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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
$C_{L\omega F}$	Flexible wing lift-curve slope, per radian
$C_{L\omega O}$	Initial rigid wing lift-curve slope, per radian
$C_{L\omega R}$	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
DMXH	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 designated 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_{x_A}	Bending moment along load reference line in swept reference system, in.-lb
M_{y_A}	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 R_{DOT}	Airplane yawing acceleration, rad/sec^2
R_{LOADS}	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

$USZW2_{SOB}$	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, $(C C_1) V/2$
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, BPCNTL, 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.

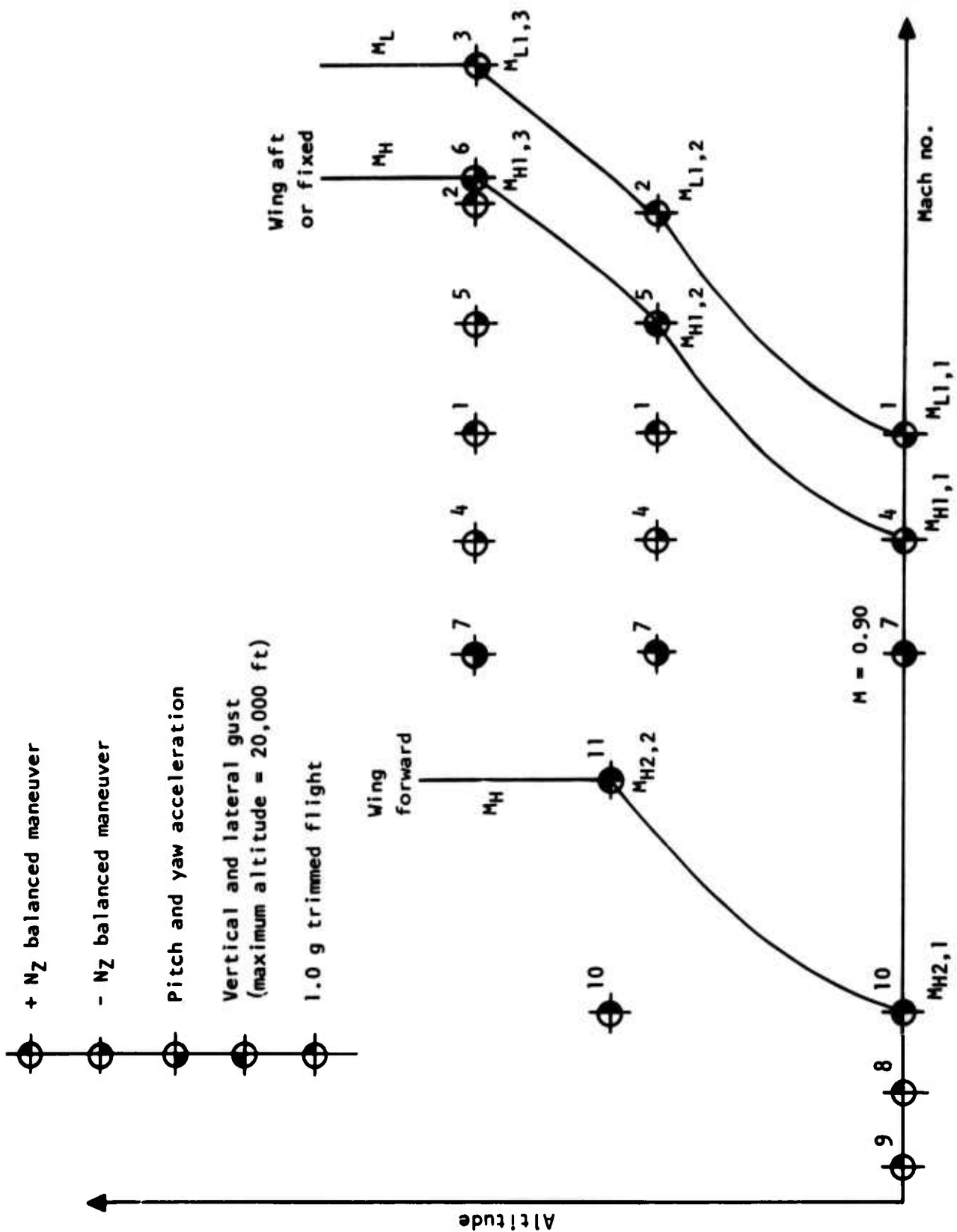


Figure 1. Basic flight condition cases.

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.

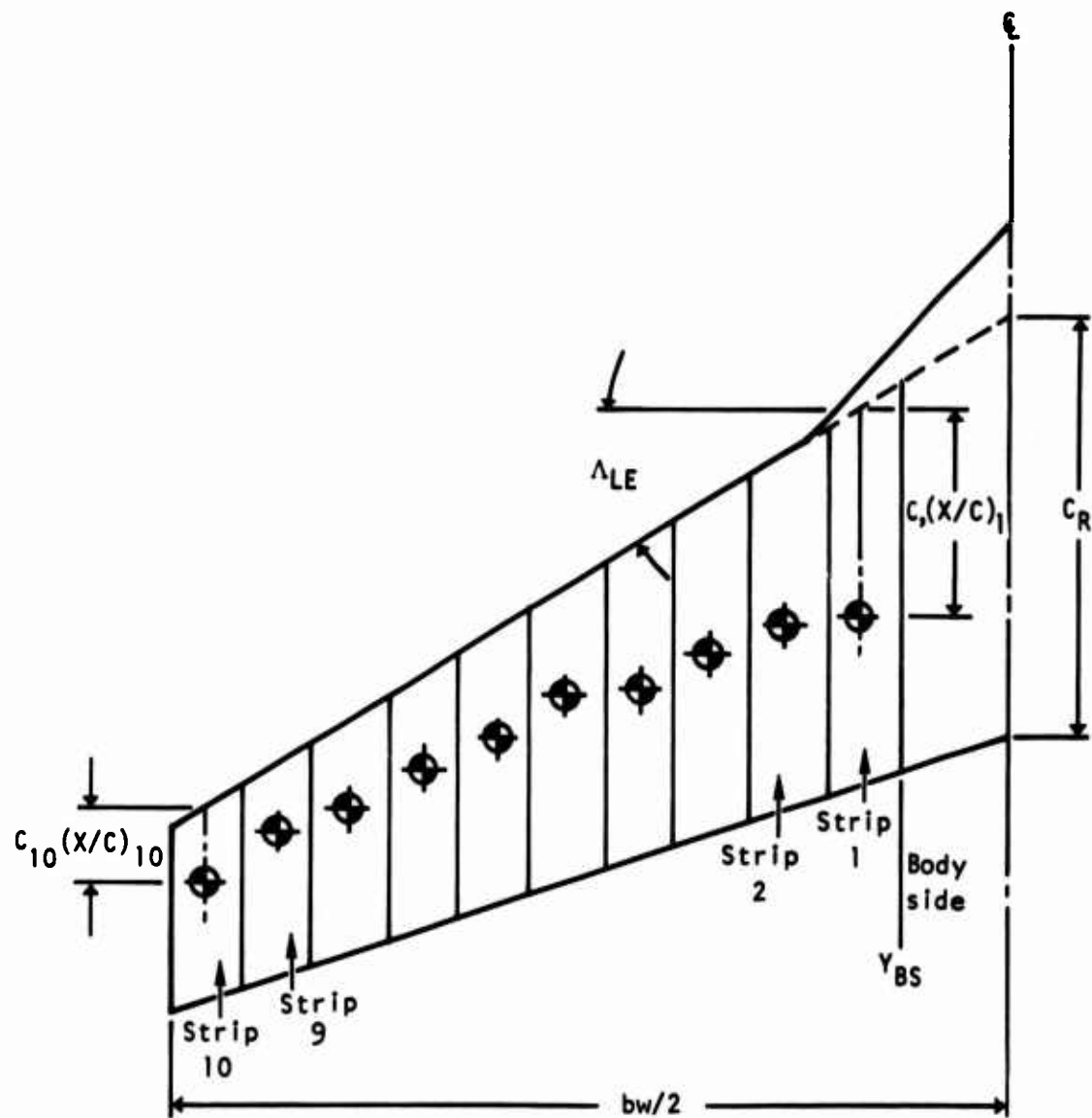


Figure 2. Wing chordwise strips and centers of pressure.

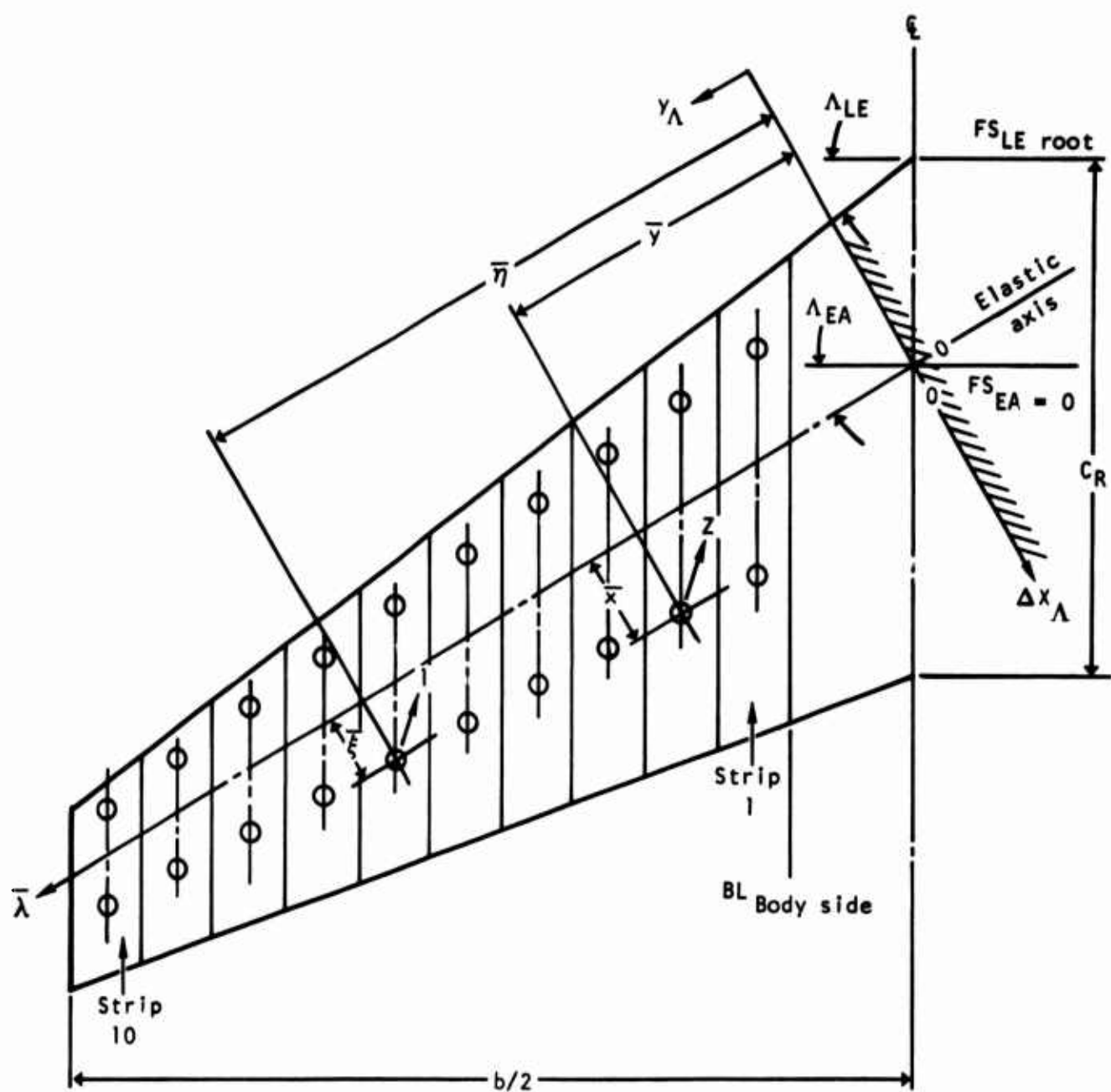


Figure 3. Wing diagram for flexible load analysis.

3. The variation of the exposed wing stiffness parameters, EI and GI, with span station, y_A , 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.,

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

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

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

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

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

Sum strip loads to obtain a new total wing load:

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

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

For strip 11,

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

and for strips 1 through 10,

$$\Delta P_{Ra} (I) = \left(\frac{1.0}{P_{W1}} \right) (\Delta P_o (I)) \quad (9)$$

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

The initial lift curve slope, C_{LaW0} , is then,

$$C_{LaW0} = 57.3 (BC_{La}/K) / (B/K), \text{ per radian} \quad (10)$$

and the wing rigid lift curve slope is then,

$$C_{LaWR} = \left(\frac{P_{W1}}{P_{W0}} \right) C_{LaW0}, \text{ per radian} \quad (11)$$

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 $(2\Gamma/Vab)$ 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:

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

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:

$$C_{L\alpha NR} = \left(\frac{P_{WL}}{P_{W0}} \right) C_{L\alpha W0} \quad (22)$$

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:

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

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

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

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:

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

Transpose and factor out P_{FLEX} :

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

Let

$$\begin{bmatrix} D \end{bmatrix} = \begin{bmatrix} I \end{bmatrix} - q \begin{bmatrix} \alpha \text{LOAD} \end{bmatrix} \begin{bmatrix} \text{SIC} \end{bmatrix} \quad (54)$$

then,

$$\begin{bmatrix} D \end{bmatrix} \begin{Bmatrix} P_{\text{FLEX}} \end{Bmatrix} = \begin{Bmatrix} P_{\text{RIGID}} \end{Bmatrix} \quad (55)$$

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.

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

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

where

$I = 1$ through 10

and

$J = 1$ α load

$J = 2$ δ F load

$J = 3$ 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:

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

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 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 $\eta < \eta_{BS}$,

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

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

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

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

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

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

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

Where $(USZW2)_{S\theta B}$ 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

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

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:

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

Where, I_y = airplane pitching moment of inertia, slug ft², and X_H 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:

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

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

Where $CL_{\alpha WF}$ is obtained using equation (68) and $CL_{\alpha H}$ 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:

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

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

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

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

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, BNLDSE, 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 BNLDSE 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.

Called Calling	RERDAT	DECRD	USPANF	BNLDSF	SPABMF	CØDIM2	FCØDM2	ATHØS	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.

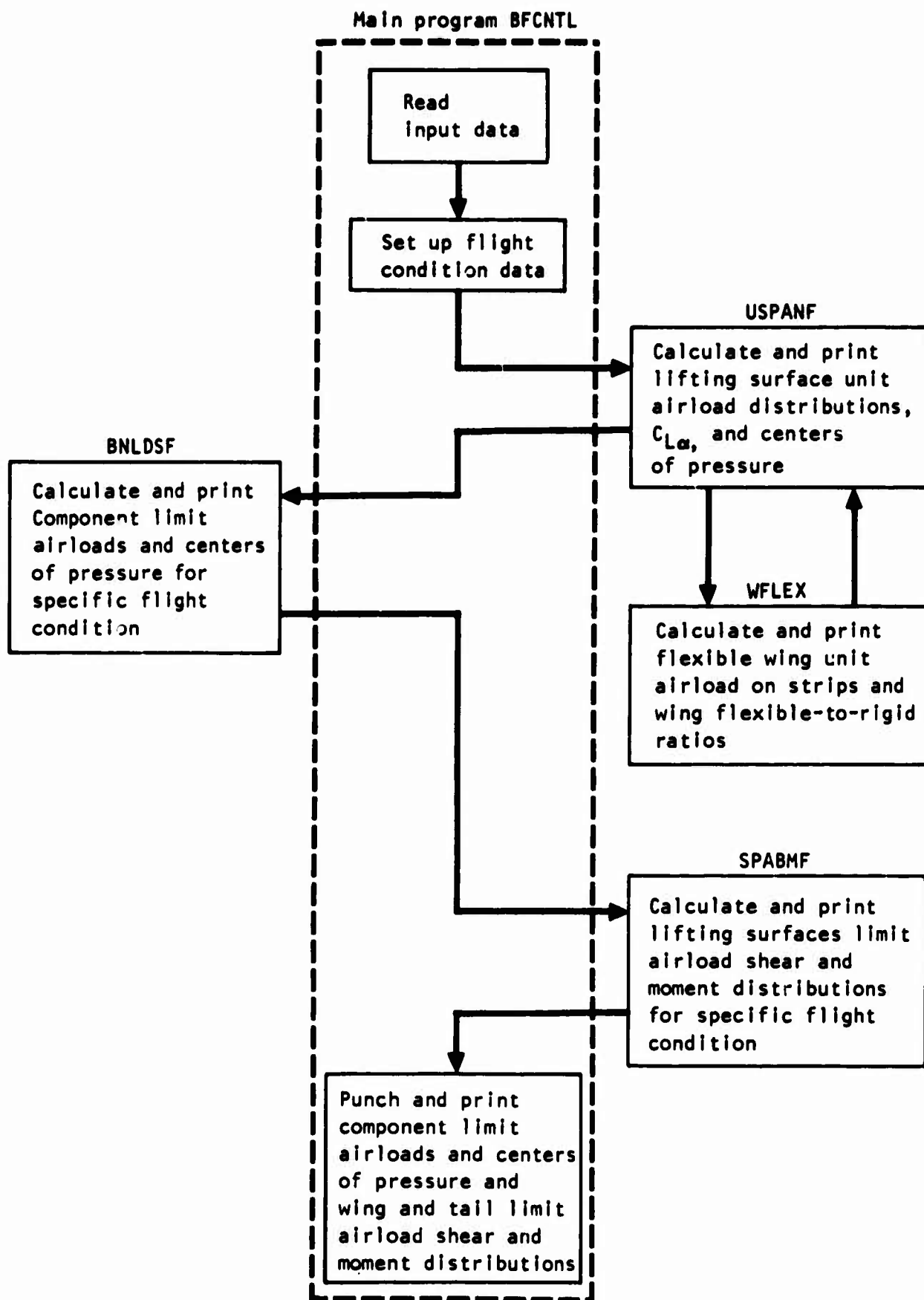


Figure 5. Logical flow chart for flexible airloads stand-alone program.

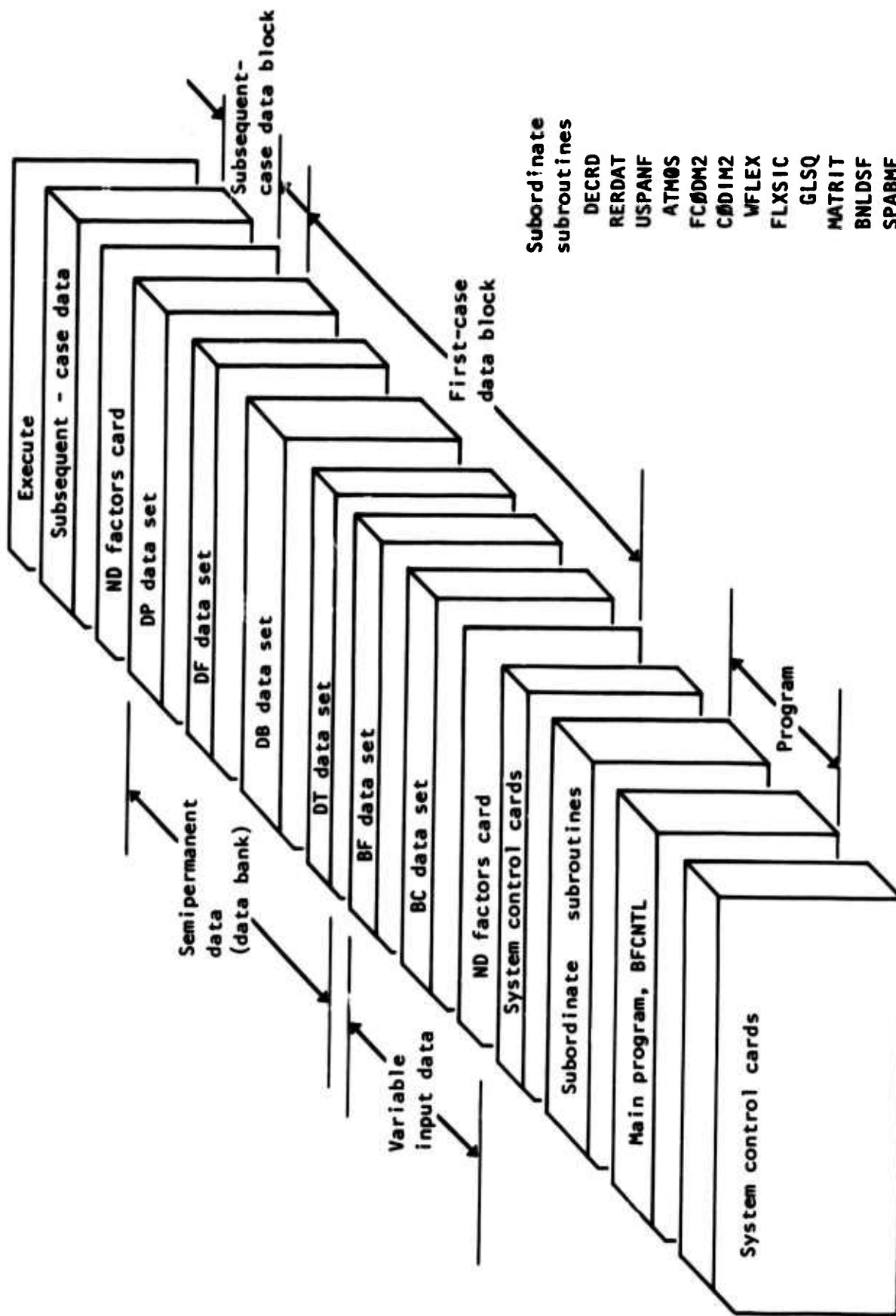


Figure 6. Flexible airloads program deck setup.

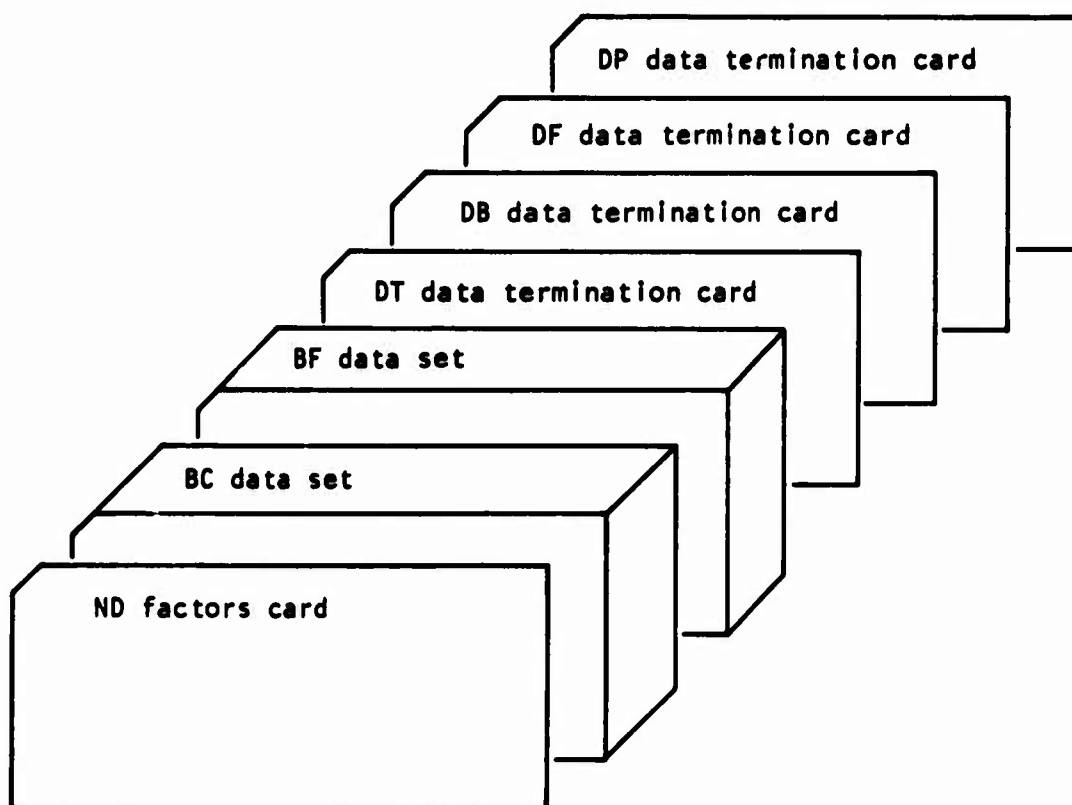


Figure 7. A subsequent-case data block setup.

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.

