
1117		C6 = A3*A2/(X1L-X1K)*(X1L-X1J)	COO10285
1118		S = AL * Y1(J) + (1. - AL) * Y1(K)	COO10290
1119		P2 = C4*Y1(K)+C5*(J)+C6*Y1(L)	COO10295
1120	310	GO TO (320,330,350),JJ	COO10300
1121	320	P2 = P1	COO10305
1122		AL = (M-X1(I1))/(X1(I2)-X1(I1))	COO10310
1123		S = AL*Y1(I2) + (1.0-AL)*Y1(I1)	COO10315
1124		P1 = S + JK*(P2-S)	COO10320
1125		GO TO 350	COO10325
1126	330	P1 = P2	COO10330
1127		AL = (M-X1(N1-1))/(X1(N1)-X1(N1-1))	COO10335
1128		S = AL*Y1(N1) + (1.0-AL)*Y1(N1-1)	COO10340
1129		P2 = S + JK*(P1-S)	COO10345
1130	350	E1 = ABS(P1 - S)	COO10350
1131		E2 = ABS(P2-S)	COO10355
1132		IF (E1+E2) 400,400,410	COO10360
1133	400	COOIME = S	COO10365
1134		GO TO 900	COO10370
1135	410	BT = (E1*AL)/(E1*AL+(1.-AL)*E2)	COO10375

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08/04/75      INPUT LISTING      AUTOFLON CHART SET - BFCNTL FLEXIBLE AIRLOADS SA PROGRAM

CARD NO      ****      CONTENTS      ****
1126          CODING = BT*P + (1.-BT)*P1      COD10300
1127          GOO RETURN      COD10305
1128          END      COD10300
1129          SUBROUTINE MFLX (AFM,AFMCP,AFMF,AFMDF,F,VEIGJ,EI,GJ,CR,B02,BLBS,MFLX001
1130          1      ANGLE,FSLERT,ANDEA,FBEAB,MLANDA,B,CLAR,EOTA,SM,MFLX002
1131          2      NOEIGJ,NS,ICALCS,IPRIMS,(IPRINA)      MFLX003
1132          C PROGRAM TO SOLVE THE STATIC AEROELASTIC PROBLEM FOR SHEEP      MFLX010
1133          DIMENSION VEIGJ(20),EI(20),GJ(20),SICBAR(10,20)      MFLX030
1134          DIMENSION AFM(10,3),AFMCP(10,3),D(20,20),RLOADS(20,3),      MFLX032
1135          1      FLOADS(20,3),BLLOADS(20,3),A(20,20),IL(20)      MFLX033
1136          2      AFMF(10,3),F(3,4),AFMDF(10,3)      MFLX034
1137          COMMON TCOH4400      MFLX035
1138          IF(NS.GT.10.OR.NOEIGJ.GT.20) GO TO 100      MFLX050
1139          XOCFND = 0.15      MFLX110
1140          XOCFT = 0.05      MFLX120
1141          IF(ICALCS.EQ.0) GO TO 40      MFLX130
1142          CALL PLVSC (SICBAR,VEIGJ,EI,GJ,CR,B02,BLBS,ANGLE,FSLERT,ANDEA,      MFLX150
1143          1      FBEAB,MLANDA,XOCFND,XOCFT,NOEIGJ,NS,(IPRIMS)      MFLX160
1144          C DISTRIBUTE RIGID LOADS TO SIC POINTS      MFLX185
1145          N0 NPTS = 2*NS      MFLX182
1146          DENOM = XOCFND-XOCFT      MFLX200
1147          DO 85 J=1,3      MFLX210
1148          DO 85 N=1,NS      MFLX220
1149          I = 2*N      MFLX230
1150          I = I-1      MFLX240
1151          RLOADS(I,J) = AFM(N,J)*(XOCFT+AFMCP(N,J))/DENOM      MFLX250
1152          85 RLOADS(I,J) = AFM(N,J)*(XOCFND+AFMCP(N,J))/DENOM      MFLX260
1153          C FORM D MATRIX = IDENTITY-G*ALPHA LD*SICBAR      MFLX325
1154          C = CLAR*EOTA*0.15M/2.1      MFLX326
1155          DO 80 J=1,NPTS      MFLX330
1156          DO 70 N=1,NS      MFLX340
1157          I = 2*N      MFLX350
1158          I = I-1      MFLX360
1159          D(I,J) = -C*RLOADS(I,1)*SICBAR(N,J)      MFLX370
1160          70 D(I,J) = -C*RLOADS(I,1)*SICBAR(N,J)      MFLX380
1161          80 D(I,J) = 1.0-D(I,J)      MFLX390
1162          C SOLVE AEROELASTIC EQU., D*FLOADS=RLOADS, USING OL50      MFLX395
1163          DO 110 K=1,3      MFLX400
1164          DO 92 J=1,20      MFLX402
1165          DO 92 I=1,25      MFLX404
1166          92 A(I,J) = 0.      MFLX406
1167          DO 85 J=1,NPTS      MFLX410
1168          DO 85 I=1,NPTS      MFLX420
1169          85 A(I,J) = D(I,J)      MFLX430
1170          NPTS1 = NPTS+1      MFLX440
1171          DO 100 I=1,NPTS      MFLX450
1172          100 A(I,NPTS1) = RLOADS(I,K)      MFLX455
1173          CALL OL50 (A,FLOADS(I,K),I,L,NPTS,NPTS,ALPHA,1.E-25,1.E-25)      MFLX460
1174          110 CONTINUE      MFLX465
1175          C WRITEOUT INPUT DATA, D MATRIX, RIGID AND FLEXIBLE LOADS      MFLX480
1176          IF(IPRINA.EQ.0) GO TO 112      MFLX470
1177          WRITE (6,111) NS,B,CLAR,EOTA,SM      MFLX471
1178          111 FORMAT (1X) 20X,27H DATA FROM SUBROUTINE MFLX, //23X, 5H NS =,113,MFLX472
1179          //23X, 4H B =,177.2, 5H .S*FT**2, //23X, 7H CLAR =,176.3, //23X, 7H MFLX473
1180          2 EOTA =,176.4, //23X, 5H SM =,177.2, 5H FT**2 )      MFLX474
1181          CALL MATRIT (D,NPTS,NPTS,20,1,2,(8H) (11X) (20) MATRIX))      MFLX475
1182          CALL MATRIT (RLOADS,NPTS,3,20,1,2,25H) (11X) (20) RIGID LOAD DISTRIB      MFLX476
1183          (TIONS))      MFLX478
1184          CALL MATRIT (FLOADS,NPTS,3,20,1,2,20H) (10X) (20) FLEXIBLE LOAD DISTRIB      MFLX480
1185          (UTIONS))      MFLX481
1186          C FORM RIGID, FLEX, DELTA FLEX LOADS, AND F/R RATIOS      MFLX510
1187          DO 117 J=1,3      MFLX530
1188          DO 114 K=1,4      MFLX540
1189          114 F(J,K) = 0.      MFLX550
1190          DO 115 N=1,NS      MFLX560
1191          I = 2*N      MFLX570
1192          I = I-1      MFLX580
1193          AFM(N,J) = FLOADS(I,J)+RLOADS(I,J)      MFLX590
1194          AFMDF(N,J) = AFM(N,J)-AFM(N,J)      MFLX595
1195          F(J,1) = F(J,1)+AFM(N,J)      MFLX600
1196          115 F(J,2) = F(J,2)+AFM(N,J)      MFLX610

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05/04/73	INPUT LISTING	AUTOFLON CHART SET - BFCNTR FLEXIBLE AIRLOADS SA PROGRAM
CARD NO	****	*****
1207	FIJ,3) = FIJ,2)-FIJ,1)	WFLN20
1208	117 FIJ,N) = FIJ,2)/FIJ,1)	WFLN21
1209	C WRITEOUT LOADS ON STRIPS. (RIGID, RIGID X/C, FLEX, AND DELTA FLEX)	WFLN23
1210	CALL MATRIT (AFM,MS,3,10,1,2,2)MINIMIZEINRIGID LOAD ON STRIPS (ALFLENS2)	WFLN25
1211	IPMA, DELTA FLAP, AND N21)	WFLN27
1212	CALL MATRIT (AFMCP,MS,3,10,1,2,2)MINIMIZEINRIGID C.P. ON STRIP(FLENS2)	WFLN29
1213	IPS (X/C), RIGID LOADS)	WFLN30
1214	CALL MATRIT (AFM,MS,3,10,1,2,2)MINIMIZEINRIGID FLEXIBLE LOAD ON STRIP(FLENS2)	WFLN32
1215	1)	WFLN33
1216	CALL MATRIT (AFMCP,MS,3,10,1,2,2)MINIMIZEINRIGID DELTA FLEX LOAD ON STRIP(FLENS2)	WFLN35
1217	1)PS)	WFLN36
1218	C WRITEOUT RIGID, FLEX, DELTA FLEX LOADS, AND F/R RATIOS	WFLN38
1219	CALL MATRIT (F,3,4,3,1,1,2)MINIMIZEINRIGID, FLEX, DELTA FLEX LOADS(FLENS2)	WFLN39
1220	IS, AND F/R RATIOS)	WFLN40
1221	RETURN	WFLN41
1222	100 WRITE (0,100) MS,NDEIGJ	WFLN42
1223	100 FORMAT (20H) PROGRAM DIMENSIONS EXCEEDED, / BND MS =,113,10H	WFLN43
1224	110J =,113)	WFLN44
1225	CALL EXIT	WFLN45
1226	STOP	WFLN46
1227	END	WFLN47
1228	SUBROUTINE FLNSIC (SICBAR,VEIGJ,EI,GJ,CR,B02,BLBS,ANGLE,FBLERT,	FSIC010
1229	1 ANEA,FSEAD,MLANDA,NOCFM,NOCAFT,NDEIGJ,MS,	FSIC015
1230	2 (PRINS)	FSIC020
1231	C THIS SUBROUTINE COMPUTES ELASTIC AXIS GEOM, SIC, DTNEDA, AND SICBAR	FSIC025
1232	DIMENSION XLE(20),BL(20),C(20),SICFS(20),SICBL(20),FSIC030	
1233	1 XBAR(20),YBAR(20)	FSIC035
1234	DIMENSION YL(21),E11(21),GJ1(21),VEIGJ(20),E1(20),FSIC040	
1235	1 GJ(20),FLANDA(21),OSIC(20,20),OSIC1(20,20),FSIC045	
1236	2 SIC(20,20),FLANDA(21)	FSIC050
1237	DIMENSION DTNEDA(10,20),SICBAR(10,20)	FSIC055