SEMI-PERMANENT DATA

The program deck setup contains data sets DT, DB, DF, and DP, which comprise semi-permanent (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-dimensioned 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).
NØIGJ	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:

$$\text{LOAD} = \text{CLAR} * \text{EOTA} * Q * \frac{S_W}{2} * \sum_{I=1}^{NS} \text{AFW}(I,1)$$

The variable EOTA 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, B02, BLBS, ANGLE, FSLERT, ANGEA, FSEA0, WLAMDA, X0CFWD, X0CAFT, N0EIGJ, 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:

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

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:

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

YEIGJ(1) = 0.	EI(1) = 10 EI _{BS}	GJ(1) = 10 GJ _{BS}
(2) = 0.25 $\overline{y}_{BS}$	(2) = 10 EI _{BS}	(2) = 10 GJ _{BS}
(3) = 0.50 $\overline{y}_{BS}$	(3) = 10 EI _{BS}	(3) = 10 GJ _{BS}
(4) = $\overline{y}_{BS}$	(4) = EI _{BS}	(4) = GJ _{BS}
(5) = 1.10 $\overline{y}_{BS}$	(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 CDDIM2.

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 E1, 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 E2.

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, TCQM

The program operating core, TCQM, 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

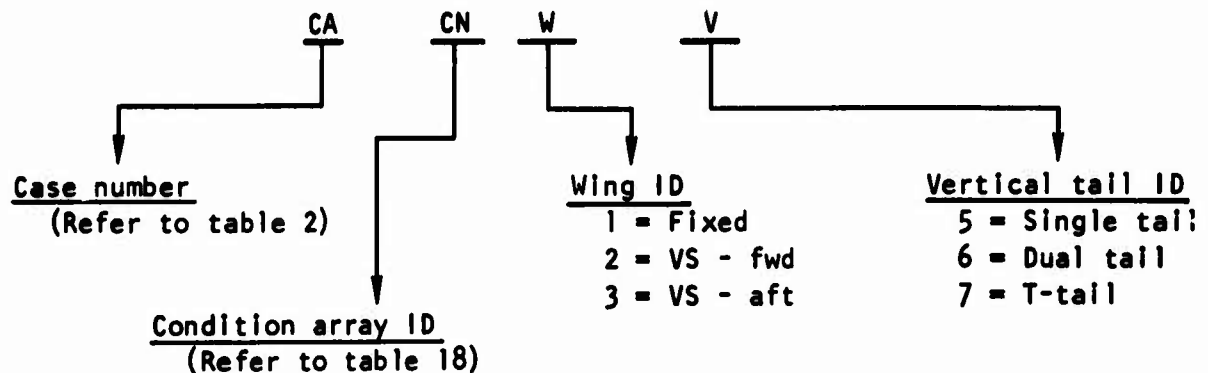
The output punched cards list limit airloads data in an E-format to be read by subroutine DECRD in SWEEP. A sample printout of data on the punched cards is shown in Table 17. Each card contains a DECRD array index number, followed by five decimal data items and the card identification number. A "yes"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

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 inputed 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 values 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		
Punch 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					**
*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. **Enter case number selected from Table 2 (the number must be right-adjusted in the field).						

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 $M_{H1, 20,000 \text{ ft}^*}$	$h_{1,2}$ 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.		$h_{1,3}$
	816 WV	Flap man.	1.5 V _{SO}	SL
	917 WV	1 g flap trim	1.2 V _{SL}	SL
	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.		$h_{2,2}$
	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 2 = Variable sweep (fwd) 3 = Variable sweep (aft) V = 5 = Single vertical tail 6 = Dual vertical tail 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 ZEROS.	
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	INCHES	CUBED INCHES
35	VN-BODY NOSE VOLUMN.		
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.		
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.		
74	WING ASPECT RATIO (AR)-SPAN SQUARED/AREA.		
75	WING TOTAL TRAPEZOIDAL AREA.	SQUARE FEET	
76	WING SPAN-TIP TO TIP.	FEET	
77-87	ELEVEN WING NCRMAL 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).	PERCENT
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).	PERCENT
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 20000 FEET-FIXED WING OR VARIABLE SWEEP AFT.	MACH NUMBER
2	SPEED MH AT 20000 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	TEN 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	TEN 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 (YEA) ALONG ELASTIC AXIS-20 MAXIMUM.	INCHES
67-86	VALUES OF EI AT (YEA) 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
111-113	SPEEDS WL-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.
134-153	VALUES OF EI FOR (YEA) STATIONS.
154-173	VALUES OF GJ FOR (YEA) STATIONS.
174	ELASTIC AXIS LENGTH FROM ROOT TO TIP.
175	(YEA TIP - YEA BODY SIDE) / 15.0
176-200	ARE NOT USED.
	POUND-INCHES SQUARED
	INCHES
	INCHES
	INCHES

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 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
NOTE: Table data order = values for $b_F/b_W(1)$, η (1) through $\eta(11)$ $b_F/b_W(2)$, $\eta(1)$ through $\eta(11)$, etc	

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 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
25-27	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	
33	SPEED MH AT 20000 FT-VARIABLE SWEEP WING FORWARD POSITION.	MACH NUMBER
34	MINIMUM SPEED FLAPS UP (V ₅₀) AT MDW.	KNOTS
35	MINIMUM SPEED FLAPS DOWN (V _{5L}) 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.	DECIMAL
55	PERCENT OF WING CHORD OF LOADS REFERENCE AXIS (X/C).	INCHES
56-66	ELEVEN WING NORMAL SPAN (Y) STATIONS FOR WEIGHT ANALYSIS.	POUNDS
	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).	
98-108	ELEVEN WING NORMAL SPAN (Y) STATIONS FOR WEIGHT ANALYSIS. FROM ROOT TO TIP.	INCHES
109-118	TEN WING OUTER PANEL STRIP WEIGHTS-BODY INTERFACE TO TIP.	POUNDS
119-128	TEN WING OUTER PANEL STRIP CG (X/C) VALUES.	DECIMAL
129	HOR TAIL LEADING EDGE SWEEP ANGLE.	DEGREES
130	HOR TAIL LOADS REFERENCE AXIS SWEEP ANGLE.	DEGREES
131	HOR TAIL APEX (X) STATION-LEADING EDGE AT HOR TAIL CEN LINE.	INCHES
132	HOR TAIL APEX CHORD (CR)-ALONG HOR TAIL CENTER LINE.	INCHES
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).	
139-149	ELEVEN HOR TAIL NORMAL SPAN (YH) STATIONS FOR WEIGHT ANALYSIS. FROM ROOT TO TIP.	INCHES
150	VERT TAIL LEADING EDGE SWEEP ANGLE.	DEGREES
151	VERT TAIL LOADS REFERENCE AXIS SWEEP ANGLE.	DEGREES
152	VERT TAIL APEX (X) STATION-LEADING EDGE AT VERT TAIL ROOT.	INCHES
153	VERT TAIL APEX CHORD (CR)-ALONG VERT TAIL ROOT.	INCHES
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.	
172-195	ARE NOT USED.	INCHES

TABLE 10. TCMM BLOCKED CORE LOCATIONS

Data Block	Core Location		Data are Described in:	
	Data	TCMM Equivalence	Table No.	Page No.
---	Not used	TCMM(1) through TCMM(99)	---	---
DT	DT(1) through DT(56)	TCMM(100) through TCMM(155)	5	93
DB	DB(1) through DB(853)	TCMM(156) through TCMM(1008)	6	94
DF	DF(1) through DF(146)	TCMM(1009) through TCMM(1154)	7	95
DP	DP(1) through DP(734)	TCMM(1155) through TCMM(1888)	8	96
---	Not used	TCMM(1889) through TCMM(2757)	---	---
BC	BC(1) through BC(195)	TCMM(2758) through TCMM(2952)	9	97-100
BB	BB(1) through BB(20)	TCMM(2953) through TCMM(2972)	11	102
BS	BS(1) through BS(20)	TCMM(2973) through TCMM(2992)	12	103-104
BD	BD(1) through BD(160)	TCMM(2993) through TCMM(3152)	13	105-107
BU	BU(1) through BU(500)	TCMM(3153) through TCMM(3652)	14	108-111
BØ	BØ(1) through BØ(348)	TCMM(3653) through TCMM(4000)	15	112-114
BF	BF(1) through BF(200)	TCMM(4001) through TCMM(4200)	4	91-92
ND	ND(1) through ND(200)	TCMM(4201) through TCMM(4400)	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	$\dot{Q}$, airplane pitching acceleration (rad/sec ²)
8	$\dot{R}$, 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 _{LWR} , wing rigid lift curve slope per radian
19	V _E , equivalent airspeed (knots)
20	Balance N _z , airplane normal load factor for balanced part
*Fixed wing ID = 1.0 Variable wing forward ID = 2.0 Variable wing aft ID = 3.0 **Single vertical tail ID = 5.0 Dual vertical tail ID = 6.0 T-type vertical tail ID = 7.0 ***This condition data region is set up for each condition by the main program BFCNTL.	

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

Location	Description
USPANF	
BS(1) is equivalent to TOVM(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 TCØM(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	WØP, 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	$\Delta PZHQ$, 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_{La}/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 ξ (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 inputted 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_{WA} (1) through Y_{WA} (12) along load reference line:	
27	Y_{WA} (1), first wing station (in.)
28	S_{ZW} (1), shear at station Y_{WA} (1) (lb)
29	M_{XA} (1), bending moment at station Y_{WA} (1) (in./lb)
30	M_{YA} (1), torsional moment at station Y_{WA} (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 - N Φ EIGJ = 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	FO Ø DM2 - Interpolation factor (N3)
139	Interpolation factor (N4)
140	Integer variable (I)
141	Integer variable (K)
142	Integer variable (L)
143	O Ø DM2 - 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	-1.32359E 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	5.28498E 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	-4.84892E 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	8.74404E 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)

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TABLE 19. INPUT BC DATA SET

3.84100E 04	3.06000E 02	2.72000E 04	3.13000E 02
3.13000E 02	6.83100E 04	6.55700E 04	6.55700E 04
2.22050E 04	3.13720E 02	7.33000E 00	-3.00000E 00
4.00000E 00	3.00000E 00	6.0	2.37000E 04
3.50000E 04	9.60000E -01	1.31000E 00	0.0
2.37000E 04	3.50000E 04	1.10000E 00	1.31000E 00
1.53300E 02	1.38000E 02	1.93500E 02	4.71000E 05
3.45000E 01	3.35000E 01	4.22667E 01	1.64730E 02
1.90350E 02	2.61700E -01	3.86100E 02	3.85830E 01
5.00000E 01	6.65000E 01	9.95000E 01	1.16000E 02
1.32500E 02	1.49000E 02	1.62000E 02	1.98500E 02
2.15000E 02	4.00000E -01	0.0	0.0
0.0	0.0	0.0	0.0
0.0	0.0	4.90357E 01	4.22667E 01
1.64730E 02	1.90350E 02	3.85560E 00	3.86100E 02
3.85830E 01	5.00000E 01	6.30000E 01	9.95000E 01
1.16000E 02	1.32500E 02	1.65500E 02	1.62000E 02
1.98500E 02	2.15000E 02	0.0	0.0
0.0	0.0	0.0	0.0
0.0	0.0	0.0	3.35000E 01
6.90000E 01	2.50000E -01	-2.89700E 01	4.90357E 01
4.22707E 01	4.09220E 02	3.01695E -01	4.90357E 01
9.91500E 01	1.87200E 01	3.32000E 01	3.53440E 00
4.76000E 01	5.48000E 01	6.92000E 01	4.04000E 01
6.36000E 01	9.08000E 01	1.05200E 02	7.64000E 01
0.0	0.0	0.0	4.00000E -01
0.0	0.0	0.0	0.0
0.0	4.97590E 01	3.96050E 02	0.0
2.65330E -01	1.59800E 00	1.05525E 01	1.25240E 02
3.03100E 01	3.90700E 01	5.65900E 01	2.15500E 01
7.41100E 01	6.26700E 01	1.00390E 02	6.53500E 01
1.17910E 02	4.00000E -01	0.0	1.09150E 02
0.0	0.0	0.0	0.0
1.06000E 00	1.68500E 00	1.57500E 00	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

TABLE 20. INPUT BF DATA SET

1.05000E 00	1.05000E 00	4.22670E 01	2.40670E 02	4.12100E 02
2.90600E 02	2.38400E 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	4.48500E-01	4.28500E-01	5.37400E-01	4.22670E 01
2.40870E 02	4.12100E 02	2.90600E 02	2.38400E 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	4.48500E-01	4.28500E-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 BC/LA/K TABLES FOR AR= 3.8556 SWB= 47.07 TR= 0.2617 BA/K= 3.9428

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 LONG	WING INBD LONG	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		
0.48663	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= 1.4846 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
 0.0
 0.38300
 0.70700
 0.92400
 1.00000

LOADING AT DATA STATIONS
 1.17510
 1.37055
 1.37891
 0.81645
 0.0

VERT TAIL

STATION
 0.0
 0.38300
 0.70700
 0.92400
 1.00000

LOADING AT DATA STATIONS
 1.23900
 1.40084
 1.38554
 0.81923
 0.0

TABLE 22. WFLEX LOADING MATRICES

RIGID LOAD ON STRIPS (ALPHA, DELTA FLAP, AND M2) (AFW Matrix)

COLUMN NO. = 1

9.80337E-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

1.04784E-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 -1.04553E-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

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

COLUMN NO. = 1

5.80000E-01 5.80000E-01 5.80000E-01 5.60000E-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. WFLEX LOADING MATRICES (CONCL)

RIGID, FLEX, DELTA FLEX LOADS, AND F/R RATIOS (FLEX)

ROW NO. = 1

9.20961E-01 5.88469E-01 -3.32492E-01 6.38973E-01

ROW NO. = 2

7.79014E-01 6.53447E-01 -1.25567E-01 8.38813E-01

ROW NO. = 3

-1.00000E 00 -8.16762E-01 1.83236E-01 8.16762E-01

TABLE 23. SPANWISE LOADING DISTRIBUTION

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

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

TABLE 23. SPANWISE LOADING DISTRIBUTION (CONT)

ANALYSIS STATIONS	INCREMENT LOADING-FLAP AEROELASTIC	ANALYSIS STATIONS	INCREMENT LOADING-INERTIA AEROELASTIC	TOR LODG
1.00000	0.0	1.00000	0.0	0.0
0.92873	-0.10513	0.92873	0.16751	-1.4862
0.85746	-0.17125	0.85746	0.26959	-2.7121
0.78618	-0.19705	0.78618	0.30645	-3.5313
0.71491	-0.21416	0.71491	0.52923	-4.2685
0.64363	-0.21365	0.64363	0.32027	-4.6193
0.57236	-0.20182	0.57236	0.29429	-4.6668
0.50108	-0.18179	0.50108	0.25545	-4.4307
0.42981	-0.15619	0.42981	0.21074	-3.9512
0.35853	-0.12781	0.35853	0.16579	-3.3482
0.28726	-0.09559	0.28726	0.12072	-2.6152
0.21598	-0.05813	0.21598	0.07268	-1.6539
0.0	0.0	0.0	0.0	0.0
ANALYSIS STATIONS	TOR LODG	ANALYSIS STATIONS	TOR LODG	TOR LODG
1.00000	0.0	1.00000	0.0	0.0
0.92873	0.9330	0.92873	0.92873	-1.4862
0.85746	1.7224	0.85746	0.85746	-2.7121
0.78618	2.2706	0.78618	0.78618	-3.5313
0.71491	2.7766	0.71491	0.71491	-4.2685
0.64363	3.0810	0.64363	0.64363	-4.6193
0.57236	3.2006	0.57236	0.57236	-4.6668
0.50108	3.1463	0.50108	0.50108	-4.4307
0.42981	2.9281	0.42981	0.42981	-3.9512
0.35853	2.5810	0.35853	0.35853	-3.3482
0.28726	2.0690	0.28726	0.28726	-2.6152
0.21598	1.3260	0.21598	0.21598	-1.6539
0.0	0.0	0.0	0.0	0.0

TABLE 23. SPANWISE LOADING DISTRIBUTION (CONCL)

ANALYSIS STATION	LOADING--(HOR TAIL)	LOADING--(VERT TAIL)	ANALYSIS STATION	LOADING--(HOR TAIL)	LOADING--(VERT TAIL)
1.00000	0.0	0.0	1.00000	0.0	0.0
0.93661	0.70005	0.75481	0.93114	0.0	0.75481
0.87251	1.06136	1.09296	0.86196	0.0	1.09296
0.80841	1.20845	1.24102	0.79278	0.0	1.24102
0.74430	1.32003	1.35903	0.72360	0.0	1.35903
0.68020	1.40389	1.42191	0.65443	0.0	1.42191
0.61610	1.41453	1.42660	0.58525	0.0	1.42660
0.55199	1.40742	1.42355	0.51607	0.0	1.42355
0.48789	1.39507	1.41111	0.44689	0.0	1.41111
0.42379	1.38048	1.39991	0.37771	0.0	1.39991
0.35969	1.36407	1.38215	0.30854	0.0	1.38215
0.29558	1.34036	1.35675	0.23936	0.0	1.35675
0.0	1.17510	1.23900	0.0	0.0	1.23900
STATION	DX SWEEP		STATION	DX SWEEP	
1.00000	0.873		1.00000	0.983	
0.93661	1.000		0.93114	1.171	
0.87251	1.130		0.86196	1.359	
0.80841	1.259		0.79278	1.547	
0.74430	1.388		0.72360	1.736	
0.68020	1.518		0.65443	1.924	
0.61610	1.647		0.58525	2.112	
0.55199	1.776		0.51607	2.301	
0.48789	1.906		0.44689	2.489	
0.42379	2.035		0.37771	2.677	
0.35969	2.164		0.30854	2.865	
0.29558	2.294		0.23936	3.054	
0.0	20.128		0.0	17.942	

TABLE 24. USPANF SPANWISE UNIT DISTRIBUTIONS

WING FLEXIBLE ALPHA PARAMETERS				MN= 1.050	CLA= 2.83530		
DXTOTAL=	175.75	YW(B)=	95.85	DXW(B)=	188.02	DXB(W)=	64.11
SIDE OF BODY UNITS							
USZW=	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
DXTOTAL=		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	USZW(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 YW(B)= 129.71 DXW(B)= 214.53 DXB(W)= 71.56

SIDE OF BODY UNITS

USZW= 0.97704 UMXW= 94.001 UMYW=-105.468

SPANWISE UNIT DISTRIBUTIONS

STA SWEPT	USZW(B)	UMXW(B) SWEPT	UMYW(B) SWEPT
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)

HOR 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. USPANE 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.	PZW62=	0.	PZW63=	0.	PZW64=	647.
						PZHB=	-2647.

TABLE 26. WING LIMIT AIRLOAD DISTRIBUTIONS

WING LOADS	COND NO=	6031.	MM=	1.050	ALT=	20000.	DF=	0.0	TORSM SCB=	-986196.IN-LB
BODY INT=	33.50IN	SHEAR SCB=	11995.LB	BENDM SCB=	755712.IN-LB					
STATION (IN)		SHEAR (LB)		BENDM (IN-LB)		TORS MOM (IN-LB)				
312.01		0.		0.		0.				
296.52		142.		1583.		-1254.				
266.22		528.		9057.		-4985.				
245.43		1045.		27160.		-11177.				
223.63		1819.		59849.		-20086.				
201.34		2711.		110144.		-32390.				
175.04		3768.		162363.		-48469.				
156.74		4962.		279679.		-66346.				
134.45		6271.		464902.		-91986.				
112.15		7675.		560374.		-119361.				
89.86		9151.		747955.		-150260.				
67.56		10654.		969078.		-184523.				

TABLE 27. HORIZONTAL TAIL LIMIT AIRLOAD DISTRIBUTIONS

HORIZONTAL TAIL LUALS				COND 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.	MM=	1.650	ALT=	20000.		
BOLY INT=	21.55IN	SHEAR SOB=	10854.LB	BENDM SOB=	500967.IN-LB	TDRSM SOB=	-23068.IN-LB		
STATION (IN)		SHEAR (LB)		BEND MOM (IN-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
 NOEIGJ = 11
 CR = 190.35 IN. BD2 = 231.50 IN. BLBS = 33.50 IN.
 ANGLE = 49.036 DEG. FSLERT = 164.73 IN.
 ANGEA = 42.267 DEG. FSEA0 = 240.87 IN.
 WLANDA = 0.262 XOCFWD = 0.150 XOCFT = 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

4.3394E 01	4.3399E 01	6.31997E 01	6.31997E 01	8.29995E 01	1.02799E 02	1.02799E 02	1.02799E 02
1.22599E 02	1.22599E 02	1.42399E 02	1.42399E 02	1.62199E 02	1.81998E 02	1.81998E 02	1.81998E 02
2.01798E 02	2.01798E 02	2.21546E 02	2.21598E 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	5.98472E 01	1.10955E 02	8.86235E 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	5.58429E-07	6.77136E-07	6.56194E-07	7.61169E-07	7.53961E-07	8.45203E-07		
6.51726E-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	1.28405E-05	1.63829E-05	1.57580E-05	1.88907E-05	1.86735E-05	2.13984E-05		
2.15931E-05	2.39061E-05	2.45106E-05	2.64138E-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	3.79068E-06	4.72494E-06	4.56012E-06	5.38632E-06	5.32958E-06	6.04769E-06		
6.09903E-06	6.70906E-06	6.86847E-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	2.67242E-05	3.48351E-05	3.34043E-05	4.05770E-05	4.00844E-05	4.63187E-05		
4.67644E-05	5.20605E-05	5.34445E-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	1.39483E-05	1.78947E-05	1.72073E-05	2.06530E-05	2.04164E-05	2.34114E-05		
2.36255E-05	2.61697E-05	2.68346E-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	4.55540E-05	6.11483E-05	5.83972E-05	7.21875E-05	7.12405E-05	8.32268E-05		
8.40838E-05	9.42661E-05	9.69270E-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	3.09397E-05	4.06070E-05	3.89016E-05	4.74506E-05	4.68636E-05	5.42942E-05		
5.48254E-05	6.11377E-05	6.27872E-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
1.06053E-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	8.78637E-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	1.89558E-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
4.78424E-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				
ROW 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				
ROW 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				
ROW 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				
ROW 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				
ROW 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

ROW NO. = 1									
3.28066E-07	-3.28108E-07	3.04011E-07	-3.04072E-07	2.79956E-07	-2.80035E-07	2.35901E-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						
ROW 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						
ROW 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						
ROW 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						
ROW NO. = 5									
2.79956E-07	-4.62290E-06	1.94972E-06	-6.88815E-06	4.16510E-06	-4.16628E-06	3.60722E-06	-3.80870E-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						
ROW 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						
ROW 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						
ROW 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	1.23808E-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 1.77586E-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 6.54862E-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 4.53537E-05

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

ROW NO. = 1									
3.97665E-07	-7.11399E-06	4.71376E-07	5.69292E-06	5.45087E-07	1.44999E-07	6.18798E-07	2.53668E-07		
6.92507E-07	3.61137E-07	7.66216E-07	4.69208E-07	8.39929E-07	5.77276E-07	9.13638E-07	6.85345E-07		
9.87348E-07	7.93415E-07	1.06106E-06	9.01481E-07						
ROW NO. = 2									
-7.11399E-08	9.26226E-06	-3.84980E-06	1.13731E-05	-5.35049E-07	1.34639E-05	2.77971E-06	1.55948E-05		
6.09451E-06	1.77056E-05	9.40927E-06	1.98164E-05	1.27240E-05	2.19273E-05	1.60388E-05	2.40381E-05		
1.93535E-05	2.61489E-05	2.26662E-05	2.62547E-05						
ROW NO. = 3									
4.71376E-07	-3.84980E-06	2.83013E-06	-3.82179E-08	3.43205E-06	7.90554E-07	4.03397E-06	1.61931E-06		
4.63588E-06	2.44808E-06	5.23780E-06	3.27685E-06	5.83972E-06	4.10561E-06	6.44164E-06	4.93437E-06		
7.04355E-06	5.76315E-06	7.64547E-06	6.59191E-06						
ROW NO. = 4									
5.69242E-08	1.13731E-05	-3.82175E-06	1.93446E-05	-2.04114E-07	2.44999E-05	7.06782E-06	2.96503E-05		
1.43398E-05	3.48008E-05	2.16117E-05	3.99511E-05	2.88836E-05	4.51015E-05	3.61556E-05	5.02519E-05		
4.34275E-05	5.54023E-05	5.66994E-05	6.05527E-05						
ROW NO. = 5									
5.45067E-07	-5.35049E-07	3.43205E-06	-2.04114E-07	8.53617E-06	5.45349E-06	1.13874E-05	8.56941E-06		
1.42385E-05	1.16853E-05	1.70897E-05	1.48012E-05	1.99409E-05	1.79171E-05	2.27921E-05	2.10330E-05		
2.56432E-05	2.41490E-05	2.84944E-05	2.72649E-05						
ROW NO. = 6									
1.44999E-07	1.34839E-05	7.90554E-07	2.44999E-05	5.45349E-06	3.74757E-05	1.12360E-05	4.77044E-05		
2.46906E-05	5.79330E-05	3.85454E-05	6.81615E-05	5.22000E-05	7.83901E-05	6.56547E-05	8.86187E-05		
7.95093E-05	9.88473E-05	9.31639E-05	1.09076E-04						
ROW NO. = 7									
6.18798E-07	2.77971E-06	4.03397E-06	7.06782E-06	1.13674E-05	1.12360E-05	2.08899E-05	2.10438E-05		
2.82996E-05	2.64391E-05	3.57093E-05	3.58343E-05	4.31190E-05	4.32295E-05	5.05267E-05	5.06246E-05		
5.74365E-05	5.80201E-05	6.53481E-05	6.54153E-05						
ROW NO. = 8									