1238	COMMON YCOM(400)	FSIC060
1239	C WRITEOUT INPUT DATA, CONTROL CONST, GEOMETRY, AND EI, GJ	FSIC065
1240	IF (PRINS.CO.0) GO TO 30	FSIC070
1241	WRITE (0,20) MS,NDEIGJ,CR,B02,BLBS,ANGLE,FBLERT,ANEA,FSEAD,MLANDA,FSIC075	
1242	1 ,NOCFM,NOCAFT	FSIC080
1243	20 FORMAT (10H) 2X,20H DATA FROM SUBROUTINE FLNSIC, / BND MS =,113,FSIC085	
1244	1 17H,0H NDEIGJ =,113, / BND CR =,170.2,0H IN., 7H,0H B02 =,170,FSIC090	
1245	20,0H IN., 0X,7H BLBS =,177.2,0H IN., / 12H ANGLE =,177.3,0H FSIC095	
1246	3 00., 4X,0H FBLERT =,170.2,0H IN., / 12H ANEA =,177.3,0H DE,FSIC100	
1247	40., 4X,0H FSEAD =,170.2,0H IN., / 13H MLANDA =,170.3,10X,0H NOFSIC105	
1248	5CFM =,170.3,10X,0H NOCAFT =,170.3)	FSIC110
1249	CALL MATRIT (VEIGJ,NDEIGJ,1,20,1,2,2)MINIMIZEINRIGID ELASTIC AXIS Y COOFSIC115	
1250	COORDINATES FOR WIND EI AND GJ)	FSIC120
1251	CALL MATRIT (EI,NDEIGJ,1,20,1,2,2)MINIMIZEINRIGID EI)	FSIC125
1252	CALL MATRIT (GJ,NDEIGJ,1,20,1,2,2)MINIMIZEINRIGID GJ)	FSIC130
1253	C FORM SIC POINT FUELAKL STATIONS AND BUTT LINE COORDINATES	FSIC135
1254	30 DEL = (B02-BLBS)/(MS*2)	FSIC140
1255	ANGLER = ANGLE/57.3	FSIC145
1256	SLOPLE = TAN(ANGLER)	FSIC150
1257	DO 40 N = 1,MS	FSIC155
1258	1 = 2*N-1	FSIC160
1259	BL(N) = (DEL*1)+BLBS	FSIC165
1260	XLE(N) = FBLERT+BL(N)+SLOPLE	FSIC170
1261	C(N) = CR*(1-(BL(N)/B02)*(1-MLANDA))	FSIC175
1262	SICFS(1) = NOCFM*C(N)+XLE(N)	FSIC180
1263	SICFS(1:1) = NOCAFT*C(N)+XLE(N)	FSIC185
1264	SICBL(1) = BL(N)	FSIC190
1265	40 SICBL(1:1) = BL(N)	FSIC195
1266	C CONVERT SIC COORDINATES TO THE SHEPT ELASTIC AXIS SYSTEM	FSIC200
1267	1 ERROR = 0	FSIC205
1268	2 NPTS = 2*MS	FSIC210
1269	3 ANDEAR = ANEA/57.3	FSIC215
1270	4 CANDEA = COS(ANDEAR)	FSIC220
1271	5 SANEAR = SIN(ANDEAR)	FSIC225
1272	60 50 N=1,NPTS	FSIC230
1273	7 XBAR(N) = (SICFS(N)-FSEAD)*CANDEA-SICBL(N)*SANEAR	FSIC235
1274	8 YBAR(N) = (SICFS(N)-FSEAD)*SANEAR-SICBL(N)*CANDEA	FSIC240
1275	9 IF (YBAR(N).LT.0.) ERROR=1	FSIC245
1276	50 CONTINUE	FSIC250
1277	IF (ERROR.EQ.1) GO TO 55	FSIC255

CARD NO	INPUT LISTING	CONTENTS	****
1270	C	WRITEOUT SIC COORDINATES	FSIC0410
1270		IF (IPRINS.EQ.0) GO TO 00	FSIC0405
1280		00 CALL MATRIT (SICYS,NPTS,1,20,1,2,20HIMH30K2MSIC FUSELAGE STATION)FSIC0430	
1281		IS11	FSIC0440
1282		CALL MATRIT (SICEL,NPTS,1,20,1,2,20HIMH30K2MSIC BUTT LINES)1	FSIC0450
1283		CALL MATRIT (YBAR,NPTS,1,20,1,2,4NIMH30K2MSIC ELASTIC AXIS X COFSIC0460	
1284		COORDINATES)1	FSIC0470
1285		CALL MATRIT (YBAR,NPTS,1,20,1,2,4NIMH30K2MSIC ELASTIC AXIS Y COFSIC0480	
1286		COORDINATES)1	FSIC0490
1287	C	STOP EXECUTION IF NEGATIVE YBAR HAS BEEN FOUND	FSIC0493
1288		IF (ERROR.EQ.0) GO TO 00	FSIC0495
1289		WRITE (6,90)	FSIC0498
1290		00 FORMAT (2D4) EXECUTION STOPPED, / DIM NEGATIVE VALUE OF Y IN THEFSIC0497	
1291		IE SHEET AXIS SYSTEM HAS BEEN FOUND IN SUBROUTINE FLYSIC 1	FSIC0498
1292		CALL EXIT	FSIC0500
1293		STOP	FSIC0502
1294	C	CALCULATION OF SIC MATRIX ELEMENTS	FSIC0510
1295		00 DO 00 J=1,NPTS	FSIC0530
1296		DLBAR = YBAR(J)/20.	FSIC0540
1297		DLBARS = DLBAR*.5	FSIC0545
1298		VL(1) = 0.	FSIC0550
1299		E(1(1)) = E(11)	FSIC0560
1300		GJ(1) = GJ(1)	FSIC0565
1301		TLAMDA(1) = 1./GJ(1)	FSIC0567
1302		DO 70 I=2,21	FSIC0570
1303		VL(I) = DLBAR*(I-1)	FSIC0580
1304		E(1(I)) = CODIME (VL(1),VEIG,I,NOEIG,0.5)	FSIC0590
1305		70 G(I) = CODIME (VL(1),VEIG,GJ,NOEIG,0.5)	FSIC0600
1306		DO 00 K=J,NPTS	FSIC0610
1307		OSIC(I,J,K) = 0.	FSIC0620
1308		OSICT(I,J,K) = 0.	FSIC0630
1309		FLAMDA(1) = YBAR(K)*YBAR(J)/E(1(1))	FSIC0640
1310		TCONST = YBAR(J)*YBAR(K)*DLBAR*.5	FSIC0650
1311		DO 70 I=2,21	FSIC0660
1312		TEST1 = YBAR(K)-VL(1)	FSIC0661
1313		TLAMDA(1) = 1./GJ(1)	FSIC0663
1314		IF (TEST1) 70,70,70	FSIC0665
1315		70 TEST1 = 0.	FSIC0667
1316		TLAMDA(1) = 0.	FSIC0668
1317		70 FLAMDA(1) = (TEST1*(YBAR(J)-VL(1))/E(1(1))	FSIC0670
1318		OSIC(I,J,K) = OSIC(I,J,K)+(FLAMDA(1)-1)*FLAMDA(1)*DLBARS	FSIC0680
1319		70 OSICT(I,J,K) = OSICT(I,J,K)+TCONST*(TLAMDA(1)-1)*TLAMDA(1)	FSIC0690
1320		OSIC(K,J) = OSIC(I,J,K)	FSIC0694
1321		OSICT(K,J) = OSICT(I,J,K)	FSIC0696
1322		SIC(I,K) = OSIC(I,J,K)+OSICT(I,J,K)	FSIC0700
1323		SIC(K,J) = SIC(I,K)	FSIC0710
1324		00 CONTINUE	FSIC0720
1325	C	WRITEOUT SIC MATRICES	FSIC0740
1326		IF (IPRINS.EQ.0) GO TO 02	FSIC0750
1327		CALL MATRIT (OSIC,NPTS,NPTS,20,1,1,1,30HIMH37K2DELTA SIC. BENDIN)FSIC0760	
1328		IN IN(LB))	FSIC0770
1329		CALL MATRIT (OSICT,NPTS,NPTS,20,1,1,1,30HIMH37K2DELTA SIC. TORSIO)FSIC0780	
1330		IN IN(LB))	FSIC0790
1331		CALL MATRIT (SIC,NPTS,NPTS,20,1,1,1,30HIMH31K4)STRUCTURAL INFLUENC)FSIC0800	
1332		IE COEFFICIENTS IN(LB))	FSIC0810
1333	C	FORM DTHEDA MATRIX	FSIC0830
1334		00 DO 05 J=1,NPTS	FSIC0850
1335		DO 05 I=1,N6	FSIC0860
1336		05 DTHEDA(I,J) = 0.0	FSIC0870
1337		K = 0	FSIC0880
1338		DO 00 I=2,NPTS,2	FSIC0890
1339		DELTA = SIC(I-1)-SIC(I-1)	FSIC0900
1340		J = I/2	FSIC0910
1341		K = K+1	FSIC0920
1342		DTHEDA(J,K) = 1./DELTA	FSIC0930
1343		K = K+1	FSIC0940
1344		00 DTHEDA(J,K) = -1./DELTA	FSIC0950
1345	C	FORM SICBAR = DTHEDA*SIC. MATRIX MULTIPLICATION	FSIC0970
1346		00 100 K=1,NPTS	FSIC0980
1347		DO 100 I=1,N6	FSIC1000
1348		SICBAR(I,K) = 0.0	FSIC1010

CARD NO	CONTENTS	****
1349	DO 100 J=1,NPTS	FSIC1020
1350	100 SICBAR(I,K) = SICBAR(I,K)+DTHEDA(I,J)*SIC(I,J,K)	FSIC1030
1351	C WRITEOUT DTHEDA AND SICBAR MATRICES	FSIC1050
1352	IF (IPRIN.EQ.0) GO TO 135	FSIC1055
1353	CALL MATRIT (DTHEDA,NPTS,10,1,1,PMHIMINIKI%DTHEDA MATRIX)	FSIC1070
1354	CALL MATRIT (SICBAR,NPTS,10,1,1,PMHIMINIKI%DTHEDA MATRIX	FSIC1080
1355	(AD/LS))	FSIC1081
1356	100 RETURN	FSIC1100
1357	END	FSIC1120
1360	SUBROUTINE QLS01A,K,IL,N,N,ALPHA,E1,E2)	QLS00010
1360	DIMENSION A(25,25),X(25),IL(25)	QLS00015
1360	MM=MM+1	QLS00020
1361	LL=1	QLS00025
1362	DO 00 J=1,MM	QLS00030
1363	00 IL(J)=0	QLS00035
1364	I=1	QLS00040
1365	DO 3 K=1,MM	QLS00045
1366	II=I+1	QLS00050
1367	DO 4 J=1,N	QLS00055
1368	IF (ABS(A(I,J,K))-E1)4,5,6	QLS00060
1369	6 T1=SQRT((A(I,J,K)**2+(A(I,K)**2)	QLS00065
1370	S=A(I,K)/T1	QLS00070
1371	C=A(I,K)/T1	QLS00075
1372	DO 5 L=1,MM	QLS00080
1373	T2=C*A(I,L)+S*A(J,L)	QLS00085
1374	A(J,L)=S*A(I,L)+C*A(J,L)	QLS00090
1375	5 A(I,L)=T2	QLS00095
1376	LL=LL+1	QLS00100
1377	4 CONTINUE	QLS00105
1378	IF (ABS(A(I,K))-E2)3,3,0	QLS00110
1379	0 IL(K)=I	QLS00115
1380	I=I+1	QLS00120
1381	3 CONTINUE	QLS00125
1382	X(MM)=-1.0	QLS00130
1383	II=MM	QLS00135
1384	DO 20 J=1,MM	QLS00140
1385	20 X(II)=0.	QLS00145
1386	DO 30 J=1,MM	QLS00150
1387	IF (IL(II)20,30,31)	QLS00155
1388	31 S=0.	QLS00160
1389	LL=II+1	QLS00165
1390	I=IL(II)	QLS00170
1391	DO 22 K=LL,MM	QLS00175
1392	22 S=S+A(I,K)*X(K)	QLS00180
1393	X(II)=S/A(I,II)	QLS00185
1394	20 II=II-1	QLS00190
1395	IF (IL(MM)50,51,50)	QLS00195
1396	51 ALPHA=0.	QLS00200
1397	GO TO 52	QLS00205
1398	50 (-IL(MM)	QLS00210
1399	ALPHA=A(I,MM)	QLS00215
1400	52 RETURN	QLS00220
1401	END	QLS00225