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

2.53068E-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	1.64060E-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	9.95819E-05
1.10598E-04	1.14755E-04	1.26507E-04	1.29927E-04				
ROW NO. = 10							
3.61137E-07	1.77056E-05	2.44808E-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	2.85156E-04	2.40056E-04	3.41743E-04
3.11947E-04	3.98330E-04	3.83836E-04	4.54917E-04				
ROW NO. = 13							
8.39925E-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
8.44092E-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)

9.44885E-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	2.10330E-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	6.68444E-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	8.76555E-04	9.48122E-04				
ROW NO. = 18							
7.93415E-07	2.61489E-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	2.26682E-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				

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	1.31593E-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	0.0
ROW NO. = 3									
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	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	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. = 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	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. = 8									
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	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 -1.87091E-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 -3.11949E-07 -3.99234E-08 -3.68669E-07
 -1.27697E-07 -4.25740E-07 -2.15469E-07 -4.82606E-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 -1.83437E-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	-3.53665E-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	-3.53008E-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
SW = 386.10 FT**2

TABLE 37. D MATRIX

COLUMN NO. = 1

9.99954E-01 -2.65900E-04 -4.76779E-05 -2.94107E-04 -4.66315E-05 -2.99465E-04 -4.94145E-05 -3.03546E-04
 -4.97719E-05 -3.05742E-04 -4.97420E-05 -3.05558E-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 1.00578E 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
 -3.51927E-04 -2.03658E-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 1.01339E 00 3.09250E-03 1.69566E-02 3.12941E-03 1.52235E-02
 3.15204E-03 1.93626E-02 3.15016E-03 1.93510E-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 -7.19463E-04 -4.18640E-04 -2.56756E-03 -9.99658E-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 4.52777E-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 -2.82288E-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	1.93894E-02	4.91524E-03	3.01937E-02	6.69192E-03	1.04234E 00
8.32713E-03	5.11524E-02	8.32217E-03	5.11219E-02	6.02653E-03	4.93058E-02	7.34216E-03	4.51020E-02
6.16175E-03	3.79736E-02	2.71657E-03	1.66999E-02				
COLUMN NO. = 9							
5.33865E-04	3.27946E-03	1.08126E-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	4.93792E-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	5.27892E-03	1.84140E-03	1.13115E-02	2.69292E-03	1.65423E-02	3.34836E-03	2.05665E-02
3.12386E-03	1.91894E-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-02	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	4.59507E-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	2.05644E-02	5.41406E-03	3.32560E-02	8.06075E-03	4.95161E-02

TABLE 37. D MATRIX (CONCL)

1.13541E-02 6.97464E-02 1.37395E-02 8.43999E-02 1.39081E-02 6.54357E-02 1.01064E 00 6.53865E-02
 6.96201E-03 5.50524E-02 3.54135E-03 2.42111E-02

COLUMN NO. = 16

2.34223E-03 1.43880E-02 5.10680E-03 3.13626E-02 8.49985E-03 5.22134E-02 1.32142E-02 6.11731E-02
 2.01582E-02 1.23829E-01 2.90749E-02 1.78603E-01 4.10043E-02 2.51684E-01 4.63237E-02 1.29685E 00
 4.63186E-02 2.84530E-01 2.03698E-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 6.39697E-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 1.46670E 00 3.05979E-02 1.67956E-01

COLUMN NO. = 19

2.16133E-03 1.52767E-02 4.65399E-03 2.92174E-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 3.79007E-02 2.32619E-01 4.06582E-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 3.73752E-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

TABLE 38. SIC POINT LOAD MATRICES

RIGID LOAD DISTRIBUTIONS MATRIX

COLUMN NO. = 1

1.37247E-02 8.43090E-02 1.41184E-02 2.67270E-02 1.43946E-02 8.84549E-02 1.45710E-02 8.95110E-02
 1.46709E-02 9.01581E-02 1.46601E-02 5.01042E-02 1.41471E-02 8.69033E-02 1.29409E-02 7.94941E-02
 1.08956E-02 2.69298E-02 4.79150E-03 2.94339E-02

COLUMN NO. = 2

6.06429E-02 1.03941E-01 6.55223E-02 1.11935E-01 5.22124E-02 8.91473E-02 3.34071E-02 5.70712E-02
 2.41201E-02 4.12050E-02 1.90634E-02 3.26011E-02 1.41559E-02 2.41832E-02 9.80287E-03 1.67466E-02
 6.21631E-03 1.06231E-02 2.26805E-03 3.87562E-03

COLUMN NO. = 3

-1.46459E-01 -6.48935E-02 -6.69400E-02 -4.76126E-02 -4.70050E-02 -8.79693E-02 -4.70549E-02 -4.46477E-02
 -3.69466E-02 -6.22420E-02 -2.33271E-02 -5.39602E-02 -2.31262E-02 -4.42576E-02 -1.69324E-02 -2.50835E-02
 -1.13133E-02 -1.42246E-02 -3.09873E-03 -1.06612E-02

FLEXIBLE LOAD DISTRIBUTIONS MATRIX

COLUMN NO. = 1

1.28914E-02 7.91441E-02 1.23437E-02 7.61332E-02 1.17445E-02 7.21452E-02 1.08510E-02 6.86600E-02
 9.67186E-03 5.94123E-02 8.34712E-03 5.12742E-02 6.53635E-03 4.01637E-02 5.00009E-03 3.07143E-02
 3.49570E-03 2.14735E-02 1.45095E-03 8.91317E-03

COLUMN NO. = 2

4.236E-02 1.00752E-01 6.44600E-02 1.05410E-01 5.06620E-02 7.97967E-02 3.14734E-02 4.51934E-02
 4.2759E-02 2.71731E-02 1.65642E-02 1.71558E-02 1.15729E-02 8.31571E-03 7.44344E-03 2.25262E-03
 4.2326E-03 -1.34961E-03 1.42417E-03 -1.31199E-03

COLUMN NO. = 3

-1.47810E-01 -8.09461E-02 -6.56031E-02 -8.94052E-02 -4.50197E-02 -7.57946E-02 -4.44244E-02 -7.66884E-02
 -3.36948E-02 -4.21544E-02 -1.96003E-02 -3.10716E-02 -1.91684E-02 -1.99444E-02 -1.32631E-02 -2.54219E-03
 -6.23014E-03 4.66624E-03 -1.73962E-03 -2.31222E-03

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.

SEMI-PERMANENT 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).

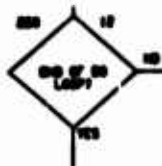
FLOW CHARTS

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.



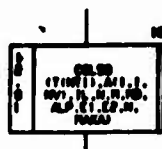
The unconditional transfer connector has its page number destination printed above or to the left of the box number destination within the connector. If there is a FORTRAN statement number at the destination, it is printed below the connector.



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.



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
FCODM2	221	262
CODIM2	224	262
WFLEX	228	264
FLXSIC	231	265
GLSQ	235	267
MATRIT	237	267
BNLDSF	239	268
SPABMF	243	270

AUTOFLW CHART SET

BFONTL

05/04/73

CARD NO.	PAGE/ROW	MARK
----------	----------	------

REFERENCES (SOURCE, SEQUENCE NO., AND PAGE/BOOK)

PORTMAN MEDIA FLEXIBLE AIRLOADS SA PROGRAM

CHART TITLE - INTRODUCTORY COMMENTS

CHART TITLE - PROCEDURES[illegible]

05/04/73		TABLE OF CONTENTS AND REFERENCES		AUTOFLW CHART SET - BFCNTL							PAGE 2	
CARD 10	PAGE/BOOK	NAME	REFERENCES (SOURCE SEQUENCE NO. AND PAGE/BOOK)									
BFCNT302	0.00 70		BFCNT310	0.10	BFCNT310	0.10	BFCNT310	0.10	BFCNT310	0.10	BFCNT300	7.03
BFCNT306	0.00 71		BFCNT310	0.10	BFCNT310	0.10	BFCNT400	7.06				
BFCNT308	0.10 72		BFCNT310	0.10	BFCNT310	0.10	BFCNT410	7.00				
BFCNT304	7.01 73		BFCNT310	0.10	BFCNT310	0.10	BFCNT310	0.10				
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	BFCNT310	0.10	BFCNT310	0.10							
BFCNT410	7.06 78											
BFCNT414	7.07 79	BFCNT410	7.06									
BFCNT420	7.00 80	BFCNT370	0.06	BFCNT300	0.07	BFCNT304	0.00	BFCNT300	0.00	BFCNT302	0.10	
BFCNT424	7.00 81	BFCNT420	7.00									
BFCNT420	7.10 82	BFCNT420	7.00									
BFCNT432	7.11 83	BFCNT420	7.00									
BFCNT430	7.12 84	BFCNT420	7.00									
BFCNT440	7.13 85	BFCNT420	7.00									
BFCNT444	0.01 86	BFCNT420	7.00									
BFCNT440	0.02 87	BFCNT420	7.00									
BFCNT452	0.03 88	BFCNT420	7.00									
BFCNT450	0.04 89	BFCNT420	7.00									
BFCNT460	0.05 90	BFCNT400	7.04	BFCNT410	7.07	BFCNT420	7.00	BFCNT430	7.10	BFCNT434	7.11	
		BFCNT420	7.12	BFCNT442	7.13	BFCNT440	0.01	BFCNT450	0.02	BFCNT454	0.03	
BFCNT406	0.07 91											
BFCNT400	0.08 92	BFCNT400	0.10									
BFCNT470	0.00 93	BFCNT404	0.06									
BFCNT470	0.10 94											
BFCNT482	0.11 95	BFCNT470	0.09									
BFCNT490	0.12 96	BFCNT474	0.00									
BFCNT494	0.14 97											
BFCNT495	0.15 9											
BFCNT490	0.17 98	BFCNT493	0.13	BFCNT496	0.16	BFCNT496	0.16					
BFCNT502	0.18 99	BFCNT494	0.14	BFCNT496	0.16	BFCNT496	0.16					
BFCNT500	0.19 100	BFCNT493	0.13	BFCNT494	0.14	BFCNT496	0.16	BFCNT496	0.16	BFCNT496	0.16	
		BFCNT496	0.16	BFCNT500	0.17							
BFCNT510	0.20 101	BFCNT500	0.19	BFCNT500	0.19	BFCNT500	0.19	BFCNT500	0.19	BFCNT500	0.19	
BFCNT512	0.21 102											
BFCNT516	0.01 103	BFCNT510	0.20									
BFCNT520	0.02 105	BFCNT500	0.19	BFCNT500	0.19	BFCNT500	0.19	BFCNT500	0.19	BFCNT500	0.19	
BFCNT526	0.03 107	BFCNT500	0.19	BFCNT500	0.19	BFCNT500	0.19	BFCNT500	0.19	BFCNT500	0.19	
		BFCNT500	0.19	BFCNT500	0.19	BFCNT500	0.19					
BFCNT532	0.04 109	BFCNT500	0.19	BFCNT500	0.19	BFCNT500	0.19					
BFCNT534	0.05 110											
BFCNT530	0.06 111	BFCNT532	0.04									
BFCNT540	0.07 112	BFCNT500	0.04	BFCNT370	0.05	BFCNT420	7.00	BFCNT420	7.00	BFCNT500	0.10	
		BFCNT500	0.10	BFCNT514	0.21	BFCNT510	0.01	BFCNT522	0.02	BFCNT520	0.03	
		BFCNT530	0.05									
BFCNT500	0.09 120	BFCNT504	0.00									
BFCNT570	10.01 117	BFCNT504	0.00									
BFCNT572	10.02 120	BFCNT500	0.00									
BFCNT562	10.06	BFCNT504	10.00									
BFCNT504	10.07 90											
BFCNT500	10.10 110	BFCNT500	0.00	BFCNT570	10.04							
BFCNT504	10.13 119	BFCNT500	10.11	BFCNT500	10.11	BFCNT500	10.11	BFCNT500	10.11	BFCNT500	10.11	
		BFCNT500	10.11	BFCNT500	10.11	BFCNT500	10.11	BFCNT500	10.11	BFCNT500	10.11	
		BFCNT500	10.11									
BFCNT600	10.14 121	BFCNT500	10.11	BFCNT500	10.11							
BFCNT604	10.15 122	BFCNT500	10.11	BFCNT500	10.11							
BFCNT600	10.16 123	BFCNT500	10.11									
BFCNT612	10.17 124	BFCNT500	10.11	BFCNT500	10.11	BFCNT500	10.11					
BFCNT610	11.01 125	BFCNT500	10.11	BFCNT500	10.11	BFCNT500	10.11					
BFCNT610	11.02 126	BFCNT500	10.13	BFCNT602	10.14	BFCNT600	10.15	BFCNT610	10.16	BFCNT614	10.17	
BFCNT630	11.05 40											
BFCNT645	11.07	BFCNT600	11.11									
BFCNT600	11.10 91											
BFCNT605	11.12 96	BFCNT625	11.04									
BFCNT670	11.13 92											
BFCNT605	11.16	BFCNT700	11.20									
BFCNT700	11.19 95											
BFCNT710	11.20 127	BFCNT310	0.06	BFCNT605	11.12							

CHART TITLE - NON-PROCEDURAL STATEMENTS

CHART TITLE - SUBROUTINE READAT

READA005 13.01 READAT BFCNT045 2.10-K USPP1200 26.21-K

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REDA050	13.12	26	REDA027	13.01	
REDA060	13.13	27			
REDA070	13.16	3			
REDA070	13.16		REDA075	13.17	
REDA080	13.19		REDA080	13.21	
REDA080	13.20	4			
REDA080	13.24	5			
REDA090	13.24		REDA080	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		REDA210	15.06	
REDA210	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	REDA305	13.12	
REDA385	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		REDA455	16.15	
REDA455	16.14	32			

CHART TITLE - NON-PROCEDURAL STATEMENTS

CHART TITLE - SUBROUTINE DECRO(V)

(000374)	10.01	5	(000382)	10.12	(000383)	12	15						
(000374)	10.01	DECRO	BFCNT050	2.11-X	BFCNT055	2.12-X	UTCNT060	2.13-X	BFCNT065	3.01-X	REDA030	13.02-X	
			REDA032	13.03-X									
(000377)	10.04	21											
(000379)	10.05	22	(000376)	10.03									
(000385)	10.06	7	(000378)	10.05									
(000388)	10.07		(000391)	10.11									
(000388)	10.09	11											
(000389)	10.10	3	(000387)	10.08									
(000391)	10.11	2	(000388)	10.09									
(000393)	10.13	6											
(000391)	10.14	8	(000378)	10.05									

CHART TITLE - NON-PROCEDURAL STATEMENTS

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USPF0010	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	USPF0115	20.09	USPF0100	20.11	USPF0005	20.10
USPF0130	20.14	10	USPF0125	20.13	USPF2375	22.31	USPF2305	33.00
USPF0100	21.01	11	USPF0150	20.15				
USPF0105	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	21.16	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	USPF0375	21.26		
USPF0420	22.11	26	USPF0410	22.10				
USPF0450	22.14		USPF0460	22.16				
USPF0460	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						
USPF0735	24.01	50	USPF0745	23.20				
USPF0760	24.02		USPF0765	24.04				
USPF0765	24.03	51						
USPF0760	24.07	52						
USPF0760	24.09	53						
USPF0760	24.09		USPF0760	24.10				
USPF0805	24.12	54	USPF0775	24.06				
USPF0825	24.13	55	USPF0800	24.11				
USPF0835	24.18	58	USPF0845	24.17				
USPF0880	24.20	59						
USPF0880	24.20		USPF0880	24.21				
USPF0900	24.24	60						
USPF0900	24.24		USPF0900	24.25				
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USPF 0970	25.02 04		USPF 0955	24.35		
USPF 0987	25.04		USPF 0955	25.06		
USPF 0995	25.05 05					
USPF 1025	25.10		USPF 1025	25.16		
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USPF 1080	25.19		USPF 1085	25.21		
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USPF 1146	26.02 75		USPF 1140	25.31		
USPF 1148	26.04		USPF 1140	26.06		
USPF 1149	26.05 106					
USPF 1155	26.08		USPF 1170	26.10		
USPF 1170	26.09 76					
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USPF 1235	26.25		USPF 1250	26.28		
USPF 1250	26.27 77					
USPF 1285	26.31 78		USPF 1280	26.09		
USPF 1290	26.32 79		USPF 1285	26.31		
USPF 1303	26.34		USPF 1305	26.36		
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USPF 1315	27.01 81		USPF 1285	26.31		
USPF 1327	27.03		USPF 1330	27.05		
USPF 1330	27.04 82					
USPF 1340	27.06 83		USPF 1285	26.31		
USPF 1343	27.07		USPF 1345	27.05		
USPF 1345	27.08 84					
USPF 1355	27.10 85		USPF 1285	26.31		
USPF 1357	27.11		USPF 1360	27.13		
USPF 1360	27.12 86					
USPF 1365	27.14 87		USPF 1350	27.09		
USPF 1380	27.15 88		USPF 1310	26.36	USPF 1335	27.05
USPF 1387	27.16		USPF 1420	27.21		
USPF 1420	27.20 89					
USPF 1455	27.25		USPF 1485	27.28		
USPF 1480	27.26 90					
USPF 1475	27.27 91		USPF 1455	27.25		
USPF 1485	27.28 92		USPF 1470	27.26		
USPF 1505	27.31 94		USPF 1500	27.30		
USPF 1520	28.01 96		USPF 1500	27.30		
USPF 1535	28.02 98		USPF 1500	27.30		
USPF 1550	28.03 100		USPF 1500	27.30		
USPF 1560	28.04 102		USPF 1515	27.31	USPF 1530	28.01
USPF 1600	28.10 105		USPF 1505	28.09	USPF 1545	28.02
USPF 1625	28.11 107		USPF 1505	28.09		
USPF 1650	28.12 109		USPF 1505	28.09		
USPF 1670	28.13 111		USPF 1505	28.09		
USPF 1685	28.14 113		USPF 1620	28.10	USPF 1645	28.11
USPF 1695	28.16 114				USPF 1685	28.12
USPF 1695	28.16		USPF 1695	28.17		
USPF 1730	28.21		USPF 1750	28.24		
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USPF1060	30.08	127	USPF1035	30.06		
USPF1095	30.09	128	USPF1045	30.07		
USPF1075	30.13	129				
USPF1070	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	USPF2310	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				
USPF2545	33.01	169	USPF2400	33.12	USPF2535	34.14
USPF2555	33.04		USPF2560	33.07		
USPF2560	33.05	170				
USPF2380	33.09	195	USPF2385	32.30		
USPF2390	33.10	196	USPF2350	32.27	USPF2360	32.29
USPF2395	33.11	197				
USPF2400	33.12	198	USPF2535	34.14		
USPF2405	33.13	199	USPF2505	33.08		
USPF2415	33.14	180	USPF1085	29.10	USPF2380	33.10
USPF2420	33.15		USPF2525	34.12	USPF2395	33.11
USPF2425	33.16	161	USPF2420	33.15		
USPF2445	33.18	162	USPF2420	33.15		
USPF2485	33.22	163	USPF2420	33.15		
USPF2405	34.01	184	USPF2420	33.15		
USPF2500	34.04	185	USPF2440	33.18	USPF2460	33.21
USPF2515	34.08		USPF2520	34.11	USPF2400	33.24
USPF2520	34.09	186				
USPF2525	34.12	167				
USPF2535	34.14	168				
USPF2575	34.15	171	USPF2505	33.08	USPF2405	33.12
USPF2585	34.18		USPF2580	34.21		
USPF2590	34.19	172				
USPF2700	34.22	181	USPF2405	33.13	USPF2530	34.13

CHART TITLE - NON-PROCEDURAL STATEMENTS

CHART TITLE - SUBROUTINE ATHDS(M,RCH,PH,AM)

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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	00000250	37.08
00000450	38.06	110	00000200	37.06	00000290	37.10
					00000370	38.03

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FCOD0005	30.02	100				
FCOD0100	30.03	110				
FCOD0115	30.04	120	FCOD0095	30.02		
FCOD0125	30.05	125	FCOD0135	30.07		
FCOD0130	30.06	130				
FCOD0140	30.08	150	FCOD0125	30.05		
FCOD0145	30.09	155				
FCOD0155	30.10	160	FCOD0140	30.08		
FCOD0160	30.11	165	FCOD0135	30.07		
FCOD0170	40.01	170	FCOD0155	30.10		
FCOD0175	40.02	200	FCOD0110	30.03	FCOD0150	30.09
FCOD0180	40.03		FCOD0195	40.05	FCOD0185	30.11
FCOD0185	40.04	300				

CHART TITLE - NON-PROCEDURAL STATEMENTS

CHART TITLE - FUNCTION CODE(X,Y,ZI,M1,M2,M3)

COD10045	42.01	110	COD10030	42.04	COD10115	42.14
COD10050	42.02	140	COD10110	42.13		
COD10075	42.05	105	COD10085	42.06		
COD10065	42.06	150	COD10030	42.04		
COD10070	42.07	185				
COD10075	42.08		COD10080	42.09		
COD10080	42.09	170				
COD10090	42.10	175	COD10065	42.06		
COD10095	42.11		COD10100	42.12		
COD10100	42.12	180				
COD10105	42.13	185	COD10085	42.09	COD10145	43.02
COD10115	42.14	190	COD10075	42.08	COD10095	42.11
COD10120	42.15	210				
COD10135	43.01	220	COD10075	42.08	COD10095	42.11
COD10145	43.02	260	COD10115	42.14		
COD10150	43.03	285				
COD10165	43.04	290	COD10145	43.02		
COD10170	43.05	295	COD10130	42.15	COD10180	43.03
COD10175	43.06	290				
COD10180	43.07	295	COD10170	43.05		
COD10255	43.12	305				
COD10265	43.13	310	COD10250	43.11		
COD10300	43.15	315	COD10260	43.12		
COD10305	43.16	320	COD10300	43.15		
COD10330	44.01	330	COD10300	43.15		
COD10350	44.03	350	COD10300	43.15	COD10325	43.16
COD10365	44.05	400				
COD10375	44.06	410	COD10360	44.04		
COD10385	44.07	500	COD10060	42.02	COD10040	42.05
					COD10140	43.01
					COD10370	44.05

CHART TITLE - NON-PROCEDURAL STATEMENTS

CHART TITLE - SUBROUTINE MFLX(M1,M2,M3,M4,M5,F,YE10J,E10J,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		
MFLX250	46.09	85				
MFLX252	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		
MFLX408	46.27	92				
MFLX406	46.27		MFLX406	46.29		
MFLX420	46.31		MFLX430	46.34		

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AUTOFLOW CHART SET - 07CNTL

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CARD 10	PAGE/BOX	NAME	REFERENCES (SOURCE SEQUENCE NO. AND PAGE/BOX)
WFLXN30	46.32	95	
WFLXN30	46.32		WFLXN30 46.33
WFLXN95	47.01	100	
WFLXN95	47.01		WFLXN95 47.02
WFLXN95	47.04	110	
WFLXN30	47.12	112	WFLXN70 47.06
WFLXN40	47.13		WFLXN21 47.23
WFLXN90	47.14	114	
WFLXN90	47.14		WFLXN90 47.15
WFLXN70	47.17		WFLXN10 47.20
WFLXN10	47.18	115	
WFLXN21	47.22	117	

CHART TITLE - NON-PROCEDURAL STATEMENTS

CHART TITLE - SUBROUTINE FLXSIC(SICBAR,VEIGJ,EI,GJ,CH,B00,BL05,ANGLE,FLENT,AND

FSIC0040	48.01	FLXSIC	WFLXN50 48.04-X
FSIC0170	48.07	30	FSIC0125 48.01
FSIC0210	48.09		FSIC0250 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	60	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	FSIC0687 50.14
FSIC0690	50.17	75	
FSIC0720	50.20	80	
FSIC0750	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 OL50(A,X,IL,N,M,ALPHA,E1,E2)

OL500020	93.01	OL50	WFLXN60 47.03-X
OL500035	93.03	60	
OL500035	93.03		OL500035 93.04
OL500050	93.07		OL500125 93.19
OL500060	93.09		OL500105 93.16
OL500065	93.10	6	
OL500085	93.12		OL500095 93.14
OL500095	93.13	5	
OL500105	93.16	4	OL500060 93.09
OL500115	93.18	8	
OL500125	93.19	3	OL500110 93.17
OL500145	93.22	35	
OL500145	93.22		OL500145 93.23
OL500195	93.25		OL500190 93.32
OL500160	93.26	31	
OL500180	93.28	32	
OL500180	93.28		OL500180 93.29
OL500180	93.31	30	OL500195 93.25
OL500200	93.34	51	
OL500210	93.35	50	OL500195 93.33
OL500220	93.36	52	OL500205 93.34

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CHART TITLE - NON-PROCEDURAL STATEMENTS

CHART TITLE - SUBROUTINE MATRIT:APN,MR,MC,NRMAX,MYME,IPRIN,HEAD:

MRIT0030	95.01	MATRIT	WFLN475 47.00-X	WFLN470 47.00-X	WFLN400 47.11-X	WFLN020 47.24-X	WFLN020 47.25-X
			WFLN030 47.26-X	WFLN035 47.27-X	WFLN070 47.28-X	FSIC0135 48.04-X	FSIC0137 48.05-X
			FSIC0130 48.06-X	FSIC0430 48.02-X	FSIC0450 48.23-X	FSIC0460 48.24-X	FSIC0480 48.25-X
			FSIC0700 50.24-X	FSIC0700 50.25-X	FSIC0800 50.26-X	FSIC1070 51.13-X	FSIC1080 51.14-X
MRIT0230	95.03	50	MRIT0150	95.02			
MRIT0250	95.05	70					
MRIT0250	95.05		MRIT0250	95.07			
MRIT0270	95.08	80	MRIT0210	95.13			
MRIT0170	95.09	10	MRIT0150	95.02			
MRIT0100	95.10		MRIT0200	95.13			
MRIT0200	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	BNLOF100	57.17		
BNLOF340	58.08	9	BNLOF330	58.07	BNLOF310	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
BNLOF570	59.10	22	BNLOF470	58.23	BNLOF535	59.06
BNLOF575	59.11	23				
BNLOF580	59.12	24	BNLOF570	59.10		
BNLOF600	59.20	25	BNLOF575	59.11		

CHART TITLE - NON-PROCEDURAL STATEMENTS

CHART TITLE - SUBROUTINE SPABSF

SPABF002	61.01	SPABSF	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		

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CARD NO	PAGE/BOX	NAME	REFERENCES	(SOURCE SEQUENCE NO. AND PAGE/BOX)			
SPAF245	02.04 12		SPAF230 01.00	SPAF230	01.10		
SPAF200	02.07		SPAF200 02.00				
SPAF200	02.08 13						
SPAF245	02.11 17		SPAF330 01.01				
SPAF200	02.12 18		SPAF330 01.01				
SPAF200	02.13 19		SPAF330 01.01				
SPAF200	02.14 20		SPAF200 02.11				
SPAF200	02.15 21		SPAF370 02.10				
SPAF410	02.17		SPAF400 02.10				
SPAF400	02.18 22						
SPAF400	02.22 23		SPAF440 02.21				
SPAF400	03.01 24		SPAF400 02.02				
SPAF470	03.02 25		SPAF440 02.21				
SPAF400	03.04		SPAF510 03.07				
SPAF400	03.05 26		SPAF400 03.04				
SPAF500	03.06 27		SPAF400 03.04	SPAF400	03.00		
SPAF510	03.07 28		SPAF400 03.05				
SPAF520	03.08 29		SPAF130 01.17 SPAF440 02.01	SPAF100 02.01 SPAF400 02.02	SPAF100 02.02 SPAF400 03.04	SPAF200 02.03	SPAF310 02.10
SPAF500	03.11		SPAF570 03.14				
SPAF570	03.13 30						
SPAF200	03.16 31		SPAF200 01.10	SPAF570 03.10	SPAF570 03.10	SPAF570 03.10	
SPAF500	03.17 32						
SPAF500	03.18 34		SPAF500 03.10				
SPAF500	03.24 35		SPAF500 03.17				
SPAF510	04.01 36						
SPAF510	04.02 37		SPAF500 03.24				
SPAF530	04.03 38		SPAF510 04.01				
SPAF530	04.09 39						
SPAF540	04.10 40		SPAF530 04.00				
SPAF500	04.10 41		SPAF530 04.00				
CHART TITLE - NON-PROCEDURAL STATEMENTS							

CHART TITLE - NON-PROCEDURAL STATEMENTS

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AUTOFLOW CHART SET - BFCNTL FLEXIBLE AIRLOADS SA PROGRAM PAGE 01

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.

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AUTOFLN CHART SET - 07CHVL FLEXIBLE AIRLOADS SA PROGRAM PAGE 00

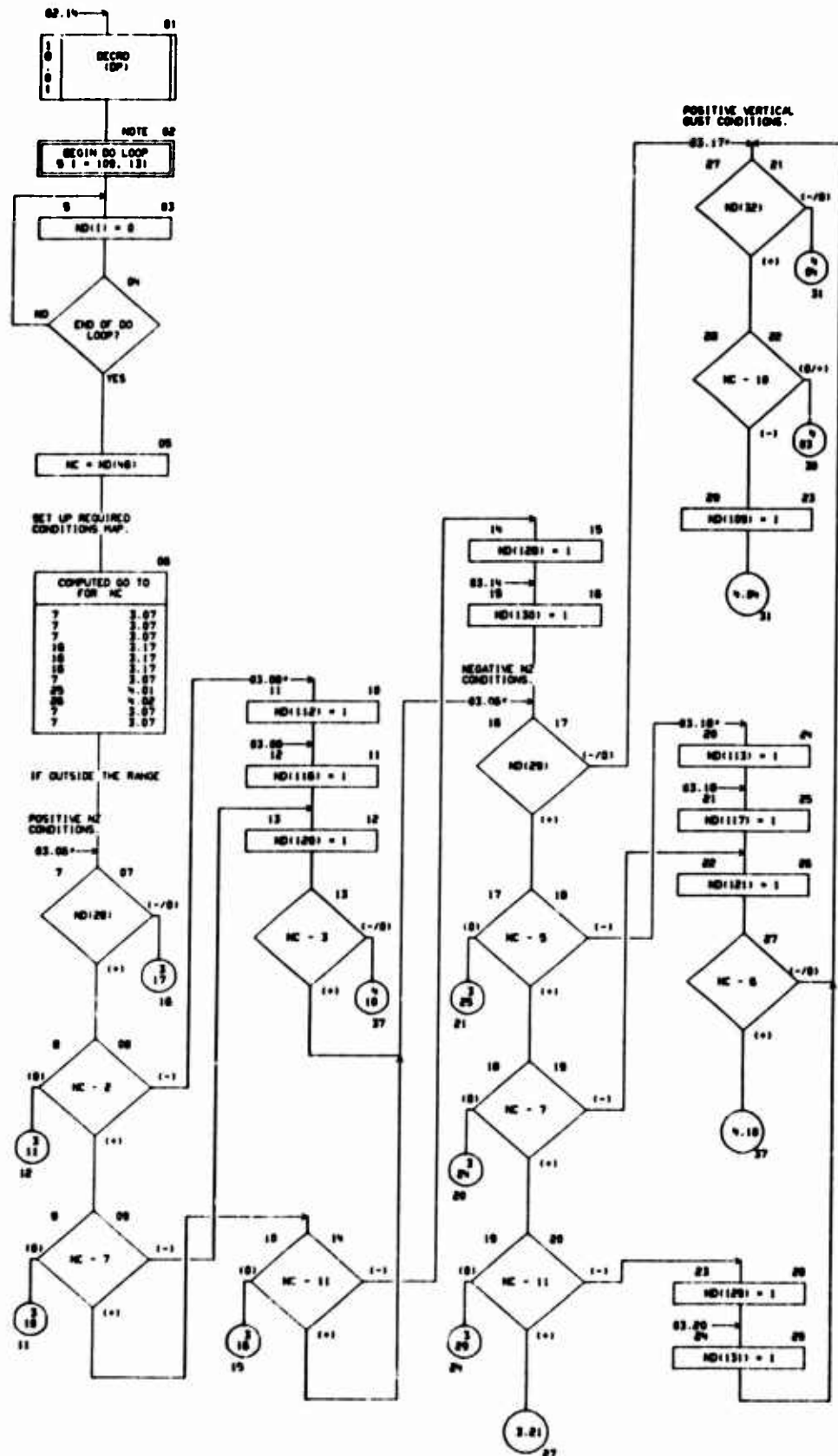
CHART TITLE - PROCEDURES



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JTFLOW CHART SET - 07CNTL FLEXIBLE AIRLOADS SA PROGRAM PAGE 03

CHART TITLE - PROCEDURES

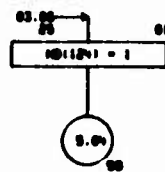


06/04/75

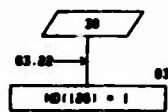
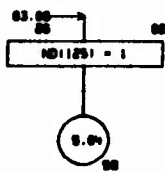
AUTOFLOW CHART SET - 87CHTL FLEXIBLE AIRLOADS SA PROGRAM PAGE 04

CHART TITLE - PROCEDURES

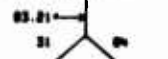
RETRACTING FLAP DOWN
 CONDITION.



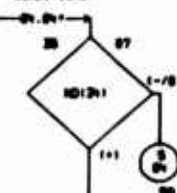
FLAP DOWN TO TRIM
 CONDITION.



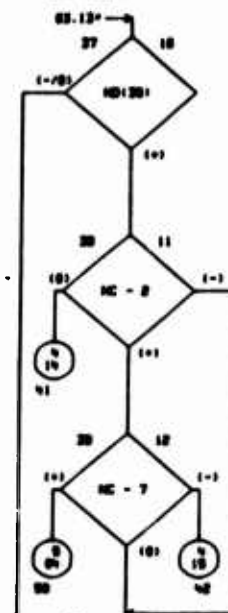
NEGATIVE VERTICAL
 GUST CONDITIONS.



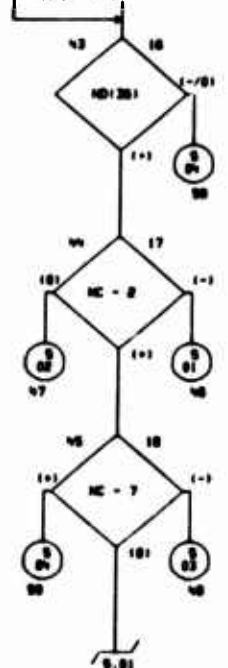
LATERAL GUST
 CONDITIONS.



PITCHING ACCELERATION
 CONDITIONS.



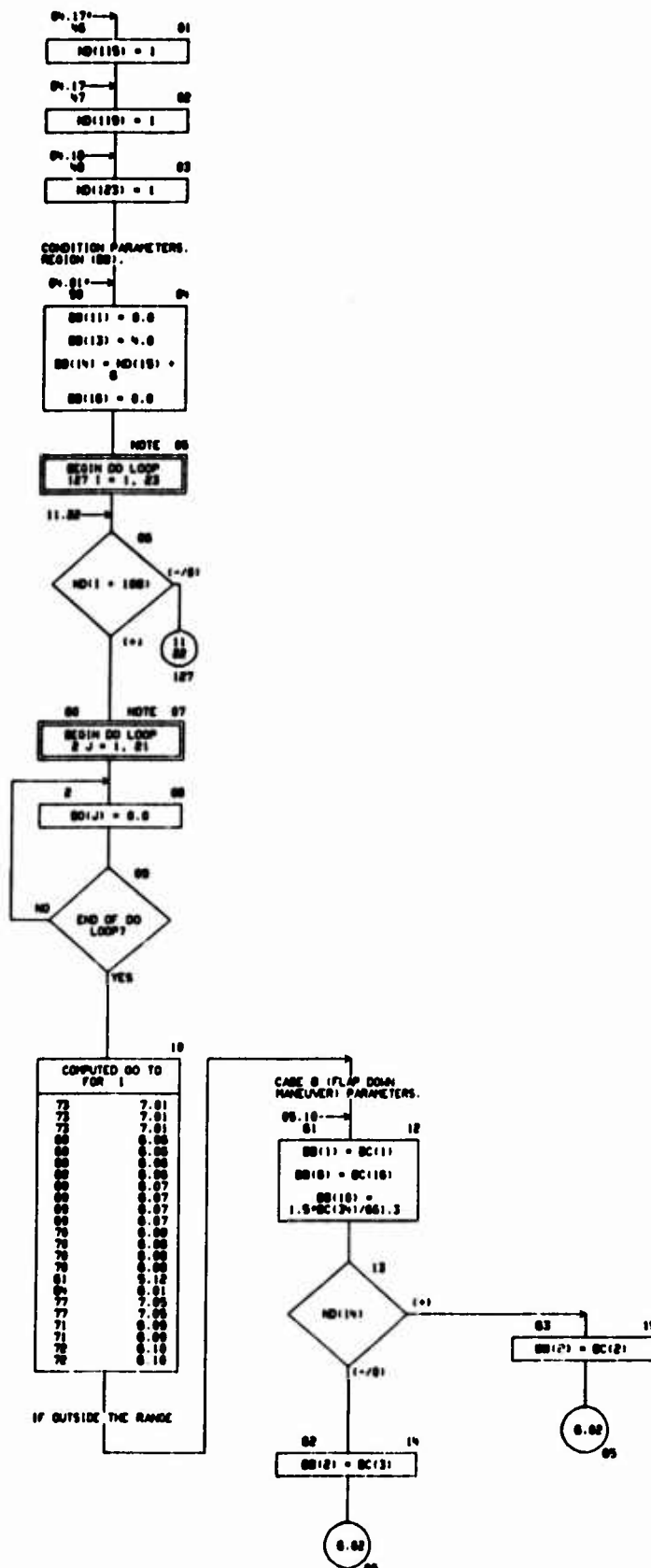
YAWING ACCELERATION
 CONDITIONS.



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AUTOFLOW CHART SET - B707L FLEXIBLE AIRLINES SA PROGRAM PAGE 05

CHART TITLE - PROCEDURES

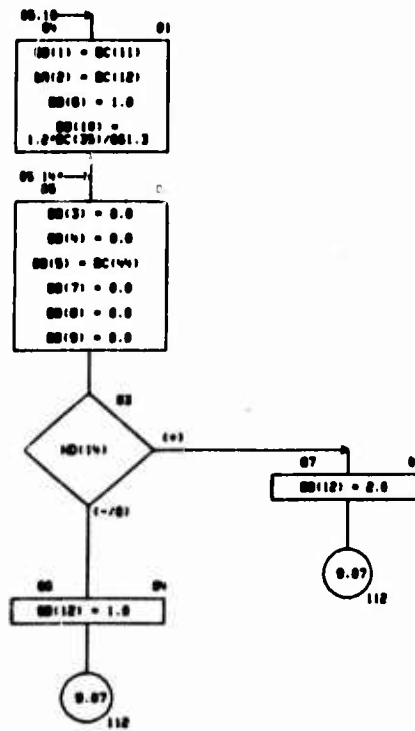


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AUTOFLOW CHART SET - 07CHVL FLEXIBLE AIRLOADS SA PROGRAM PAGE 05

CHART TITLE - PROCEDURES

CASE 0 (FLAPS DOWN
 1.00 TRIM)
 PARAMETERS.



FLAPS UP CONDITION
 ALTITUDE.

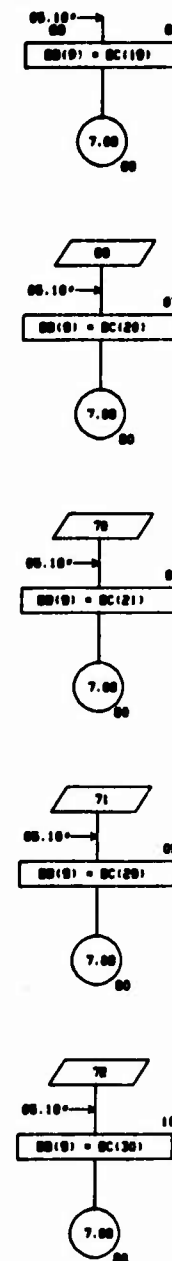


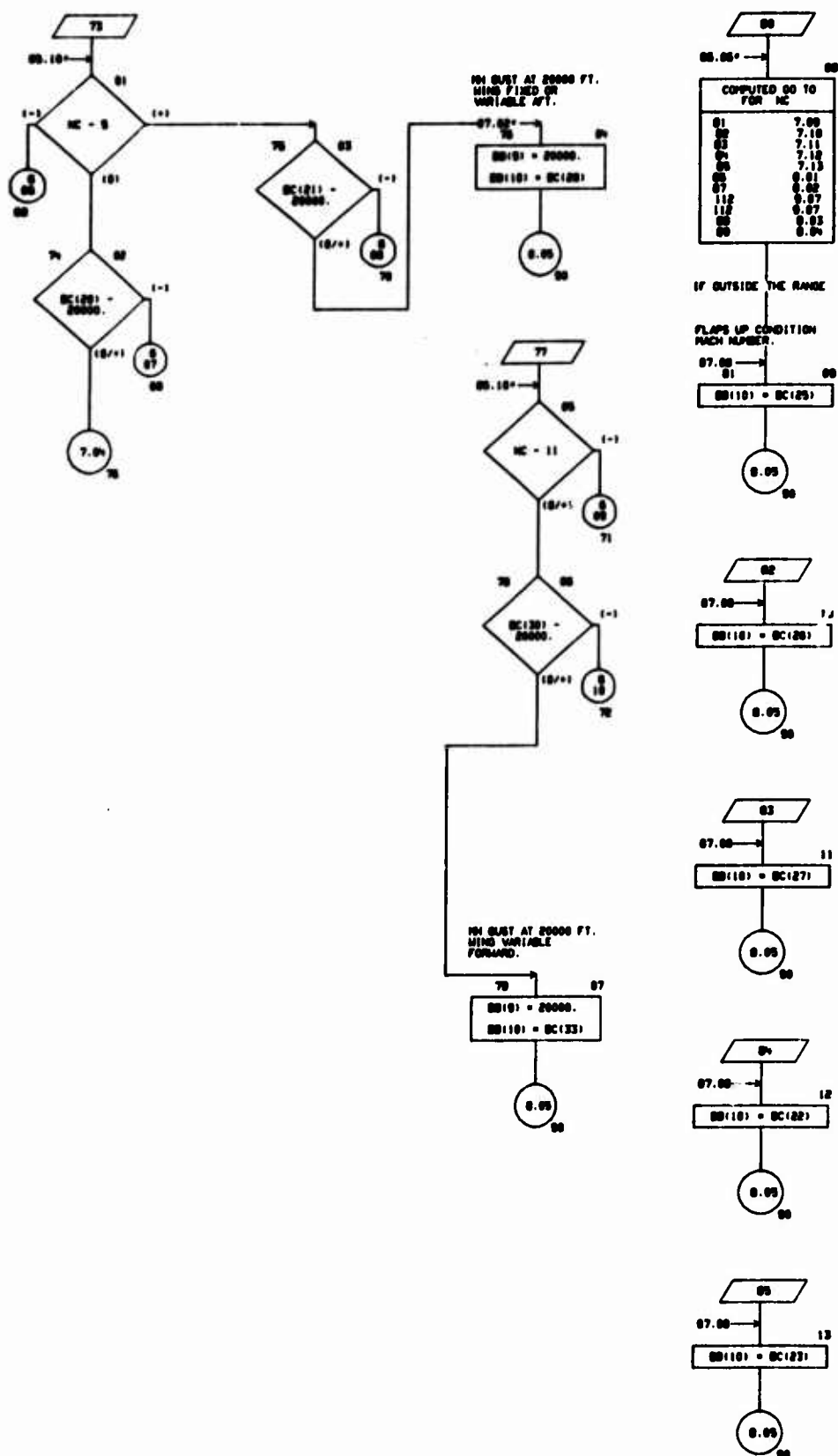
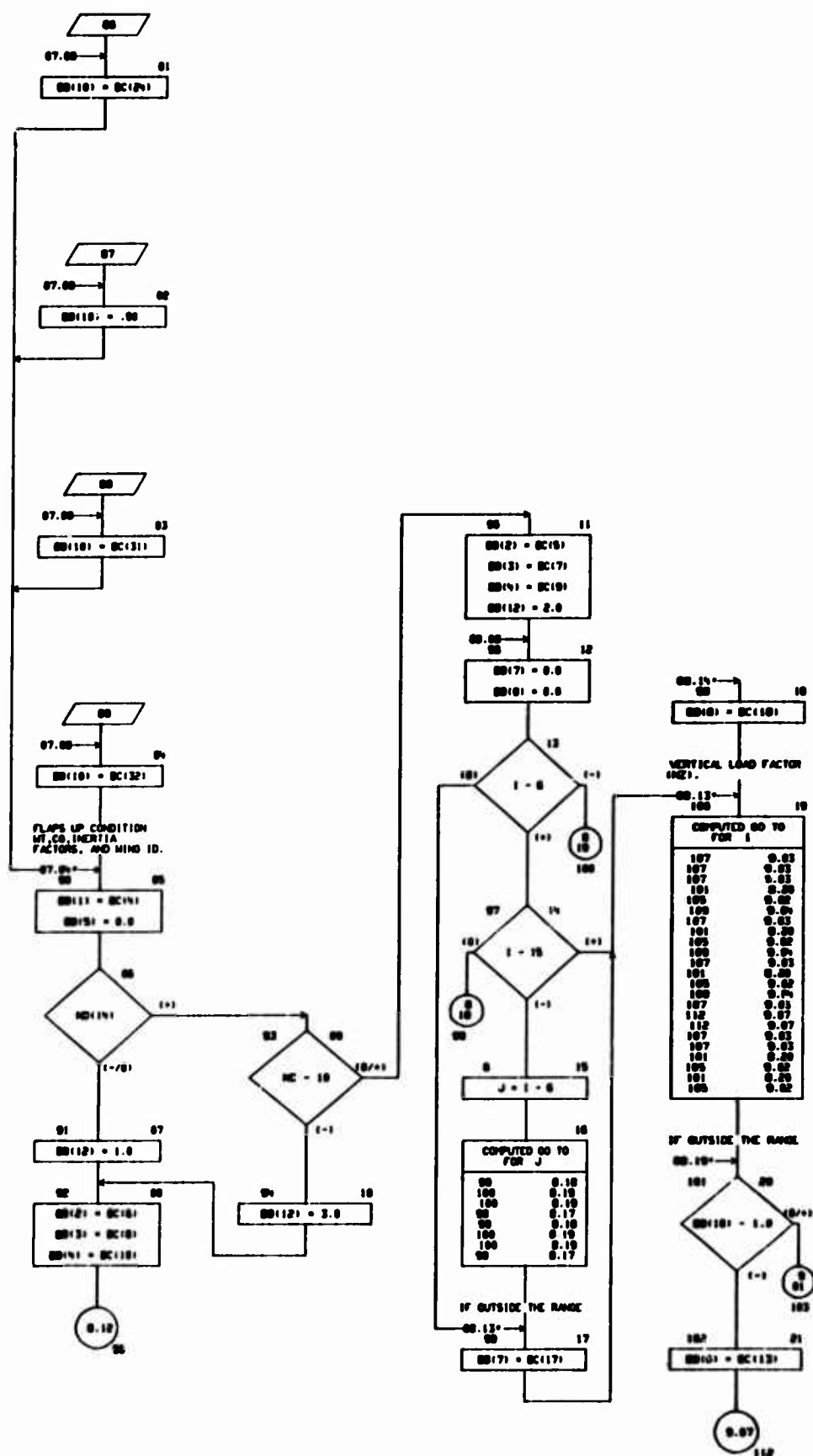
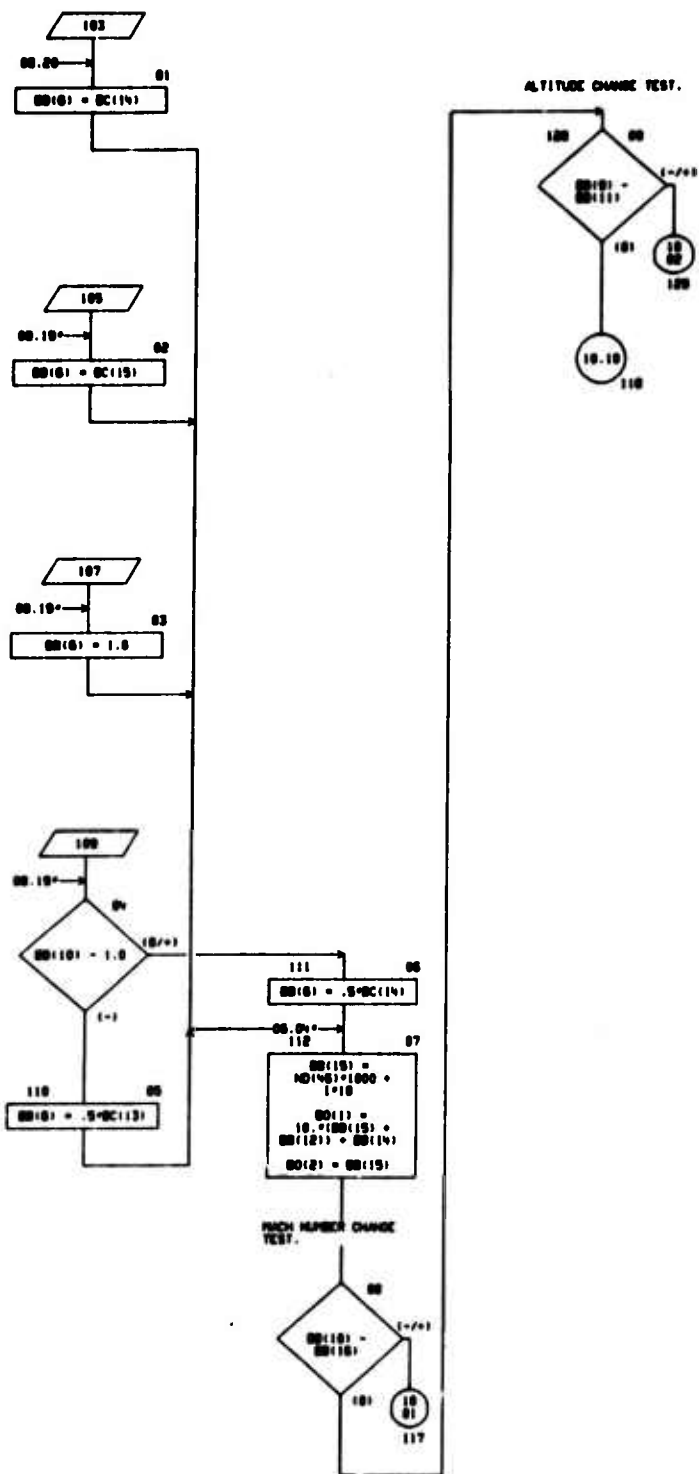
CHART TITLE - PROCEDURES