1402	SUBROUTINE MATRIT(MM,NR,NC,NMAX,NTYPE,IPRIN,HEAD)	MR170010
1403	C MM = MATRIX NAME	MR170030
1404	C NR = NUMBER OF ROWS IN MM	MR170040
1405	C NC = NUMBER OF COLS IN MM	MR170050
1406	C NMAX = MAXIMUM NO. OF ROWS IN MM, DIMENSION IN CALLING PROGRAM	MR170060
1407	C NTYPE = 1 (REAL MATRIX), -1 (COMPLEX MATRIX)	MR170070
1408	C IPRIN = 1 (PRINT BY ROWS), 2 (PRINT BY COLUMNS)	MR170080
1409	C HEAD = FORMAT OF MATRIX HEADING, EXAMPLE: ZENIMIZOKIIMMABS MATRIX)	MR170090
1410	DIMENSION A(NR),HEAD(100)	MR170110
1411	WRITE(6,HEAD)	MR170130
1412	IF (IPRIN -2) 50,10,10	MR170150
1413	C PRINT BY COLUMNS	MR170160
1414	10 DO 30 J=1,NC	MR170170
1415	N = (J-1)*NMAX+1	MR170180
1416	LAST = N+NR-1	MR170190
1417	30 WRITE(6,105) J,(A(N,I),I=N,LAST)	MR170200
1418	GO TO 00	MR170210
1419	C PRINT BY ROWS	MR170220

CARD NO	CONTENTS	
1420	00 NCI = NRMAR*MC	NR10230
1421	00 TO 11=1,NR	NR10240
1422	70 WRITE(6,110) 11,(APN(1),1=11,NC1,NRMAR)	NR10250
1423	00 RETURN	NR10270
1424	105 FORMAT(10H\$12NCOLUMN NO. =14//11H (PBE13.5))	NR10290
1425	110 FORMAT(10H\$12ROW NO. =14//11H (PBE13.5))	NR10300
1426	END	NR10320
1427	SUBROUTINE BLOADP	BLOAD001
1428	C BASIC LOADS SUBROUTINE FOR SHEEP 11 STAND ALONE PROGRAM.	BLOAD002
1429	C COMPUTES COMPONENT TOTAL AIRLOADS AND THE CENTERS OF PRESSURE.	BLOAD003
1430	C COMPUTES APPLICABLE INERTIA FACTORS.	BLOAD004
1431	COMMON TCOM(14*80)	BLOAD007
1432	DIMENSION DF(14*8),BC(105),BB(20),BS(20),BD(100),BU(500),BO(3*8),NOMLDF(10	BLOAD010
1433	1200),F(3,4)	BLOAD011
1434	EQUIVALENCE (DF(1),TCOM(100)),(BC(1),TCOM(270)),(BB(1),TCOM(293)),(BO(1),	BLOAD015
1435	11),BO(1),TCOM(297)),(BD(1),TCOM(298)),(BU(1),TCOM(315)),(BO(1),BLOAD016	
1436	2,TCOM(305)),(ND(1),TCOM(420)),(F(1,1),BU(3*8)),(NI,ND(106)),(IP,BLOAD017	
1437	BD(137)),(INT,ND(150)),(I,ND(151)),(J,ND(152)),(K,ND(153))	BLOAD018
1438	BS(1)=0.0	BLOAD020
1439	C SELECTION OF WING AREA, FUS STA OF LE AT CL, SPAN, AND HOP HEIGHT.	BLOAD025
1440	IF(IP)3,1,3	BLOAD030
1441	1 BS(1)=BC(95)	BLOAD035
1442	BS(2)=BC(90)	BLOAD040
1443	BS(3)=BC(85)	BLOAD045
1444	00 2 1=109,110	BLOAD050
1445	2 BS(1)=BS(11)+BC(11)	BLOAD055
1446	00 TO 5	BLOAD060
1447	3 BS(1)=BC(53)	BLOAD065
1448	BS(2)=BC(48)	BLOAD070
1449	BS(3)=BC(44)	BLOAD075
1450	00 4 1=87,70	BLOAD080
1451	4 BS(1)=BS(11)+BC(11)	BLOAD085
1452	C INTERPOLATE DF DATA FOR KCF. COMPUTE PZH/PZH1 AND FACTORS A TO F.	BLOAD090
1453	5 BS(1)=DF(20)*BC(143),DF(1),DF(11),S,,5)	BLOAD095
1454	BS(1)=.043633*BS(20)**2/(BS(1)+BU(1))	BLOAD100
1455	BS(5)=1.0+BS(4)	BLOAD105
1456	BS(6)=BS(2)-BS(2)-BU(2)+BS(4)*(BB(2)-BC(36)-BC(37)+BC(30)/13.14199*BLOAD110	
1457	1*BC(30)**2)	BLOAD115
1458	BS(7)=BS(2)-BS(2)-BU(62)	BLOAD120
1459	BS(8)=BS(2)-BS(2)-BU(358)	BLOAD125
1460	BS(9)=BS(2)-BS(2)-BU(4*4)	BLOAD130
1461	BS(10)=BS(2)-BC(131)-BU(111)	BLOAD135
1462	C COMPUTE RIGID FLAP, AERO. FLAP, AND AERO. INERTIA TOTAL AIRLOADS.	BLOAD140
1463	BS(14)=BS(5)+BS(12)+BU(61)+BB(18)+BB(17)+BS(11)/57.3	BLOAD145
1464	BS(15)=BU(60)+BS(14)*F(2,4)-1.0)	BLOAD150
1465	BS(16)=2.0*BS(11)+BS(6)*F(3,4)-1.0)	BLOAD155
1466	C FOR PA COND, COMPUTE OPZH GDOT AND EFFECTIVE LOAD FACTOR INI=5).	BLOAD160
1467	IF(INI=5)7,6,7	BLOAD165
1468	6 BS(20)=(BS(7)+BS(3)*12.0)/(BU(111)+BC(131)+BS(2))	BLOAD170
1469	BS(20)+BS(6)-BS(20)/BS(1)	BLOAD175
1470	00 TO 8	BLOAD180
1471	7 BS(20)=0.0	BLOAD185
1472	BS(20)+BS(6)	BLOAD190
1473	C COMPUTE FLEX ALPHA, HOR TAIL, AND BODY NOSE TOTAL AIRLOADS.	BLOAD195