CHART TITLE - PROCEDURES

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AUTOFLEX CHART SET - BFCNTL FLEXIBLE AIRLOADS SA PROGRAM PAGE 00

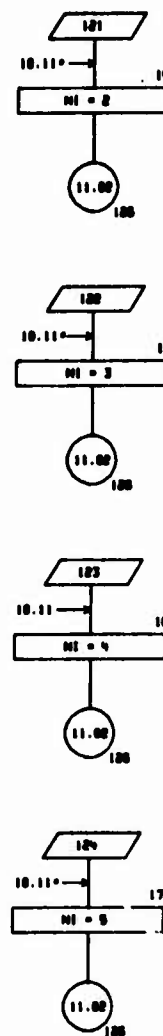
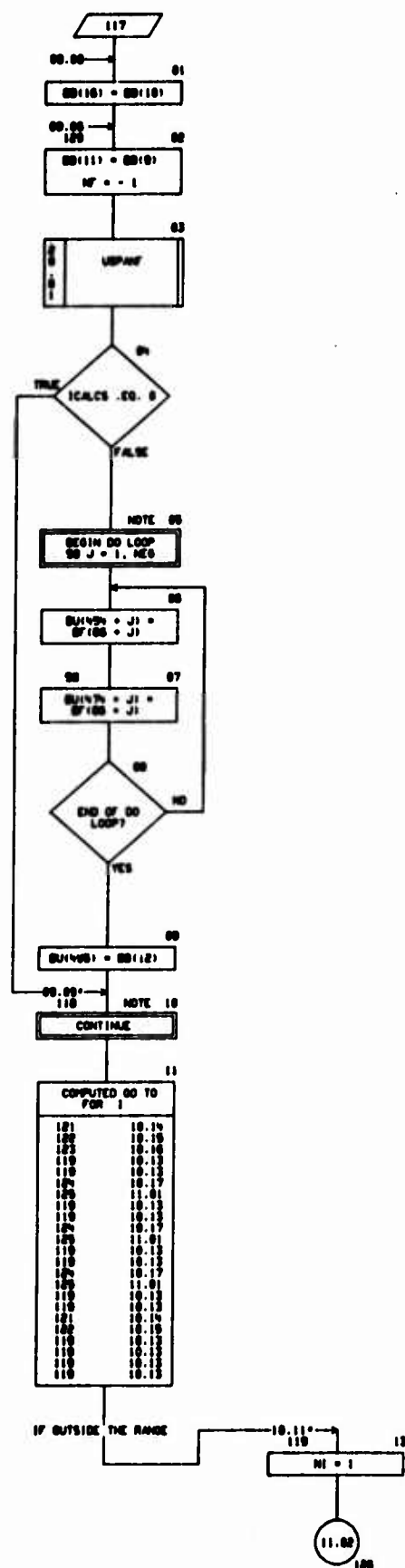
CHART TITLE - PROCEDURES



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AUTOFLOW CHART SET - 07-INTL FLEXIBLE AIRLOADS SA PROGRAM PAGE 10

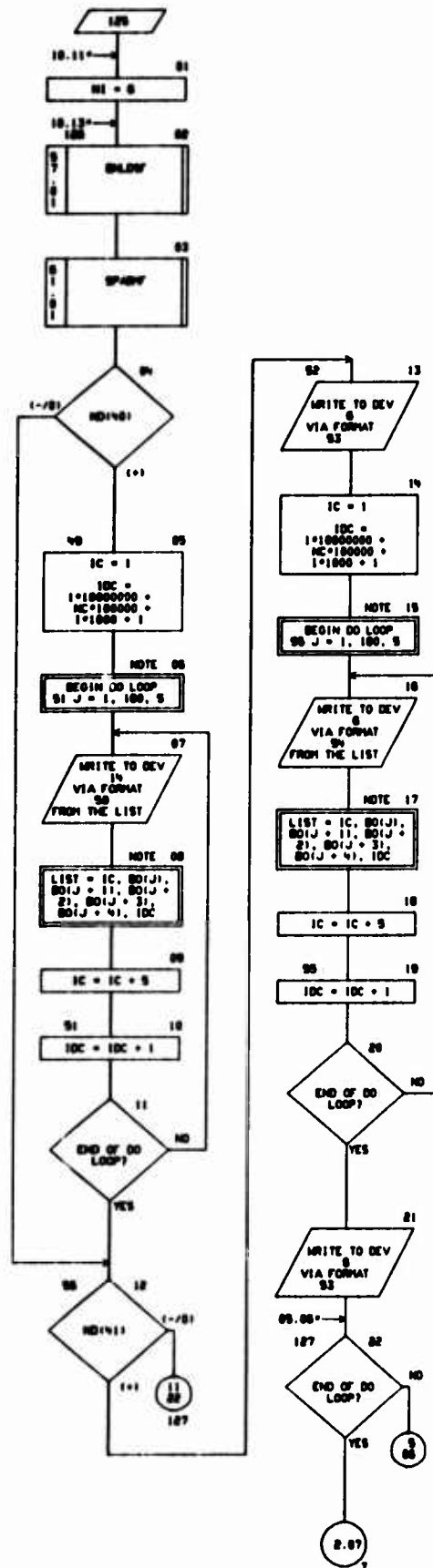
CHART 117 - PROCEDURES



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AUTOFLW CHART SET - BFCNL FLEXIBLE AIRLOADS SA PROGRAM PAGE 11

CHART TITLE - PROCEDURES



AUGUST 1987 SET - SPECIAL: FLEXIBLE AIRLINES SA PROGRAM PAGE 12

CHART TITLE - NON-PROCEDURAL STATEMENTS

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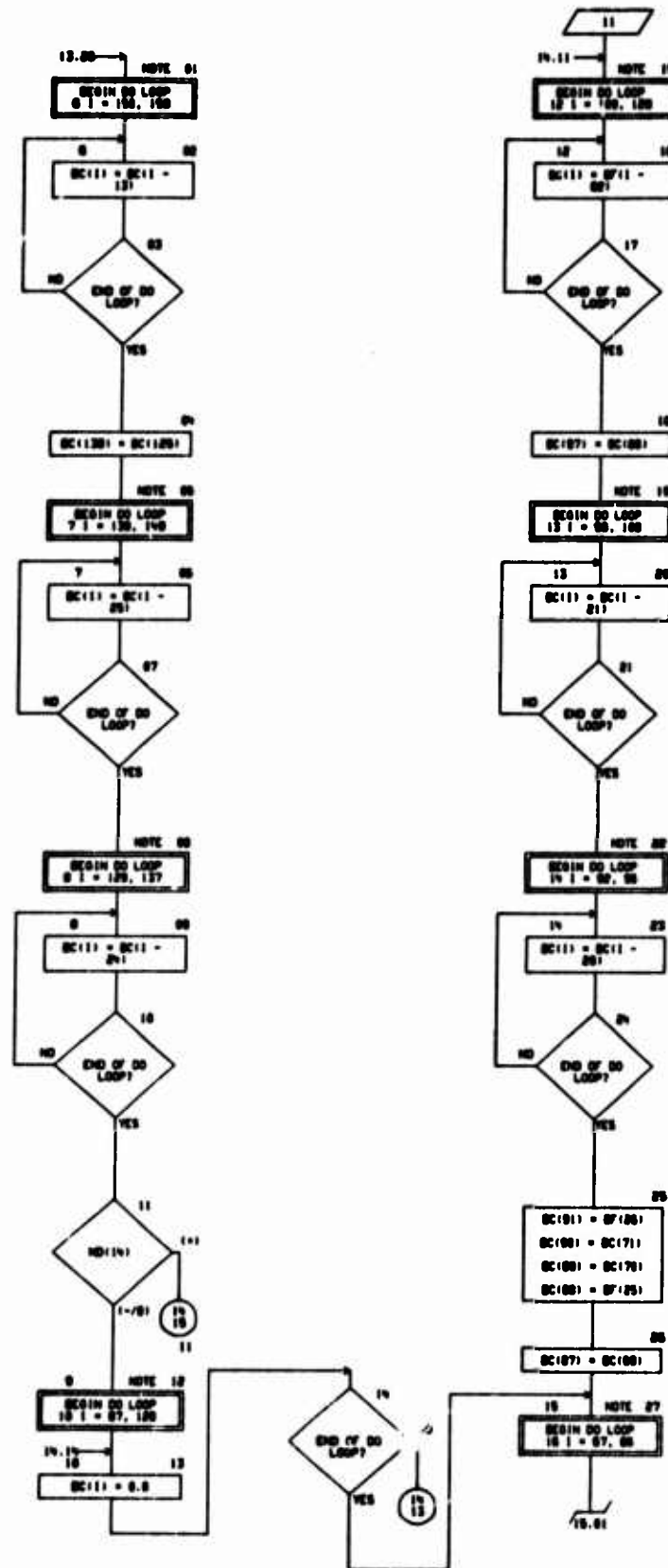
4      FORMAT(3I2)
20     FORMAT(1I2,1PRE12.5,10)
33     FORMAT(1H)
54     FORMAT(1H 3I12,3X1PRE15.5,3X10)

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AUTOFLON CHART SET - 07CHVL FLEXIBLE AIRLOADS SA PROGRAM PAGE 14

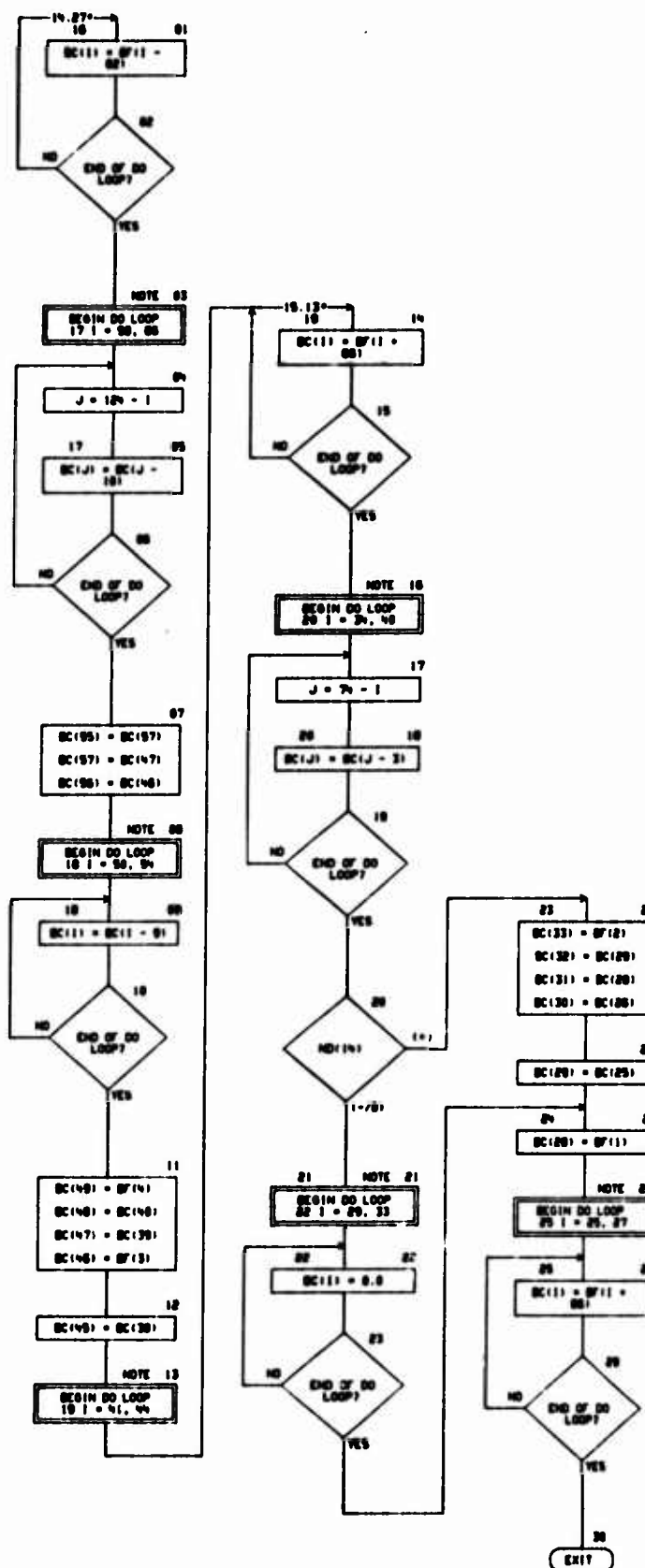
CHART TITLE - SUBROUTINE READAT



05/04/72

AUTOFLON CHART SET - OFCNL FLEXIBLE AIRLOADS SA PROGRAM PAGE 15

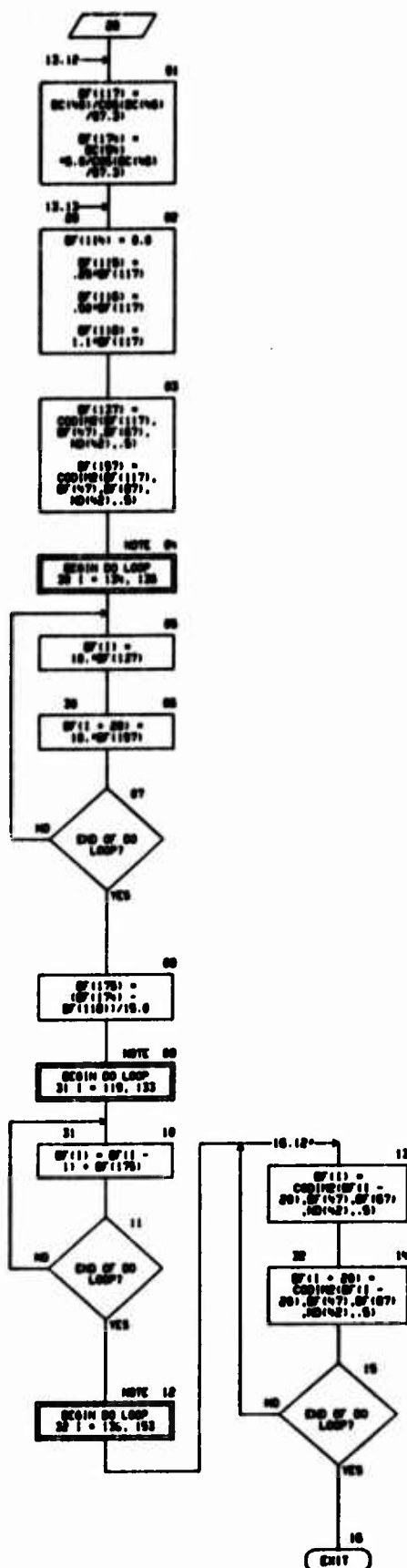
CHART TITLE - SUBROUTINE RERBAT



06/04/72

AUTOFLEX CHART SET - SPINFL FLEXIBLE AIRLOADS SA PROGRAM PAGE 18

CHART TITLE - SUBROUTINE RETDAY



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AUTOFLW CHART SET - BFCNL FLEXIBLE AIRLOADS SA PROGRAM PAGE 17

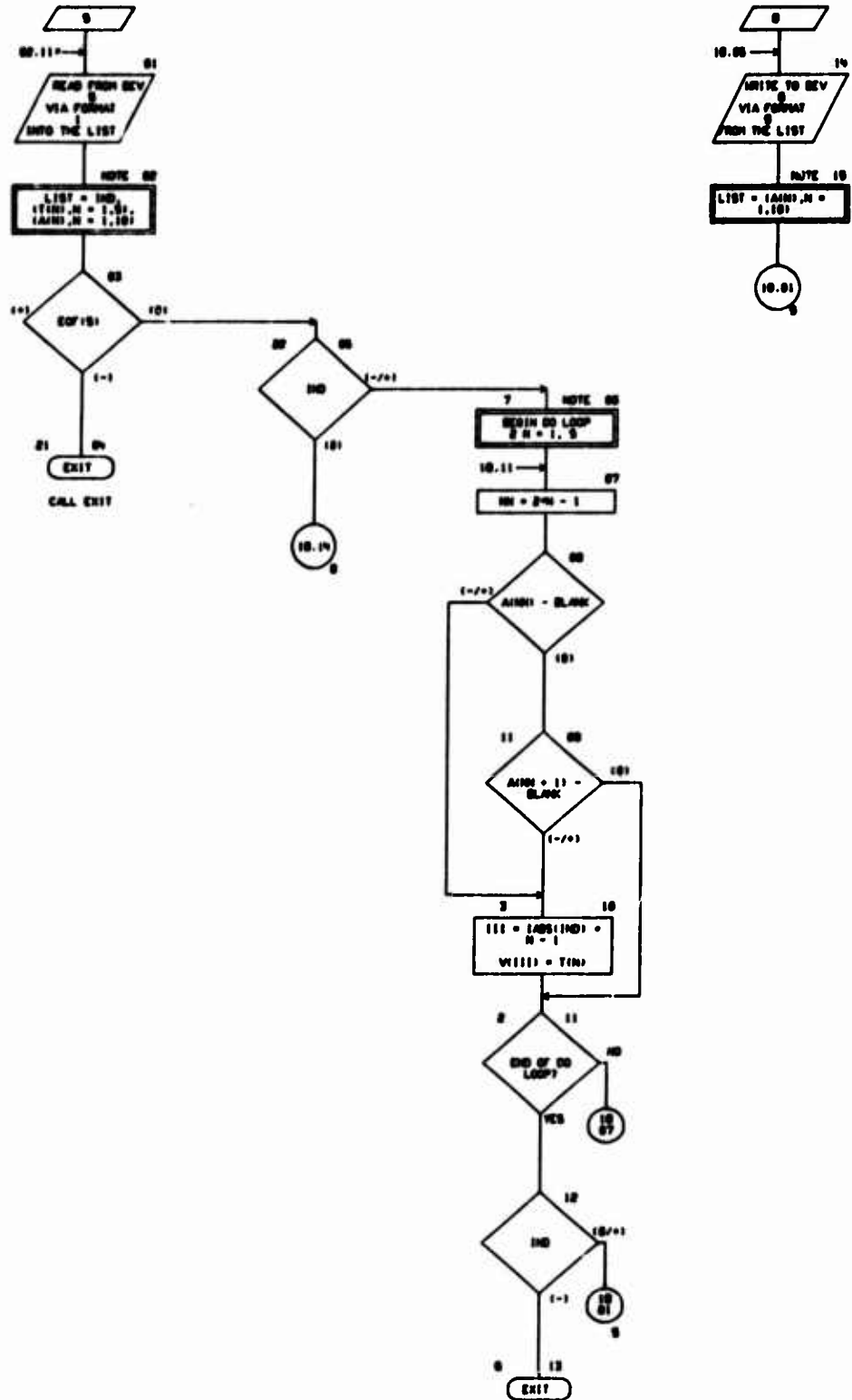
CHART TITLE - NON-PROCEDURAL STATEMENTS

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

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AUTOFLON CHART SET - 07CMT. FLEXIBLE AIRLADS SA PROGRAM PAGE 10

CHART TITLE - SUBROUTINE SECRO(V)



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AUTOFLIGHT CHART SET - 07CHTL FLEXIBLE AIRLOADS SA PROGRAM PAGE 19

CHART TITLE - NON-PROCEDURAL STATEMENTS

DIMENSION V(1),T(5),A(10)
DATA BLANK/EN /
1 FORMAT(11,112,713,0712,0,713,1048)
0 FORMAT(117H NO DECK LOCATION,04,1048/)

AUTOFLOW CHART SET - BFCNTL FLEXIBLE AIRLOADS SA PROGRAM PAGE 29

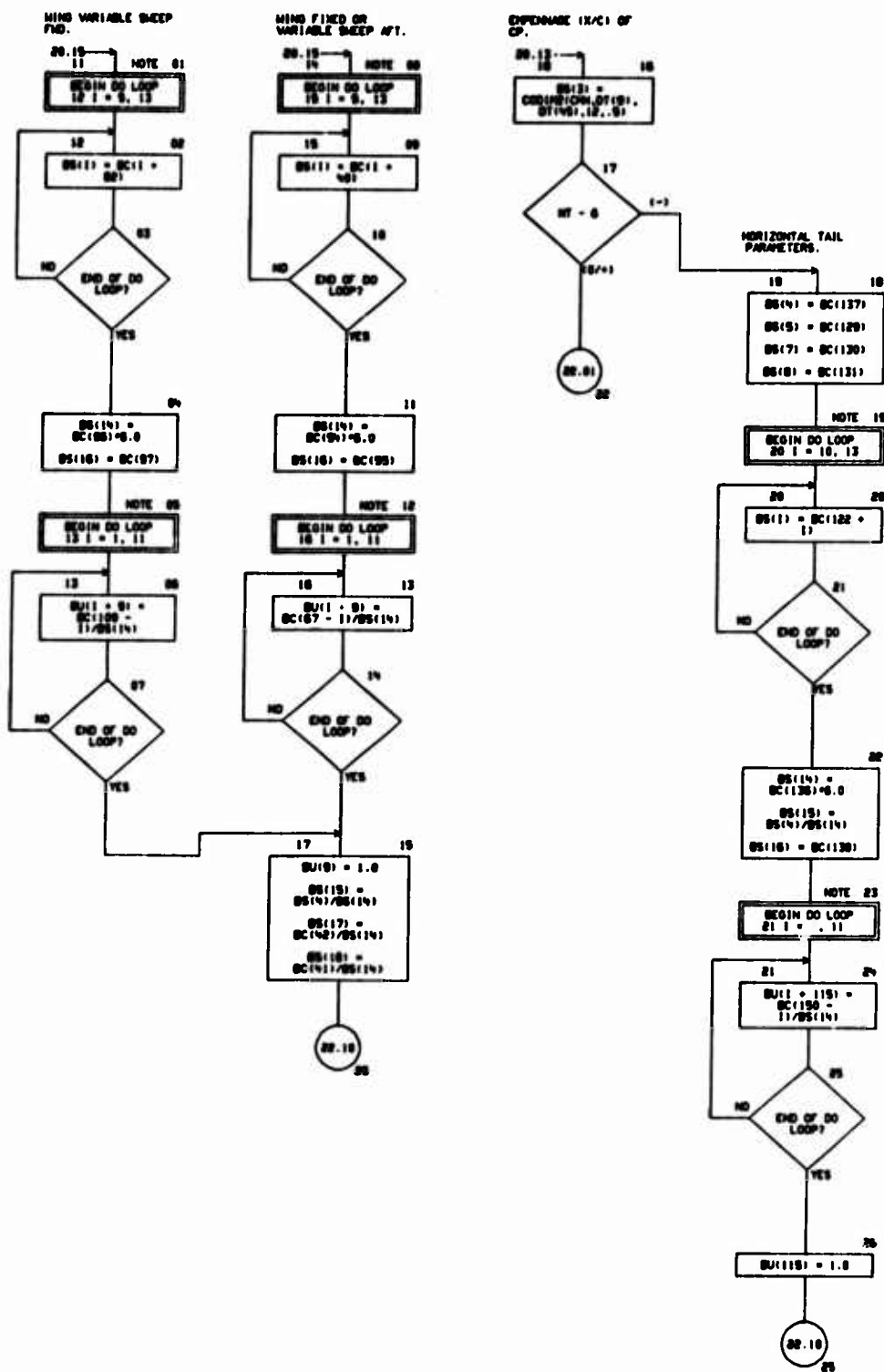
CHART TITLE - SUBROUTINE UPART



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AUTOFLIGHT CHART SET - 07CHTL FLEXIBLE AIRLOADS SA PROGRAM PAGE 21

CHART TITLE - SUBROUTINE UPMAT



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AUTOFLOW CHART SET - BFCNLT FLEXIBLE AIRLOADS SA PROGRAM PAGE 22

CHART TITLE - SUBROUTINE USPAF

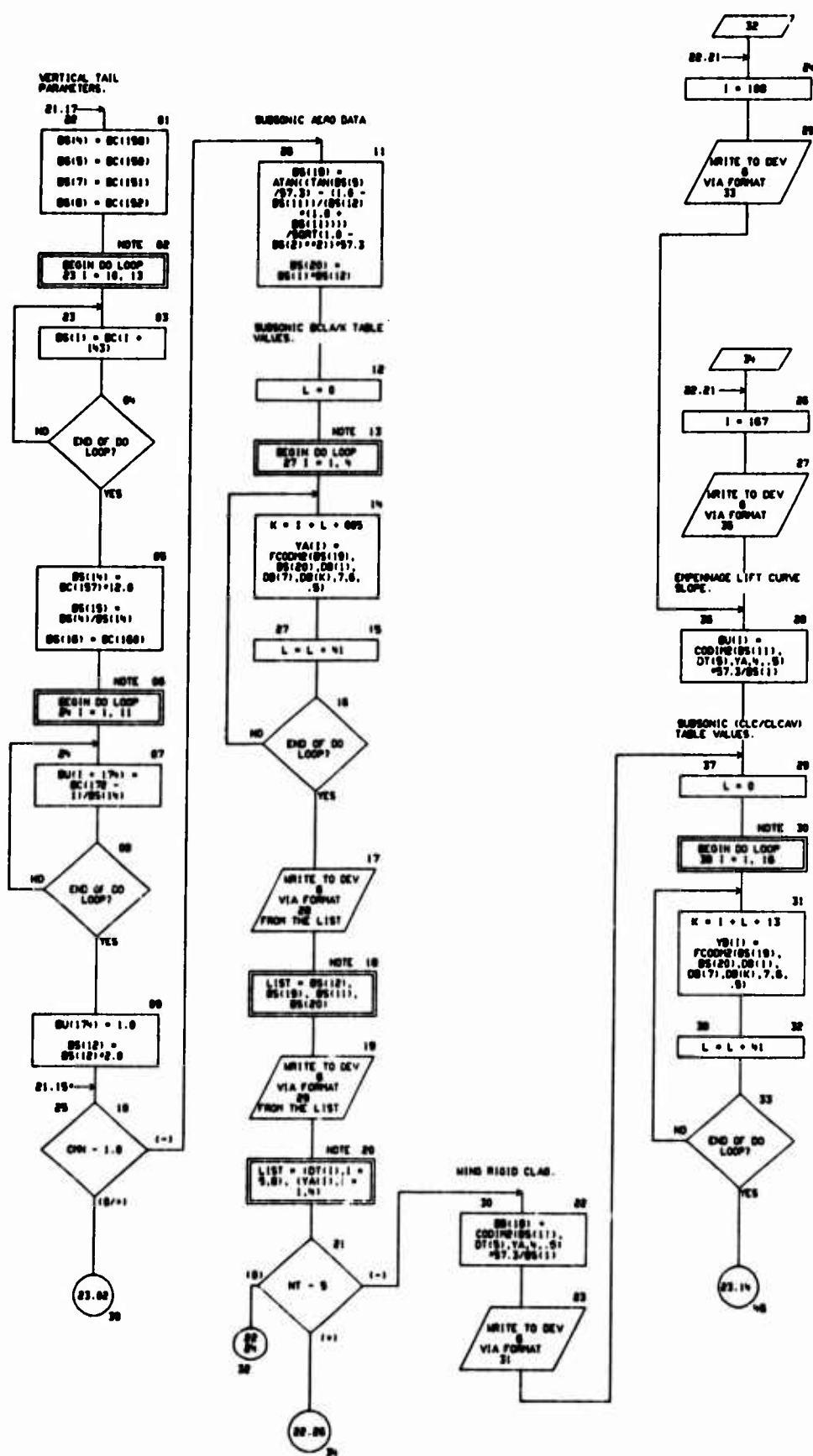
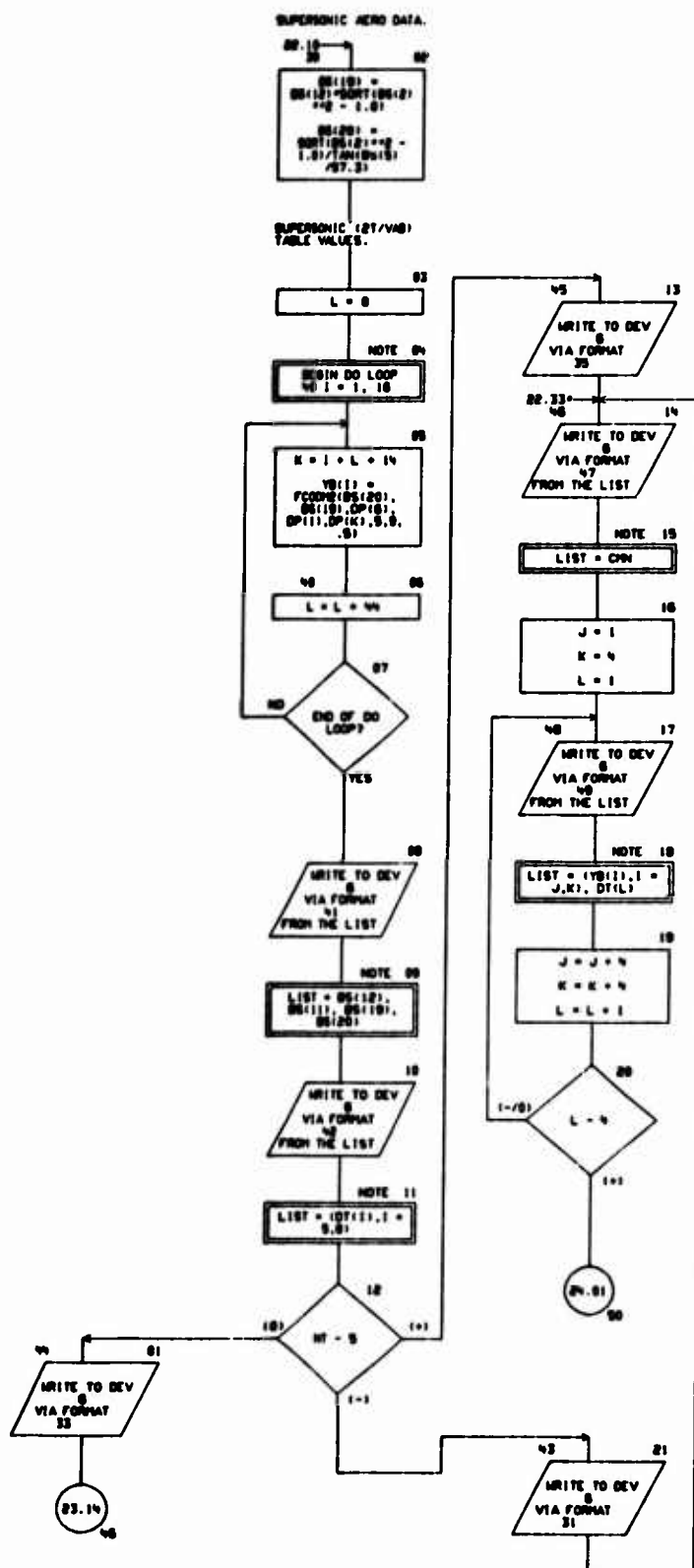


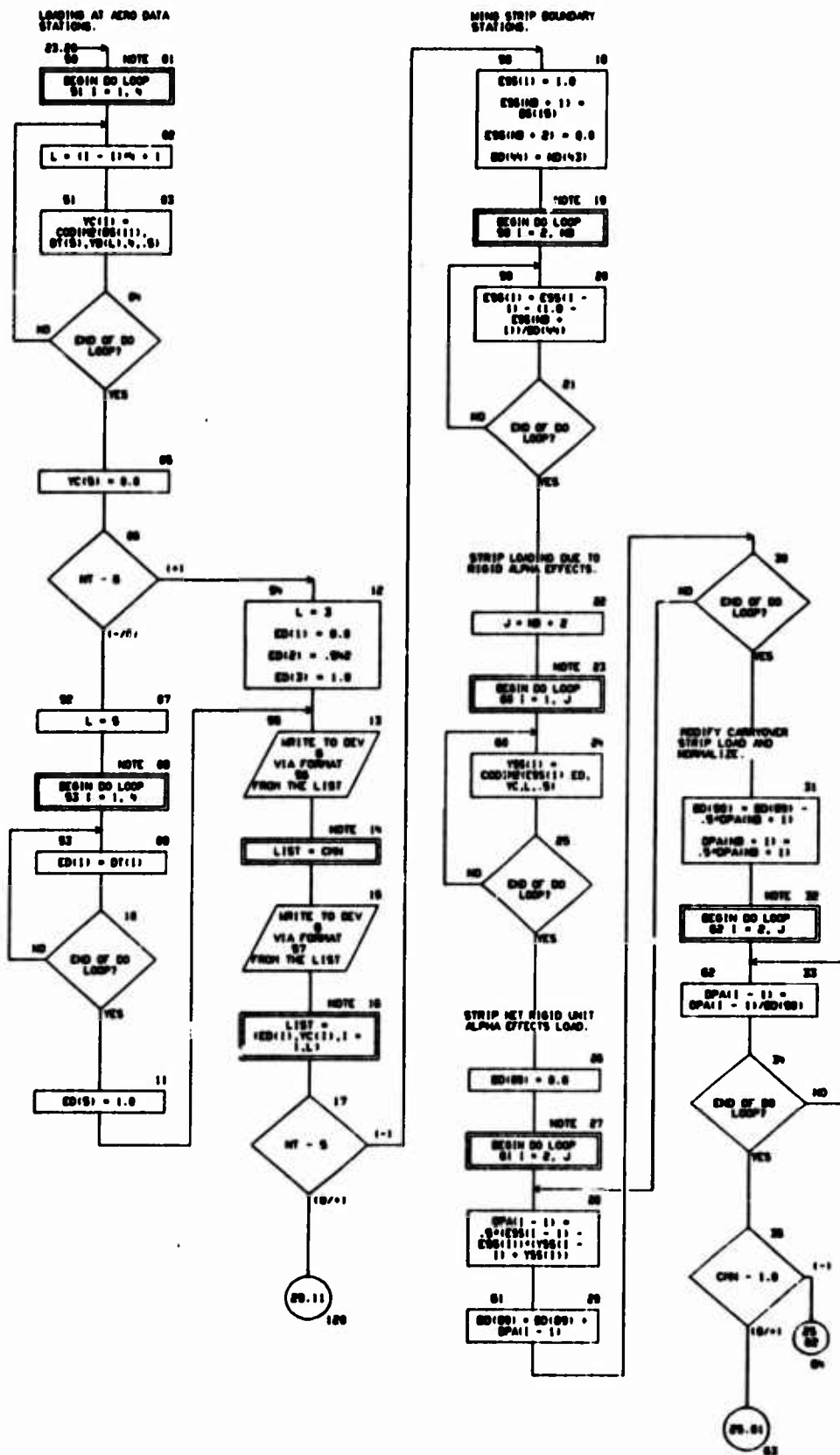
CHART TITLE - SUBROUTINE USPAR



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AUTOFLOW CHART SET - BFCNL FLEXIBLE AIRLOADS SA PROGRAM PAGE 24

CHART TITLE - SUBROUTINE UPAUT



05/04/73

AUTOFLOW CHART SET - OFCNL FLEXIBLE AIRLOADS SA PROGRAM PAGE 25

CHART TITLE - SUBROUTINE USPAW

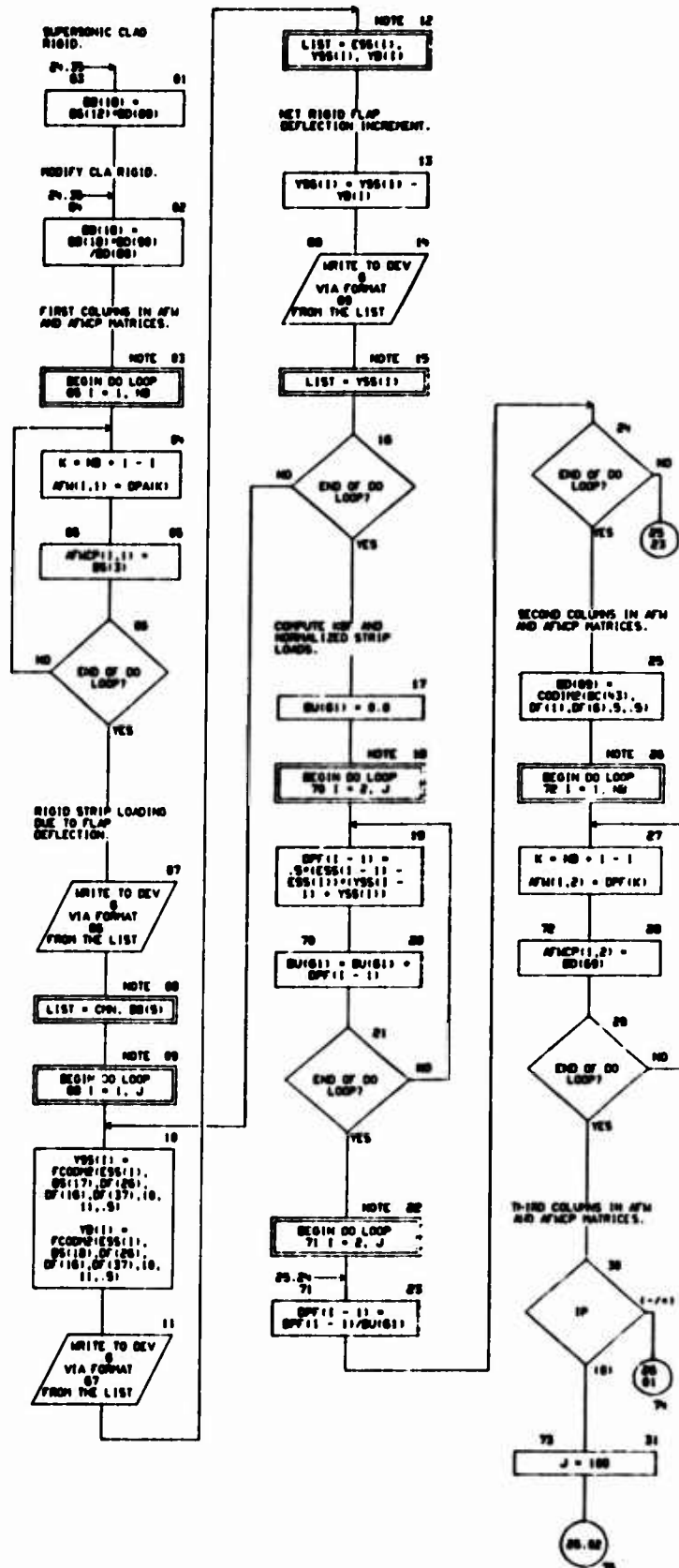
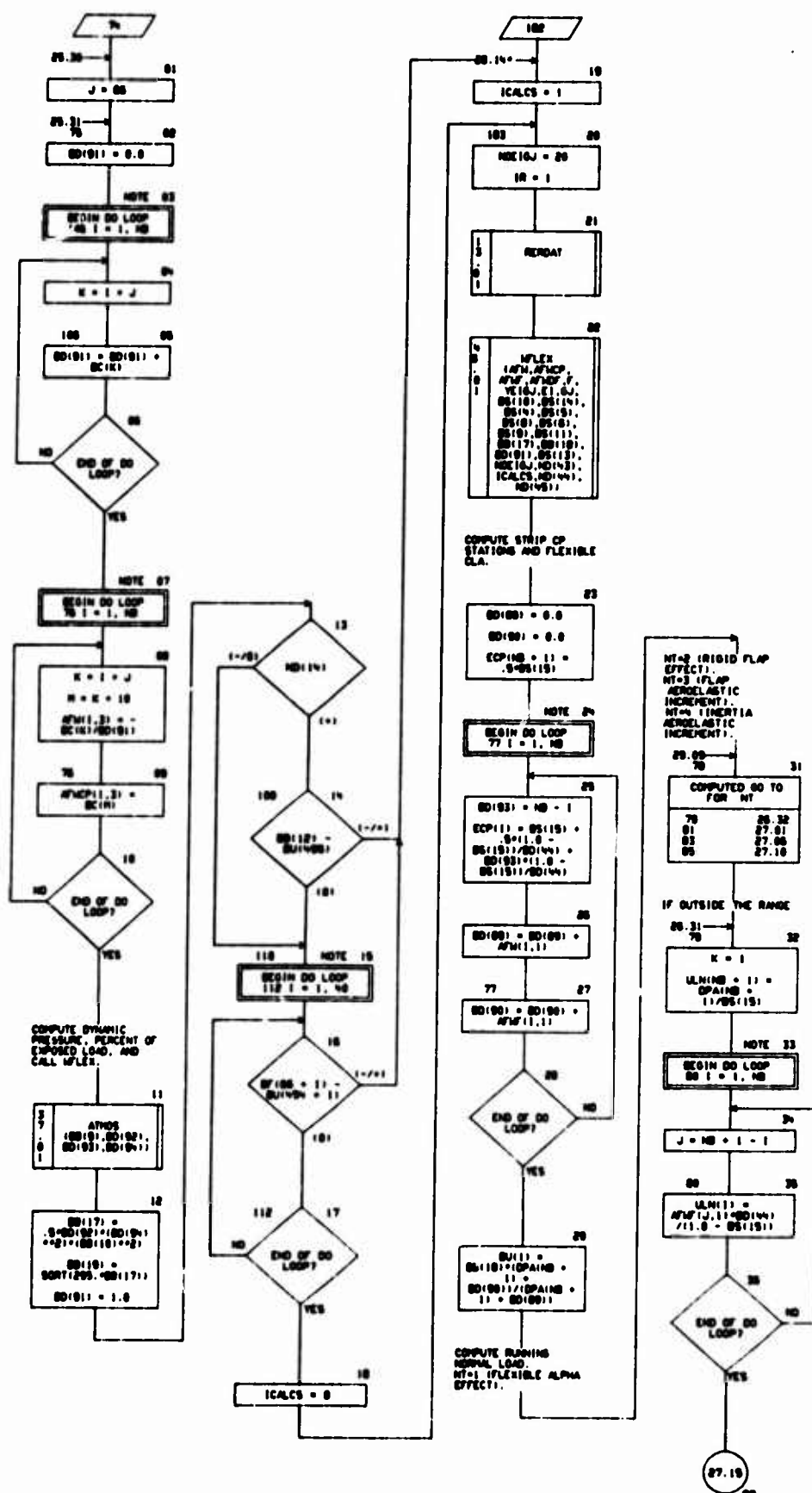


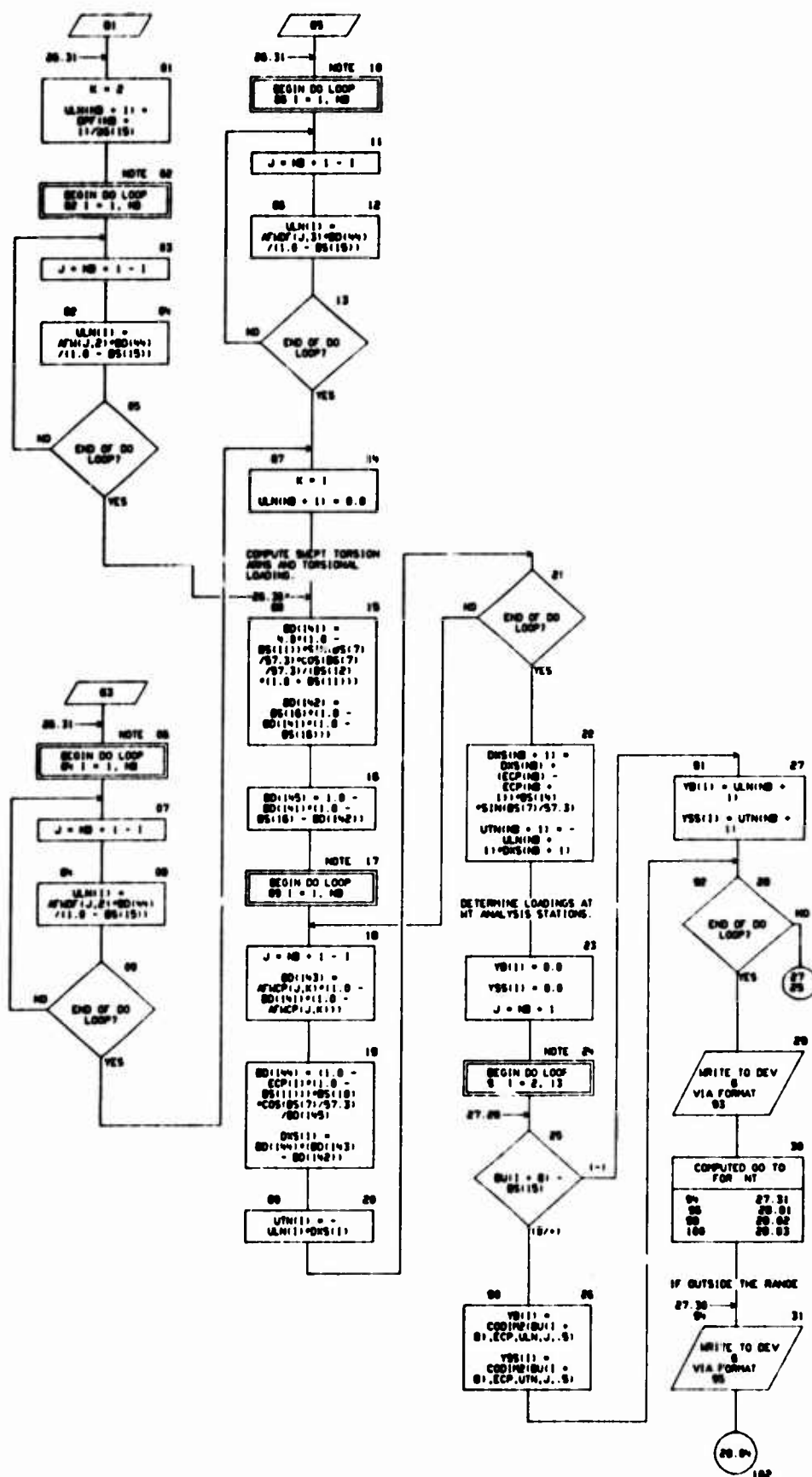
CHART TITLE - SUBROUTINE UPDANT



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AUTOFLOW CHART SET - BFCNL FLEXIBLE AIRLOADS SA PROGRAM PAGE 27

CHART TITLE - SUBROUTINE USPANT



08/04/73

AUTOFLEX CHART SET - EFCVFL FLEXIBLE AIRLOADS SA PROGRAM PAGE 20

CHART TITLE - SUBROUTINE UPMAT

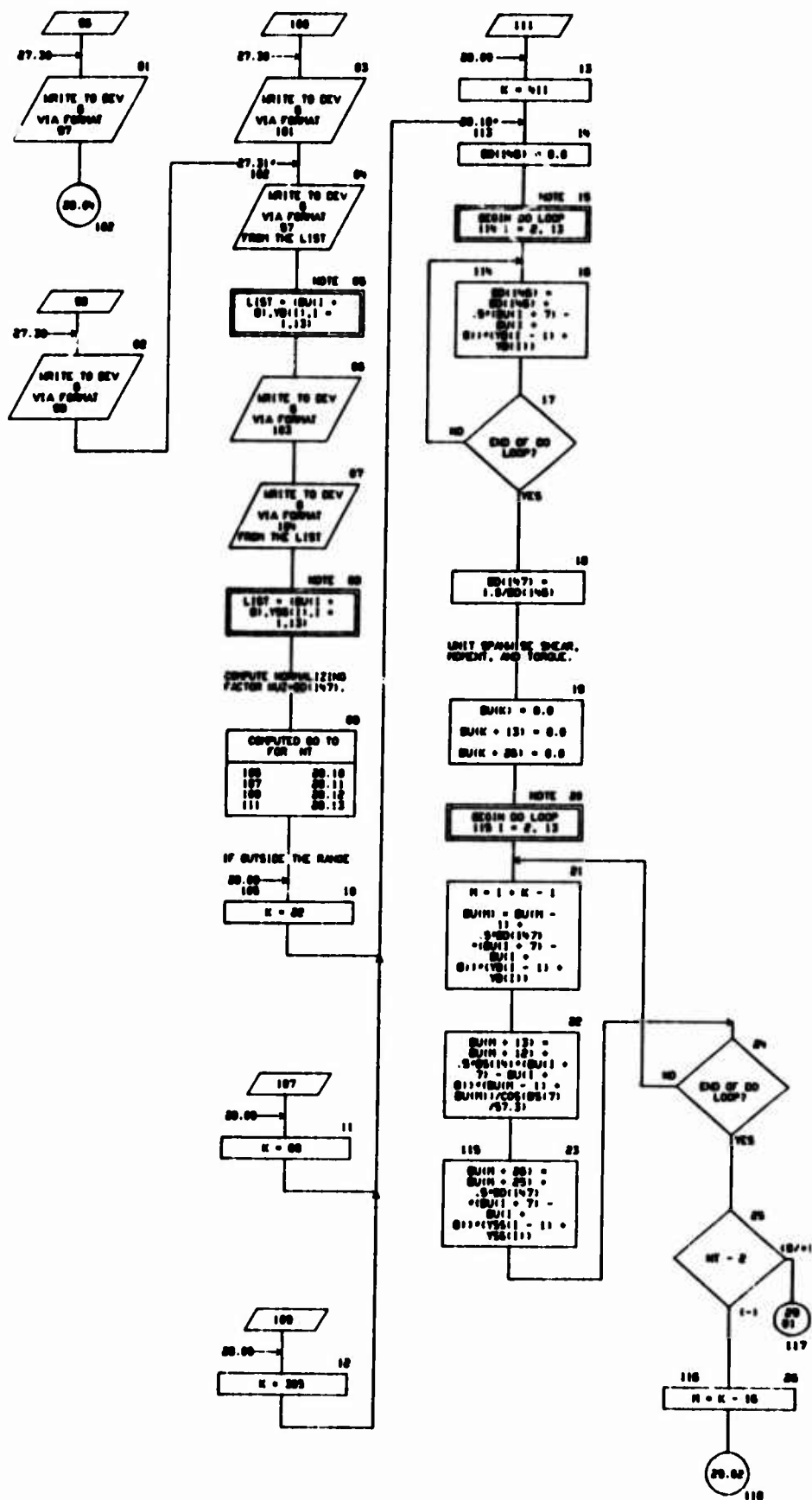
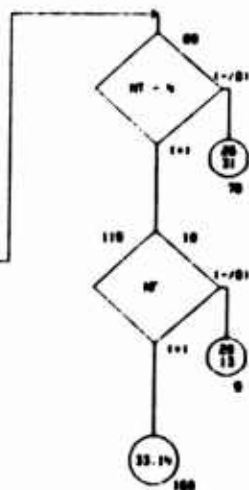
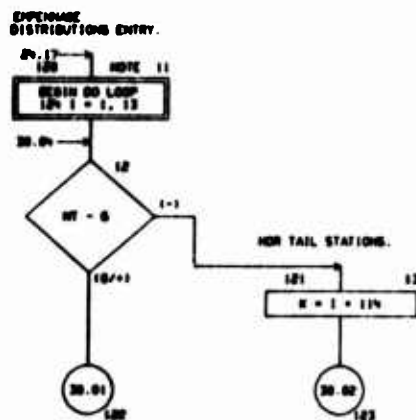
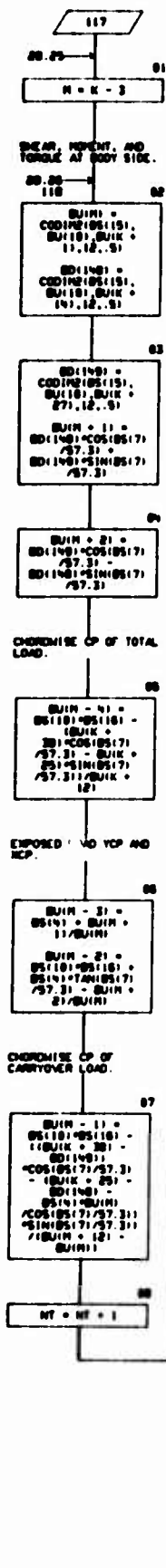