1474	8 BS(13)=(BS(20)+BS(11)+BS(10)+BS(14)+BS(7)-BS(10))+BS(15)+BS(8)-BLOAD200	
1475	15(10))+BS(10)+BS(8)-BS(10)/11+(BS(8)-BS(5)+BS(10))	BLOAD205
1476	BS(17)=BS(20)+BS(20)+BS(11)+BS(13)+BS(9)-BS(14)-BS(15)-BS(16)	BLOAD210
1477	BO(3)=BS(4)+BS(13)	BLOAD215
1478	BO(5)=BC(36)+BC(37)+BC(30)/13.14199*BC(30)**2)	BLOAD220
1479	BO(11)=.5*BS(17)	BLOAD225
1480	BO(12)=BC(131)+BU(111)	BLOAD230
1481	C COMPUTE WING AND HOR TAIL AIRLOAD FACTORS FOR SPADP.	BLOAD235
1482	BU(450)=BS(13)	BLOAD240
1483	BU(451)=BS(14)	BLOAD245
1484	BU(452)=BS(15)	BLOAD250
1485	BU(453)=BS(16)	BLOAD255
1486	BU(454)=BS(17)	BLOAD260
1487	C COMPUTE NET PANEL AIRLOADS AND CENTERS OF PRESSURE.	BLOAD265
1488	BO(6)=.5*(BS(13)+BU(6)+BS(14)+BU(66)+BS(15)+BU(362)+BS(16)+BU(400)+BLOAD270	
1489	11	BLOAD271
1490	BO(7)=.5*(BS(13)+BU(3)+BU(6)+BS(14)+BU(66)+BU(63)+BS(15)+BU(362)+BLOAD275	

CARD NO	****	CONTENTS	****
1481		BU(38)*BS(15)*BU(40)*BU(45)/BO(8)	BNLDF288
1482		BO(8)*.5*(BS(13)*BU(8)*BS(2)*BU(4)*BS(14)*BU(8)*BS(2)*BU(4)*BNLDF289	
1483		BS(15)*BU(38)*BS(2)*BU(38)*BS(15)*BU(40)*BS(2)*BU(45)/BO(8)BNLDF290	
1484		28)	BNLDF291
1485		BO(9)*BS(13)*BS(14)*BS(15)*BS(16)*2.0*BO(8)	BNLDF295
1486		BO(10)*BS(13)*BS(2)*BU(2)*BS(14)*BS(2)*BU(8)*BS(15)*BS(2)*BNLDF300	
1487		BU(38)*BS(15)*BS(2)*BU(40)*2.0*BO(8)*BO(8)/BO(8)	BNLDF305
1488		BO(12)*BU(11)	BNLDF310
1489	C	DRIV DUE TO ASYMMETRIC HOR TAIL LOAD.	BNLDF315
1490		BO(14)*ABS(.30*BO(11)*BO(12))	BNLDF320
1491		BO(17)*BC(152)*BU(17)	BNLDF322
1492		BO(18)*0.0	BNLDF324
1493		BO(20)*0.0	BNLDF326
1494		BO(21)*0.0	BNLDF328
1495		GO TO (21,0,0,16,10,20),N1	BNLDF330
1496	C	VERTICAL GUST CALCULATIONS, NU, AND SUBSONIC OR SUPERSONIC NO.	BNLDF335
1497		0 BS(18)*BO(1)*BS(2)/(16.1*BO(8)*BU(1)*BS(1)*2)	BNLDF340
1498		IF(BO(18)-1.0)10,11,11	BNLDF345
1499		10 BS(18)*.00*BS(18)/15.3*BS(18)	BNLDF350
1510		GO TO 12	BNLDF356
1511		11 BS(18)*BS(18)**.03/16.05*BS(18)**1.03	BNLDF360
1512	C	INCREMENTAL LOADS DUE TO VERT GUST.	BNLDF365
1513		12 BO(15)*BO(18)*BC(30)**2/226.37535	BNLDF370
1514		BO(152)*.100354*BS(18)*BU(8)*BU(1)*BS(1)*BO(18)	BNLDF375
1515		BO(153)*BO(152)*11.0*BU(8)/BU(8)	BNLDF380
1516		BO(154)*.100354*BS(18)*BU(8)*BC(135)*BO(18)	BNLDF385
1517	C	REVERSE SIGN OF LOADS FOR - VERT GUST (N1=3).	BNLDF390
1518		IF(N1-3)15,13,15	BNLDF395
1519		13 DO 14 1=151,154	BNLDF400
1520		14 BO(1)*BO(1)	BNLDF405
1521		15 BS(13)*BS(13)*BO(152)*BO(153)	BNLDF407
1522		BS(17)*BS(17)*BO(154)	BNLDF410
1523	C	VERTICAL GUST INERTIA FACTORS.	BNLDF412
1524		BO(18)*BS(15)*BS(13)*BS(17)/(BO(11)*BS(18))	BNLDF414
1525		BS(18)*BS(18)*BO(18)	BNLDF416
1526		BO(3)*BO(3)*BO(151)	BNLDF420
1527		BO(20)*(BO(3)*BO(2)*BO(5)*BS(13)*(BO(2)*BS(2)*BU(21)*BS(17)*BS(18)BNLDF425	
1528		1)*BS(17)*BS(18))/(12.0*BO(3))	BNLDF426
1529	C	COMPUTE COMPONENT TOTAL AIRLOADS FOR VERTICAL GUST CONDITIONS.	BNLDF430
1530		BO(8)*.5*(BU(8)*BS(13)*BU(8)*BS(14)*BU(38)*BS(15)*BU(40)*BS(16)BNLDF435	
1531)	BNLDF436
1532		BO(9)*BS(13)*BS(14)*BS(15)*BS(16)*2.0*BO(8)	BNLDF440
1533		BO(11)*.5*BS(17)	BNLDF445
1534		BO(14)*ABS(.30*BO(11)*BO(12))	BNLDF450
1535		BU(45)*BS(13)	BNLDF455
1536		BU(43)*BS(16)	BNLDF460
1537		BU(45)*BS(17)	BNLDF465
1538		GO TO 22	BNLDF470
1539	C	LATERAL GUST CALCULATIONS WITH UDE=50 FPS (N1=4).	BNLDF475
1540		16 BO(14)*.0043788*BO(18)*BC(30)**2	BNLDF480
1541		BO(15)*.100354*BU(16)*BC(156)*BO(18)	BNLDF485
1542		IF(ND(15))16,17,16	BNLDF490
1543	C	DUAL VERT TAIL.	BNLDF495