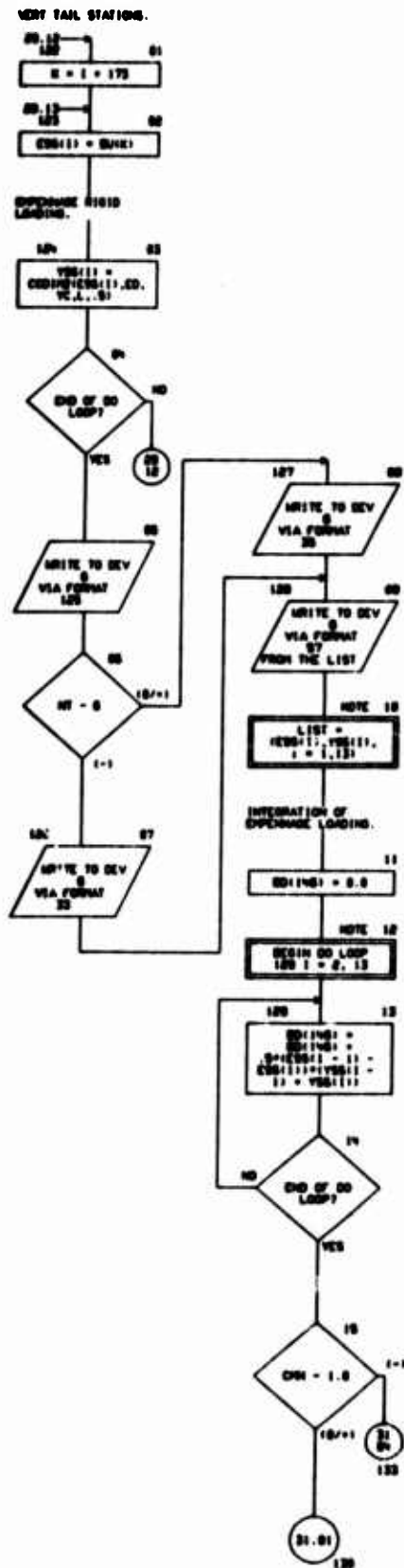
CHART TITLE - SUBROUTINE USPAR



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AUTOFLW CHART SET - B707FL FLEXIBLE AIRLINES SA PROGRAM PAGE 30

CHART TITLE - SUBROUTINE USPMF

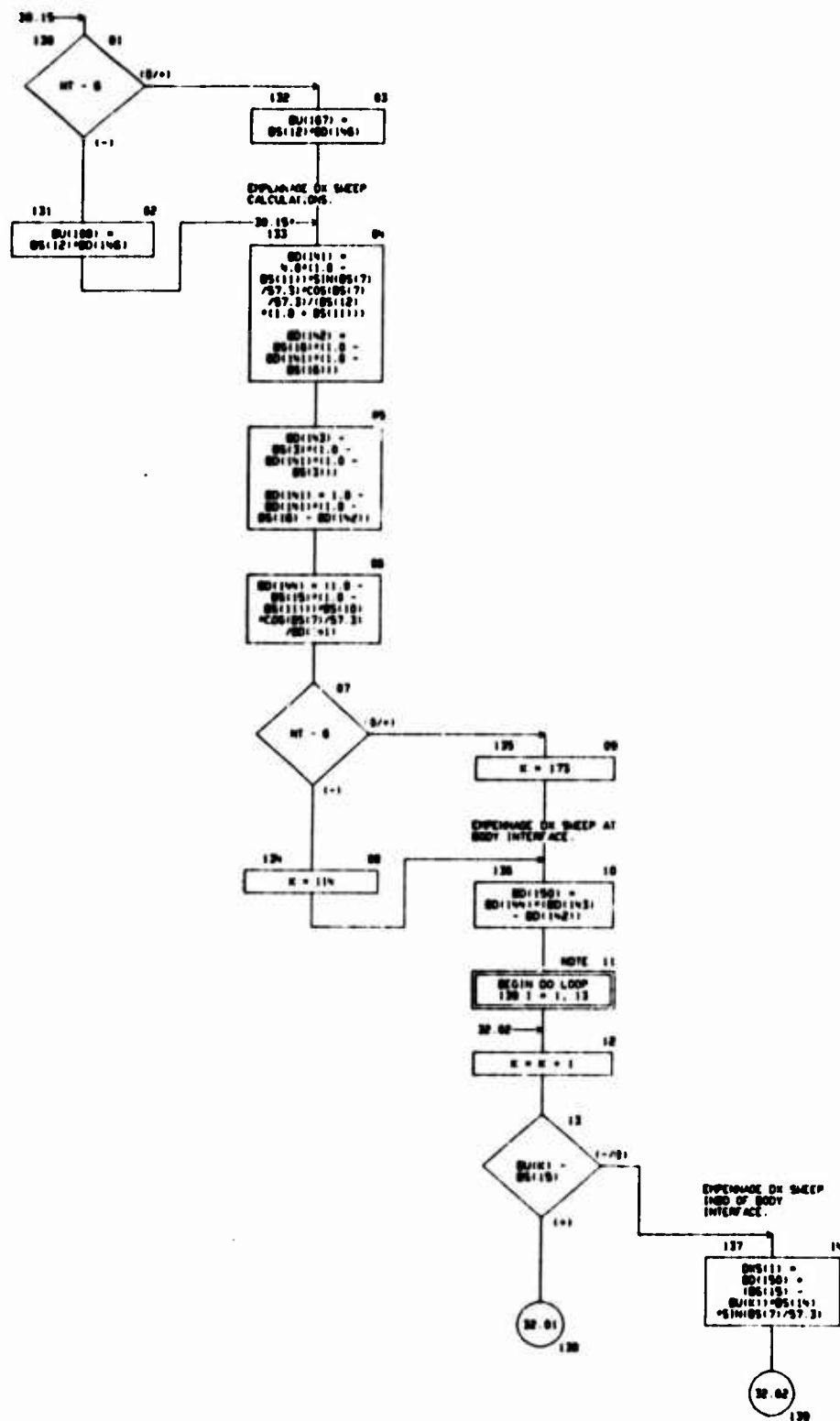


05/04/73

AUTOFLOW CHART SET - BFCNTL FLEXIBLE AIRLOADS SA PROGRAM PAGE 31

CHART TITLE - SUBROUTINE USPAW

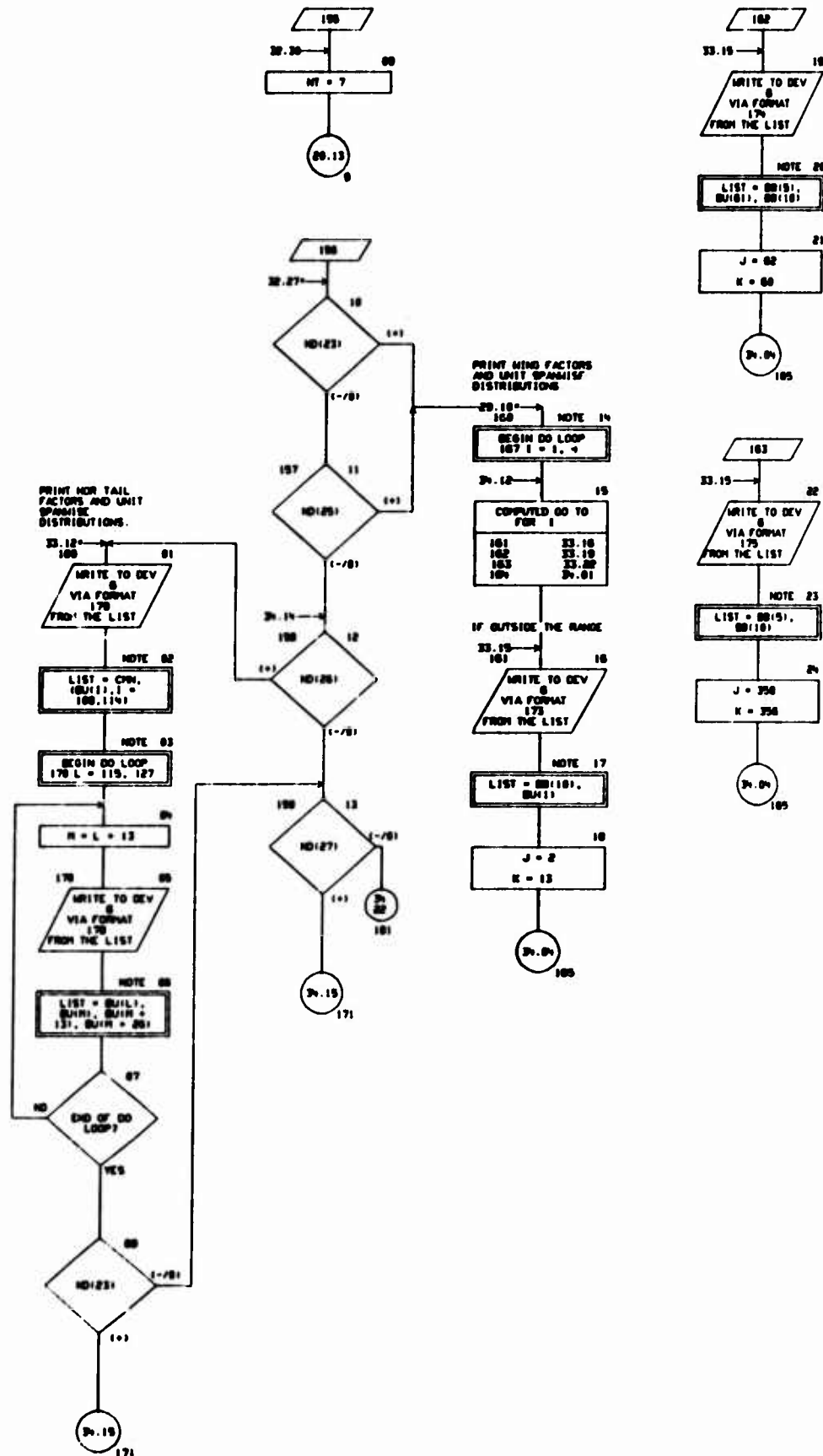
EXPANDED SUPERSONIC
 LIFT CURVE SLOPE
 (CLAN OR CTBY)



05/04/73

AUTOFLW CHART SET - B7CHTL FLEXIBLE AIRLOADS SA PROGRAM PAGE 33

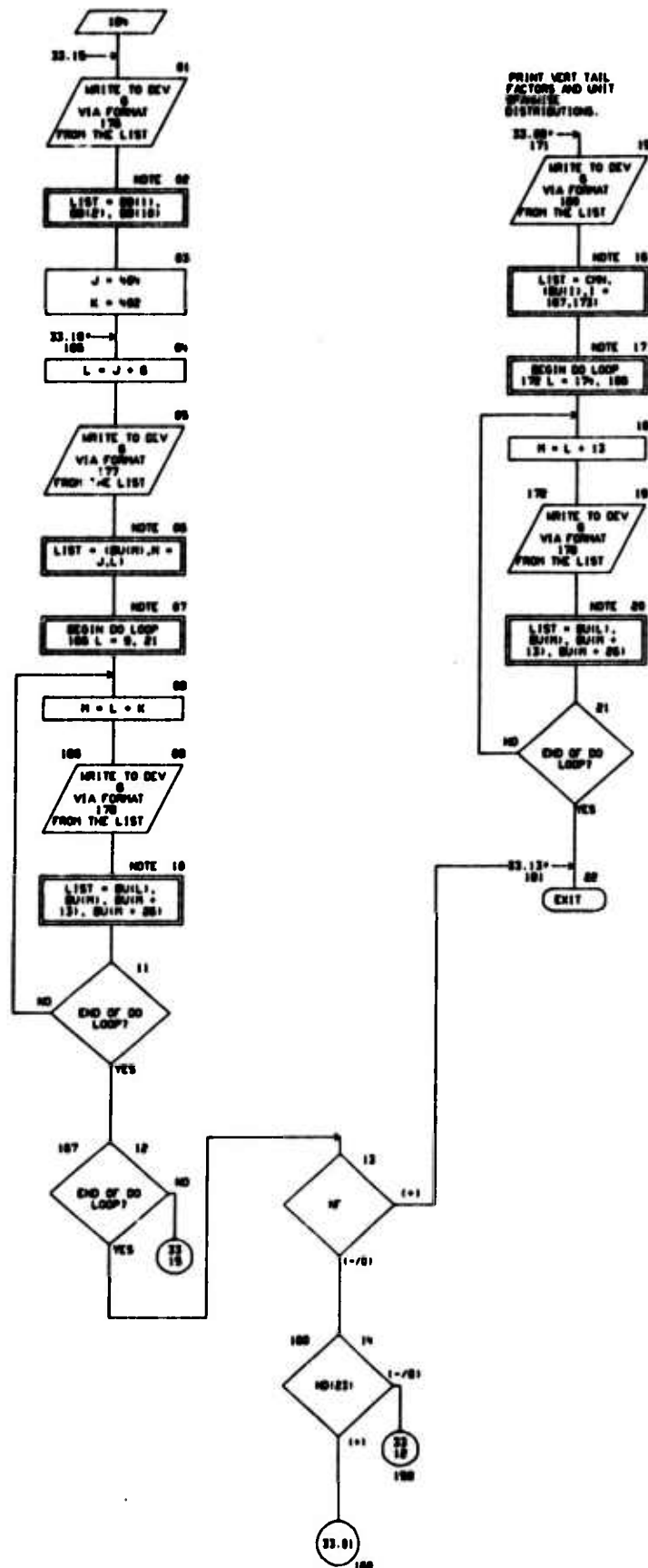
CHART TITLE - SUBROUTINE UPMAT



05/04/75

AUTOFLW CHART SET - BFCNTL FLEXIBLE AIRLOADS SA PROGRAM PAGE 34

CHART TITLE - SUBROUTINE UBPW4



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AUTOLON CHART SET - BYCNL FLEXIBLE AIRLOADS SA PROGRAM PAGE 38

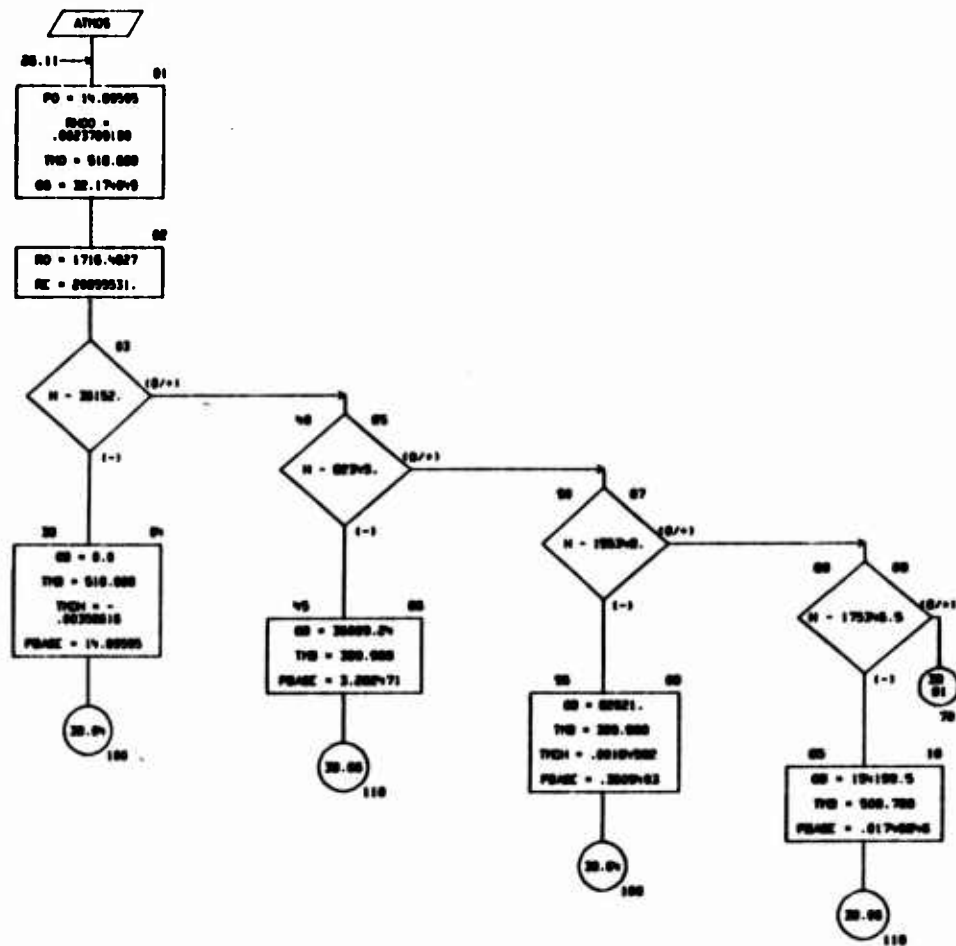
CHART TITLE - NON-PROCEDURAL STATEMENTS

SYNOPS/8.9,4X84APCUB-78.3,4X84APCUB-78.3//74274SPANWISE UNIT DISTRI
BUTIONS//8X84ST7474SYVIB/4X74APVIB/4X74APVIB//8X84EXEPTIONS/8X84
EXPANSION/1

09/04/73

AUTOFLOW CHART SET - BFWIL FLEXIBLE AIRLOADS S1 PROGRAM PAGE 37

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

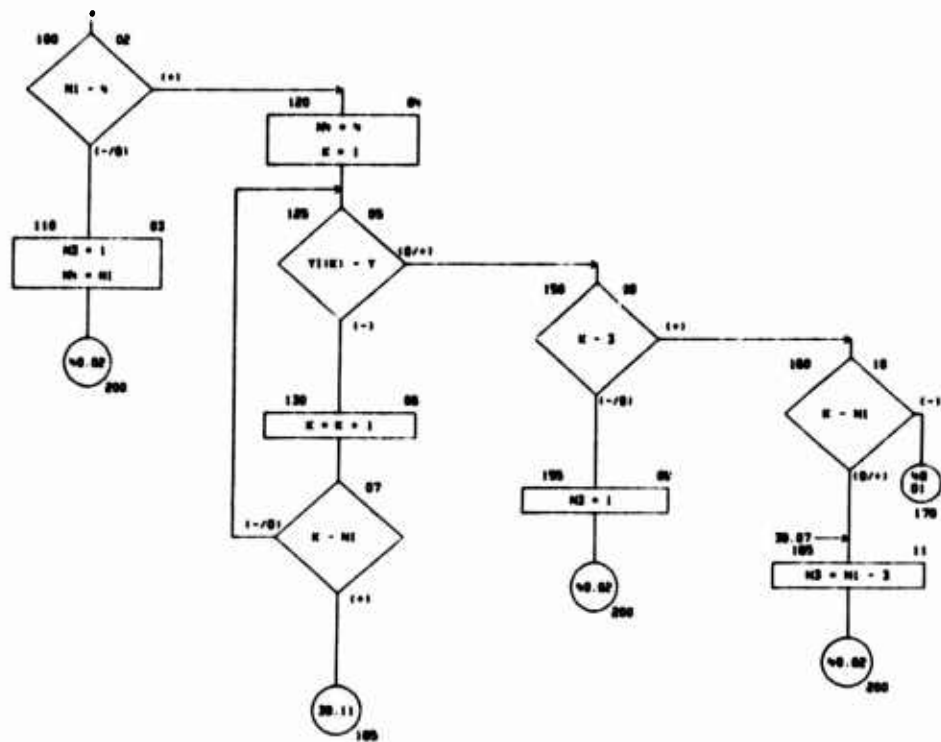


05/04/73

AUTOFLOW CHART SET - B7CMT FLEXIBLE AIRLOADS SA PROGRAM PAGE 30

CHART TITLE - FUNCTION FCODEM(X,V,N1,V1,Z1,N1,N2,N3)

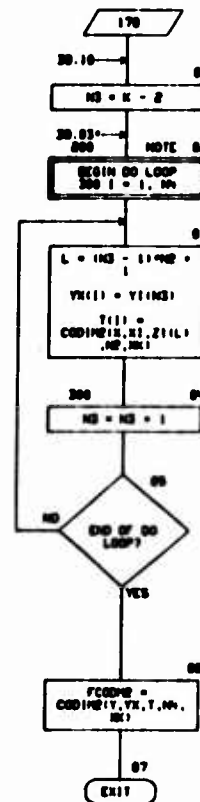
TWO DIMENSION CURVE
 FIT
 SUBPROGRAM...FCODEM
 CALLING SEQUENCE
 FCODEM(X,V,N1,V1,Z1,
 N1,N2,N3)
 X = ARGUMENT - 1ST
 VARIABLE
 V = ARGUMENT - 2ND
 VARIABLE
 N1 = ARRAY OF 1ST
 VARIABLE
 V1 = ARRAY OF 2ND
 VARIABLE
 Z1 = ARRAY OF THE
 SUBSEQUENT VARIABLE
 N1 = NO. OF POINTS -
 V1
 N2 = NO. OF POINTS -
 X1
 N3 = END INTERVAL
 INTERPOLATION CONTROL
 CONSTANT



08/04/73

AUTOFLOW CHART SET - BFCNL FLEXIBLE AIRLOADS SA PROGRAM PAGE 40

CHART TITLE - FUNCTION FCODE(X,Y,XI,YI,ZI,M1,M2,MK)