1544		17 BO(15)*BO(15)*2.	BNLDF500
1545		18 BO(18)*BU(18)	BNLDF505
1546		BO(18)*(BO(14)*BO(15))/BO(1)	BNLDF510
1547		BO(21)*(BO(4)*BO(2)*BO(5)*BO(15)*(BO(17)*BO(21))/(BO(4)*12.1	BNLDF515
1548		GO TO 21	BNLDF520
1549	C	PITCHING ACCELERATION (N1=5).	BNLDF525
1550		19 BO(20)*BO(7)	BNLDF530
1551		GO TO 21	BNLDF535
1552	C	YAWING ACCELERATION (N1=6).	BNLDF540
1553		20 BO(15)*-(BO(8)*BO(4)*12.1/BO(17)*BO(2))	BNLDF545
1554		BO(18)*BU(18)	BNLDF550
1555		BO(18)*BO(15)/BO(1)	BNLDF555
1556		BO(21)*BO(8)	BNLDF560
1557		21 BO(18)*BO(8)	BNLDF565
1558		22 IF(ND(23))23,23,24	BNLDF570
1559		23 IF(ND(24))25,25,24	BNLDF575
1560		24 WRITE(6,26)BO(2),BO(18),BO(9),BO(5)	BNLDF580
1561		WRITE(6,27)BO(1),1,3,5)	BNLDF585

05/04/73	INPUT LISTING	AUTOFLEX CHART SET - SPCHL	FLEXIBLE AIRLOADS SA PROGRAM
CARD NO	***	CONTENTS	****
1002	WRITE(0,20) (0(1),1-0,0)		0ALD700
1003	WRITE(0,20) (0(4),0(10))		0ALD700
1004	WRITE(0,20) (0(1),1-1,14)		0ALD700
1005	WRITE(0,21) (0(1),1-10,17)		0ALD700
1006	WRITE(0,21) (0(1),1-10,21)		0ALD701
1007	WRITE(0,23) (0(1),1-40,40)		0ALD701
1008	25 RETURN		0ALD700
1009	26 FORMAT (IHXI) (CONDITION NO=77.0,SKED=76.3,SPHALT=77.0,SKED7=76.0,DF005		0ALD700
1070	10.2)		0ALD700
1071	27 FORMAT (IHXI) (BODY LOADS/7XHPZ=76.0,4XHPY=77.0,4XHPZ=76.2/1) (0ALD701		0ALD701
1072	28 FORMAT (IHXI) (HING PANEL LOAD/7XHPZ(1)/2=76.0,4XHPY(1)/2=77.0,4XHPZ(1)/2=76.2,4XHPZ(2)/2=76.2/1) (0ALD701		0ALD701
1073	(X7XHPZ(1)/2=76.2/1)		0ALD701
1074	29 FORMAT (IHXI) (HING CARRY-OVER LOAD/7XHPZ(1)/2=76.0,4XHPY(1)/2=76.2,4XHPZ(1)/2=76.2/1) (0ALD701		0ALD701
1075	(2/1)		0ALD701
1076	30 FORMAT (IHXI) (HORIZONTAL TAIL LOADS/7XHPZ(1)/2=76.0,4XHPY(1)/2=76.2,4XHPZ(1)/2=76.2,4XHPZ(2)/2=76.2/1) (0ALD701		0ALD701
1077	(X7XHPZ(1)/2=76.2,4XHPY(1)/2=76.2/1)		0ALD701
1078	31 FORMAT (IHXI) (VERTICAL TAIL LOAD/7XHPY=76.0,4XHPZ=76.2,4XHPZ(1)/2=76.2/1) (0ALD701		0ALD701
1079	(1)/2=76.2/1)		0ALD701
1080	32 FORMAT (IHXI) (WING PLANE INERTIA FACTORS/7XHPZ=76.2,4XHPY=76.2,4XHPZ=76.2,4XHPZ(1)/2=76.2/1) (0ALD701		0ALD701
1081	(X7XHPZ(1)/2=76.2,4XHPY(1)/2=76.2/1)		0ALD701
1082	33 FORMAT (IHXI) (COMPONENT SPANWISE FACTORS/7XHPZ(1)/2=76.0,5XHPZ(1)/2=76.0,5XHPZ(2)/2=76.0,5XHPZ(3)/2=76.0,5XHPZ(4)/2=76.0) (0ALD701		0ALD701
1083	(1)/2=76.0,5XHPZ(3)/2=76.0,5XHPZ(4)/2=76.0,5XHPZ(5)/2=76.0)		0ALD701
1084	END		0ALD700
1085	SUBROUTINE SPAB7		SPAB701
1086	C SUBROUTINE SPAB7 FOR STAND ALONE LOADS MODULE OF SHEEP 11.		SPAB702
1087	C CALCULATES HING AND SPANNING AIRLOAD SHEAR,BEND MOM,TOR.		SPAB703
1088	C AIRLOADS INCLUDE THE EFFECTS OF HING FLEXIBILITY.		SPAB704
1089	COMMON TCON(400)		SPAB705
1090	DIMENSION 00(20),0C(100),0D(30),0E(100),0J(500),ND(200)		SPAB706
1091	EQUIVALENCE (0C(1),TCON(2700)),(0D(1),TCON(2000)),(0E(1),TCON(2000)) (SPAB707		SPAB707
1092	((1),0J(1),TCON(3100)),(0D(1),TCON(3000)),(ND(1),TCON(4000)),(IP,ND(500)) (SPAB708		SPAB708
1093	(1),ND(150)),(1,ND(150)),(1,ND(150)),(1,ND(150)),(1,ND(150)),(1,ND(150)) (SPAB709		SPAB709
1094	3), (N,ND(150))		SPAB710
1095	DO 32 1-22,100		SPAB711
1096	22 00(1)=0.0		SPAB712
1097	IF (ND(23)) 1,2		SPAB713
1098	1 IF (ND(25)) 10,10.2		SPAB714
1099	C SET UP PARAMETERS TO DO HING LOADS.		SPAB715
1100	2 00(22)=00(15)+00(12)		SPAB716
1101	00(23)=0C(40)		SPAB717
1102	J=0		SPAB718
1103	IF (IP) 4,3,4		SPAB719
1104	3 1=00		SPAB720
1105	K=00		SPAB721
1106	GO TO 5		SPAB722
1107	4 1=0		SPAB723
1108	K=0		SPAB724
1109	5 00(150)=0.0C(1)		SPAB725
1110	00(157)=0C(K)		SPAB726
1111	1=0		SPAB727
1112	DO 6 K=1,12		SPAB728
1113	L=1-K*20		SPAB729
1114	00(L)=00(150)+00(K*8)/COS(00(157)/57.3)		SPAB730
1115	6 1=1+3		SPAB731
1116	C 10-1 FLEXIBLE ALPHA EFFECTS.		SPAB732
1117	10-1		SPAB733
1118	00(190)=.5*0J(450)		SPAB734
1119	1=0		SPAB735
1120	K=00		SPAB736
1121	GO TO 20		SPAB737
1122	C 10-2 RIGID FLAP EFFECTS.		SPAB738
1123	7 10-2		SPAB739
1124	00(190)=.5*0J(451)		SPAB740
1125	1=00		SPAB741
1126	K=00		SPAB742
1127	GO TO 20		SPAB743
1128	C 10-3 AEROELASTIC FLAP EFFECTS.		SPAB744
1129	8 10-3		SPAB745
1130	00(190)=.5*0J(452)		SPAB746
1131	1=302		SPAB747
1132	K=305		SPAB748

05/04/73	INPUT LISTING	AUTOFLON CHART SET - B/CNTR	FLEXIBLE AIRLOADS SA PROGRAM
CARD NO	CONTENTS		
1033	00 TO 20		SPAF105
1034	C 10-4 AERELASTIC INERTIA EFFECTS.		SPAF200
1035	0 10-4		SPAF205
1036	BD(195)=.5*BU(453)		SPAF210
1037	I=00		SPAF215
1038	K=11		SPAF220
1039	00 TO 20		SPAF225
1040	10 IF(ND(23))11,11,12		SPAF230
1041	11 I=ND(20)14,14,12		SPAF235
1042	C SET UP HORIZONTAL TAIL PARAMETERS (10-5).		SPAF240
1043	12 10-5		SPAF245
1044	BD(175)=BD(15)+BD(13)		SPAF247
1045	BD(176)=BC(137)		SPAF250
1046	BD(195)=.5*BU(404)		SPAF255
1047	BD(196)=G.*BC(138)		SPAF260
1048	BD(197)=BC(139)		SPAF265
1049	I=0		SPAF270
1050	00 13 K=1,12		SPAF275
1051	L=1+K*70		SPAF280
1052	BD(L)=BD(195)*BU(K+114)/COS(BD(157)/57.3)		SPAF285
1053	13 I=1+3		SPAF290
1054	I=112		SPAF295
1055	J=77		SPAF300
1056	K=180		SPAF305
1057	00 TO 20		SPAF310
1058	14 IF(ND(23))15,15,16		SPAF315
1059	15 IF(ND(27))31,3,16		SPAF320
1060	C SET UP VERTICAL TAIL PARAMETERS.		SPAF325
1061	16 BD(120)=BD(15)+BD(14)		SPAF327
1062	BD(120)=BC(198)		SPAF330
1063	IF(ND(15))17,18,19		SPAF335
1064	C SINGLE VERTICAL TAIL. CONSIDER INTRA-SPAN HOR TAIL PLANE.		SPAF340
1065	17 10-7		SPAF345
1066	00 TO 20		SPAF350
1067	C DUAL VERTICAL TAIL. NO INTRA-SPAN HOR TAIL PLANE CONSIDERED.		SPAF355
1068	18 10-8		SPAF360
1069	BD(195)=.95*BD(15)		SPAF365
1070	00 TO 21		SPAF370
1071	C T VERTICAL TAIL. HOR TAIL PLANE AT VERT TAIL TIP.		SPAF375
1072	19 10-8		SPAF380
1073	20 BD(195)=BD(15)		SPAF385
1074	21 BD(195)=12.*BC(157)		SPAF390
1075	BD(157)=BC(151)		SPAF395
1076	I=0		SPAF400
1077	00 22 K=1,12		SPAF405
1078	L=1+K*132		SPAF410
1079	BD(L)=BD(195)*BU(K+173)/COS(BD(157)/57.3)		SPAF415
1080	22 I=1+3		SPAF420
1081	I=171		SPAF425
1082	J=130		SPAF430
1083	K=187		SPAF435
1084	IF(10-7)29,23,25		SPAF440
1085	C SINGLE VERT TAIL. CHECK IF HOR TAIL PLANE AT/OUTD OF TOP OF BODY.		SPAF445
1086	23 IF(BC(199)-BC(198))20,24,24		SPAF450
1087	C SHEET STATION OF HOR TAIL PLANE.		SPAF455
1088	24 BD(198)=BC(199)/COS(BD(157)/57.3)		SPAF460
1089	C ASYMMETRIC HOR TAIL LOAD EFFECT AT BODY INTERFACE.		SPAF465
1090	25 BD(131)=BD(14)		SPAF470
1091	C SPANWISE EFFECT OF ASYMMETRIC HOR TAIL LOAD.		SPAF475
1092	00 26 L=175,178,4		SPAF480
1093	IF(10-7)29,26,27		SPAF485
1094	C SINGLE VERT TAIL. CHECK IF HOR TAIL PLANE AT/OUTD OF STAIL-2).		SPAF490
1095	26 IF(BD(198)-BD(L)-2)126,27,27		SPAF495
1096	C INCLUDE EFFECT. ALWAYS FOR T TAIL.		SPAF500
1097	27 BD(L)=BD(14)*COS(BD(157)/57.3)		SPAF505
1098	BD(L)=BD(14)*SIN(BD(157)/57.3)		SPAF510
1099	28 CONTINUE		SPAF515
1700	C NET AIRLOADS AT BODY INTERFACE.		SPAF520
1701	29 BD(J1)=BD(J1)+BD(195)*BU(1)		SPAF525
1702	BD(J1)=BD(J1)+BD(195)*BU(1+1)		SPAF530
1703	BD(J2)=BD(J2)+BD(195)*BU(1+2)		SPAF535