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AUTOFLOW CHART SET - BFCNL FLEXIBLE AIRLOADS SA PROGRAM PAGE 41

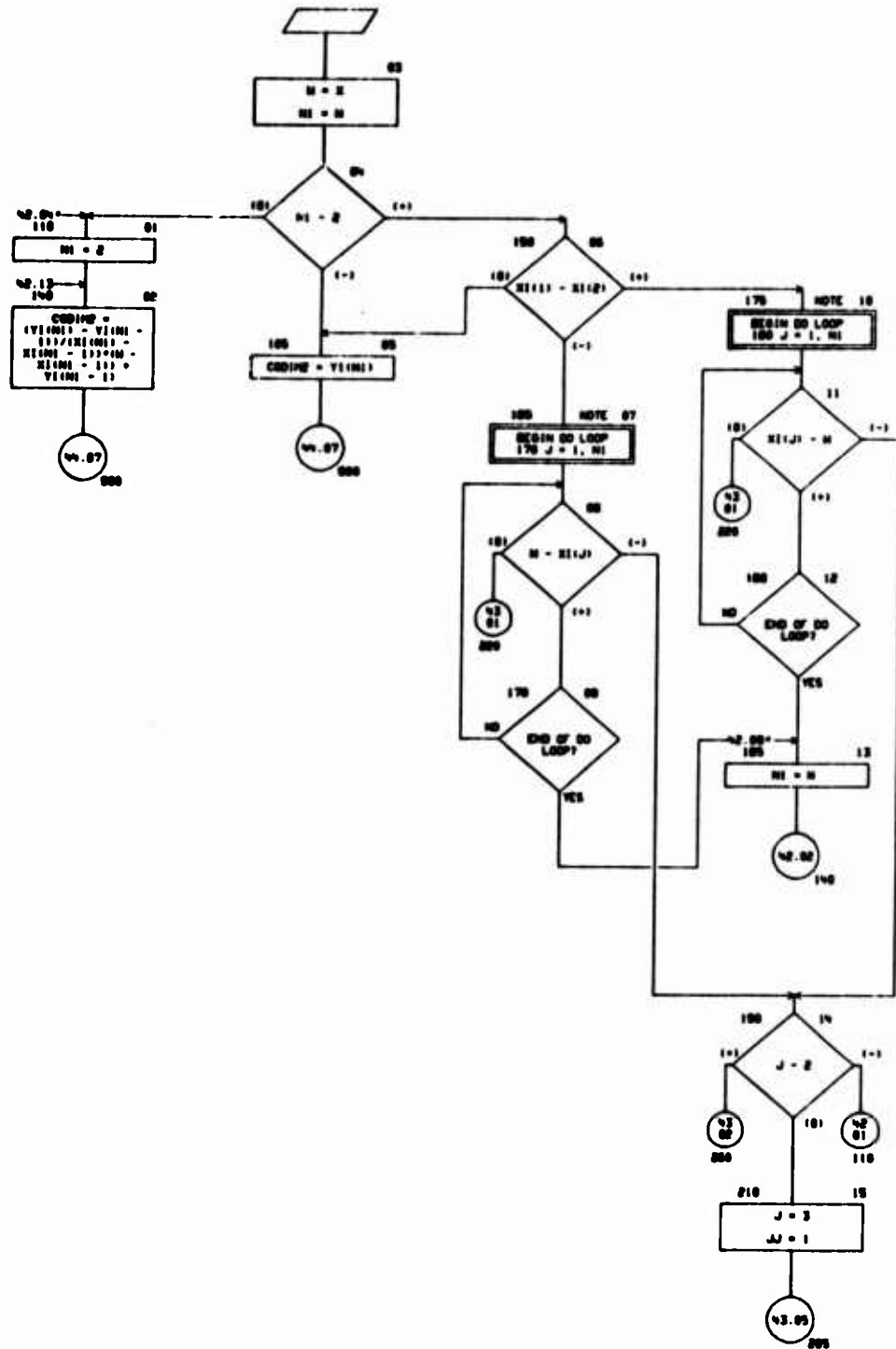
CHART TITLE - NON-PROCEDURAL STATEMENTS

```
COMPEN TCOM44001  
DIMENSION BD1001,AD12001,X1111,Y1111,Z1111,T141,YR141  
EQUIVALENCE (BD111,TCOM12001), (AD111,TCOM44001), (Y111,BD1011), (Y  
X111,BD1001), (AD111,AD11301), (AD11301,AD11401), (AD11401,AD11411), (L,  
AD11401)
```

05/04/73

AUTOFLIGHT CHART SET - B7CHTL FLEXIBLE AIRLOADS SA PROGRAM PAGE 42

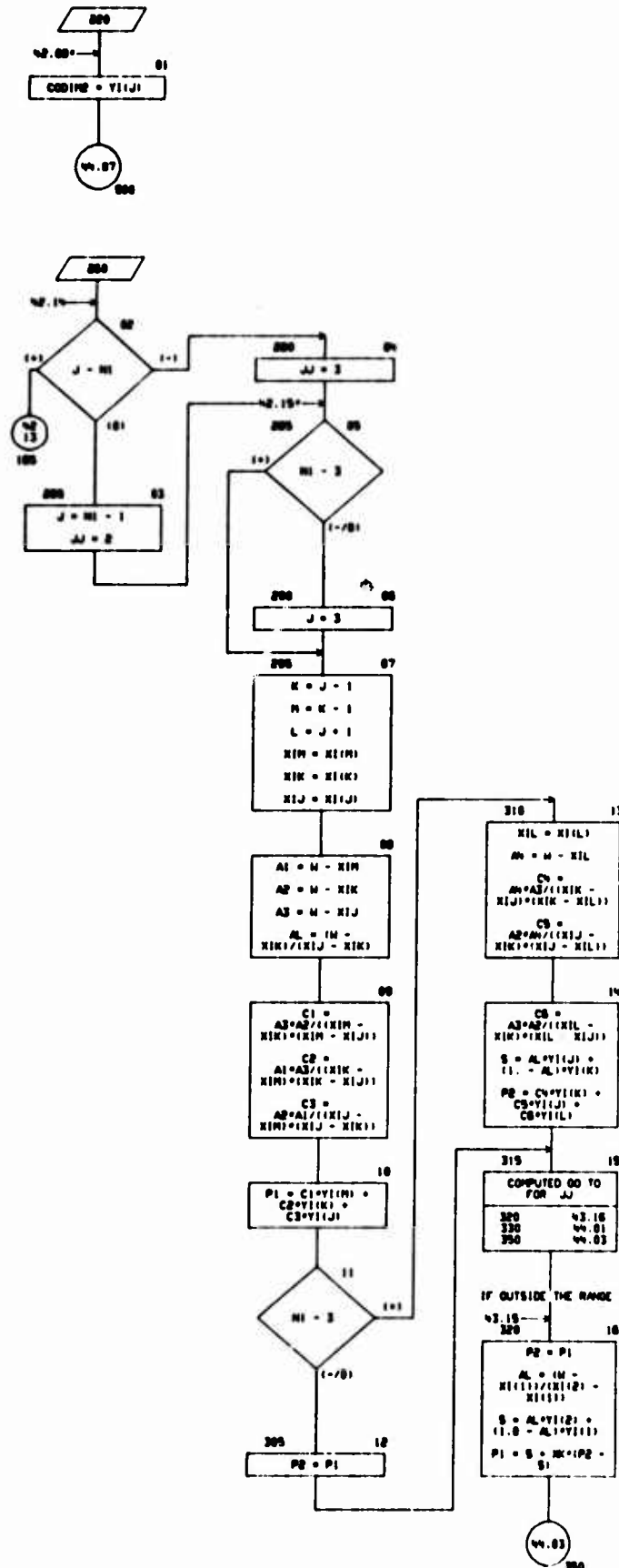
CHART TITLE - FUNCTION CODE: N, N1, V1, N, N1



05/04/73

AUTOFLOW CHART SET - BFCNTL FLEXIBLE AIRLOADS SA PROGRAM PAGE 43

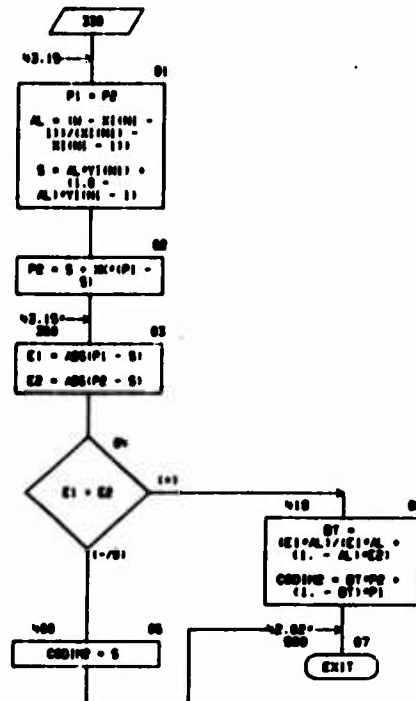
CHART TITLE - FUNCTION CODING(XI,YI,M,XI)



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AUTOFLEX CHART SET - B7C7L FLEXIBLE AIRLOADS SA PROGRAM PAGE 44

CHART TITLE - FUNCTION CODEINDEX,VI,N,MI



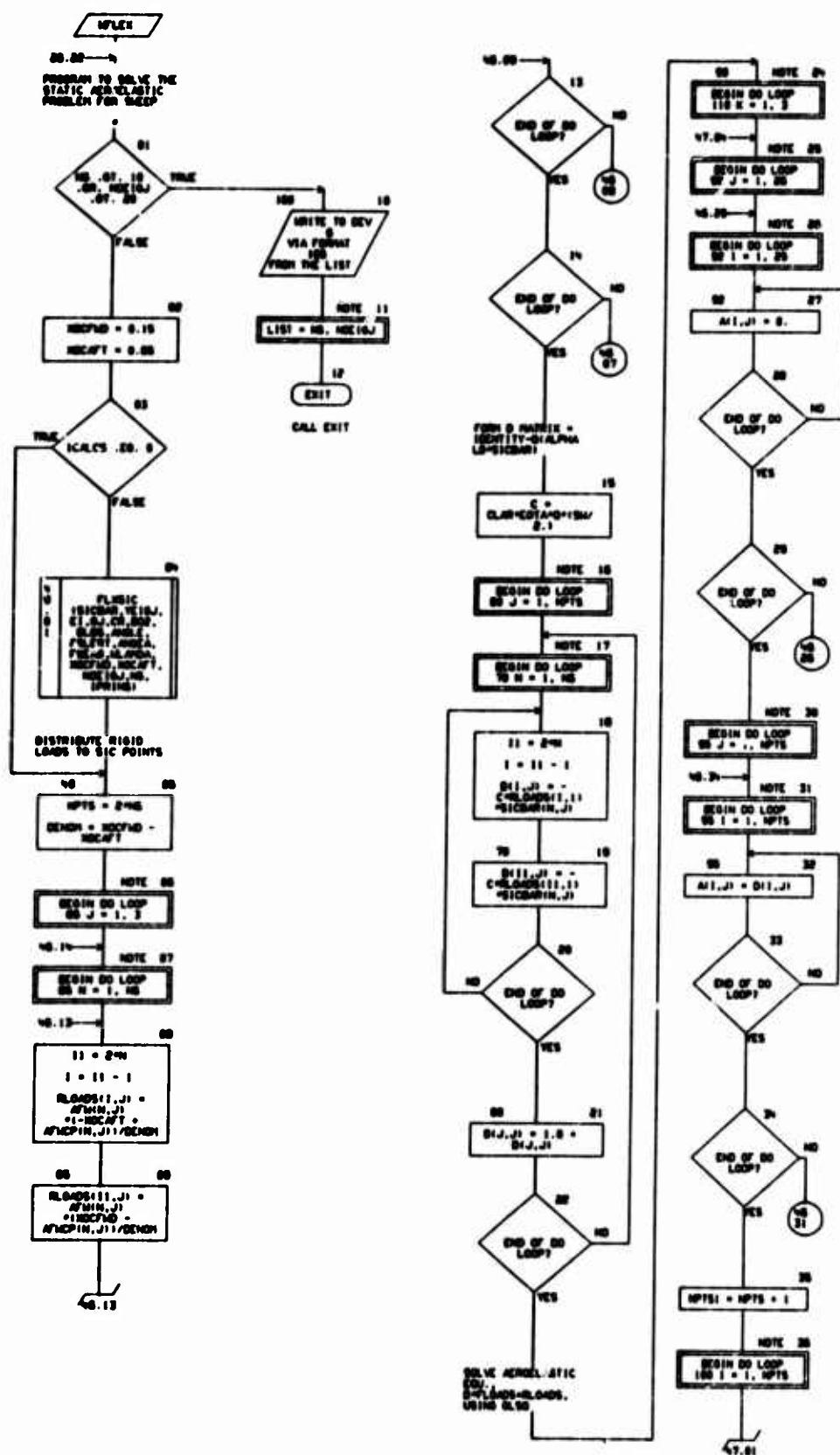
05/04/73

AUTOFLEX CHART SET - SPCHL FLEXIBLE AIRLIFT SA PROGRAM PAGE 45

CHART TITLE - NON-PROCEDURAL STATEMENTS

COMMON PCOMM4001
DIMENSION ND12001,X1111,V1111
EQUIVALENCE ND111,PCOMM400111,ND114311,IJ,ND114411,IJJ,ND1145
11,ND114611,IL,ND114711,IN,ND114811

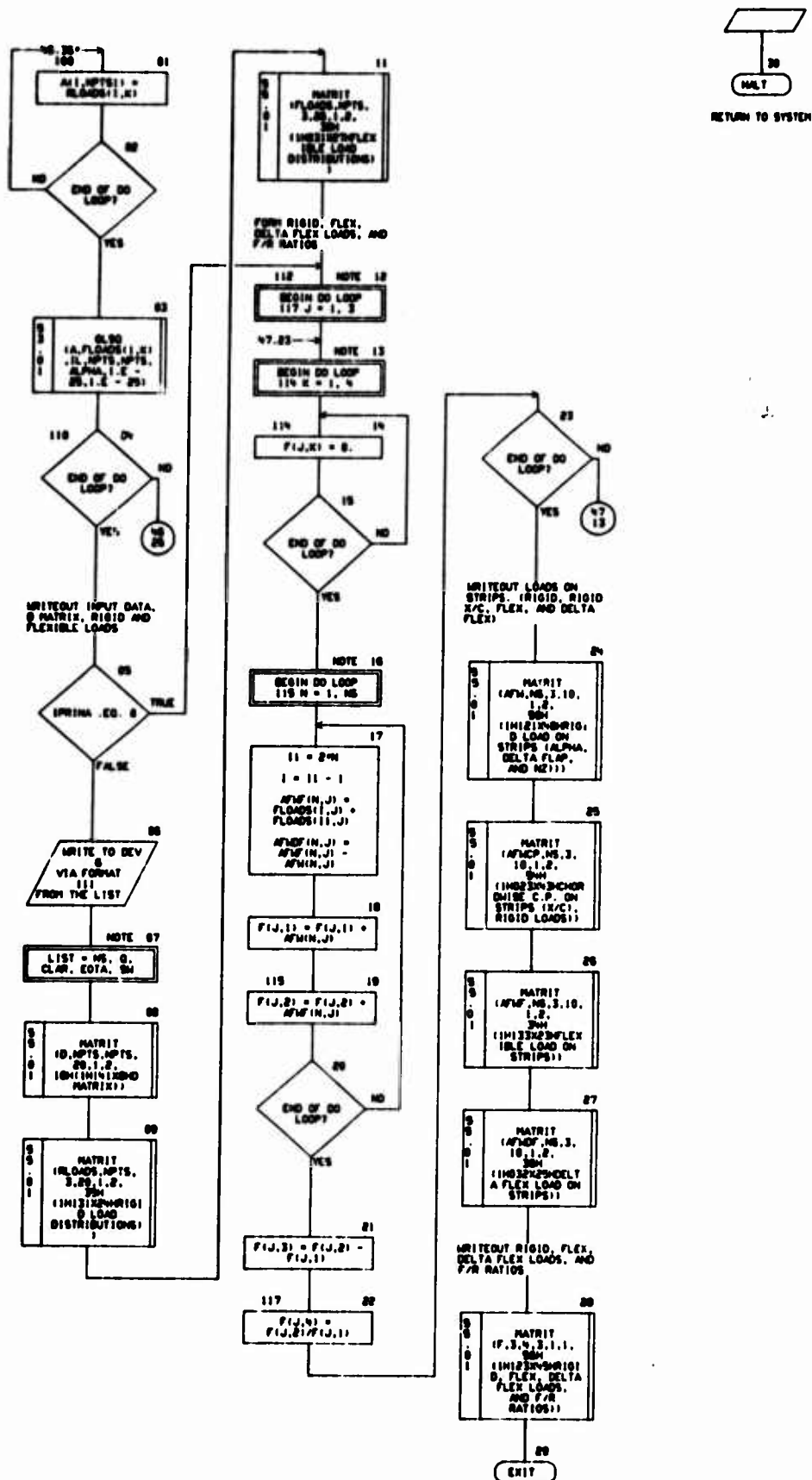
COURT TITLE - SUBROUTINE WFLX1AFH,AFICP,AFW,AFDF,F,VEIG,SI,QJ,CR,DD,BL,DS,A



05/04/75

AUTOFLW CHART SET - 07CNFL FLEXIBLE AIRLOADS SA PROGRAM PAGE 47

CHART TITLE - SUBROUTINE WFLXN:AFN,AFNP,AFWF,AFWF,F,VEIGJ,EI,GJ,CR,BOZ,BLPS,A



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AUTOFLEX CHART SET - B7CMTL FLEXIBLE AIRLOADS SA PROGRAM PAGE 48

CHART TITLE - NON-PROCEDURAL STATEMENTS

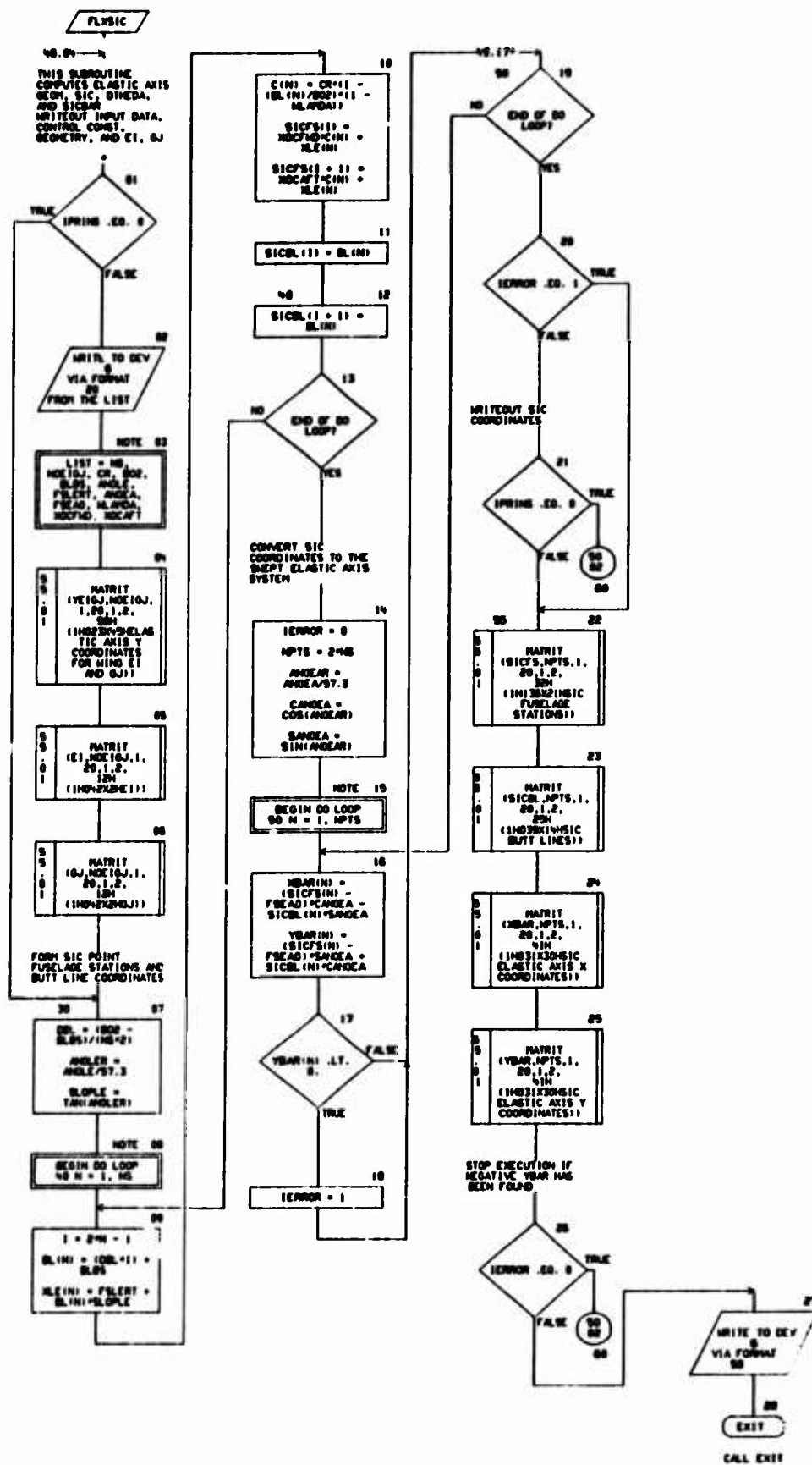
```

      DIMENSION VEIG(20),EI(20),GJ(20),SICBAR(10,20)
      DIMENSION APM(10,3),APMP(10,3),D(20,20),LOADS(20,3),
      FLOADS(20,3),BLANDS(20,3),A(20,20),IL(20),
      AMF(10,3),F(3,4),APMF(10,3)
      COMMON TCDH4400
111  FORMAT (10H 20H,37H DATA FROM SUBROUTINE WFLX, //2X, 6H NS =.113,
      //2X, 4H S =.177.2, 6H LB/FT**2, //2X, 7H CLAR =.175.3, //2X, 7H
      SOTA =.175.4, //2X, 6H SM =.177.2, 6H FT**2 )
100  FORMAT (20H) PROGRAM DIMENSIONS EXCEEDED, / 6H NS =.113,12H NSR
      10J =.113)
  
```

05/04/73

AUTOFLOW CHART 4-1 - BFCNVL FLEXIBLE AIRLOADS SA PROGRAM PAGE 40

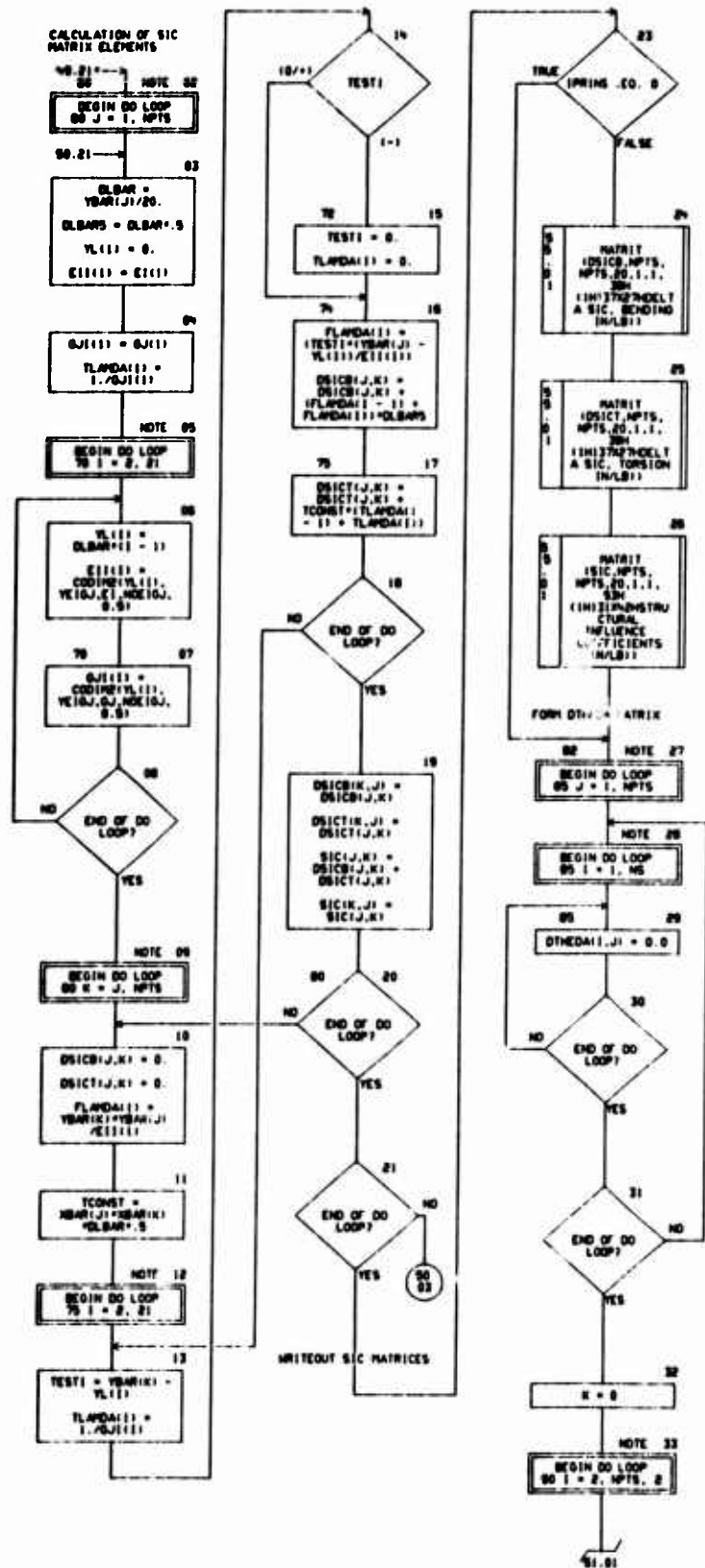
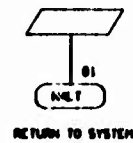
CHART TITLE - SUBROUTINE FLXSIC(SICBAR,VEIGJ,EI,GJ,CR,B02,B05,ANGLE,FLEET,ANG



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AUTOFLON CHART SET - BFCNL FLEXIBLE AIRLOADS SA PROGRAM PAGE 90

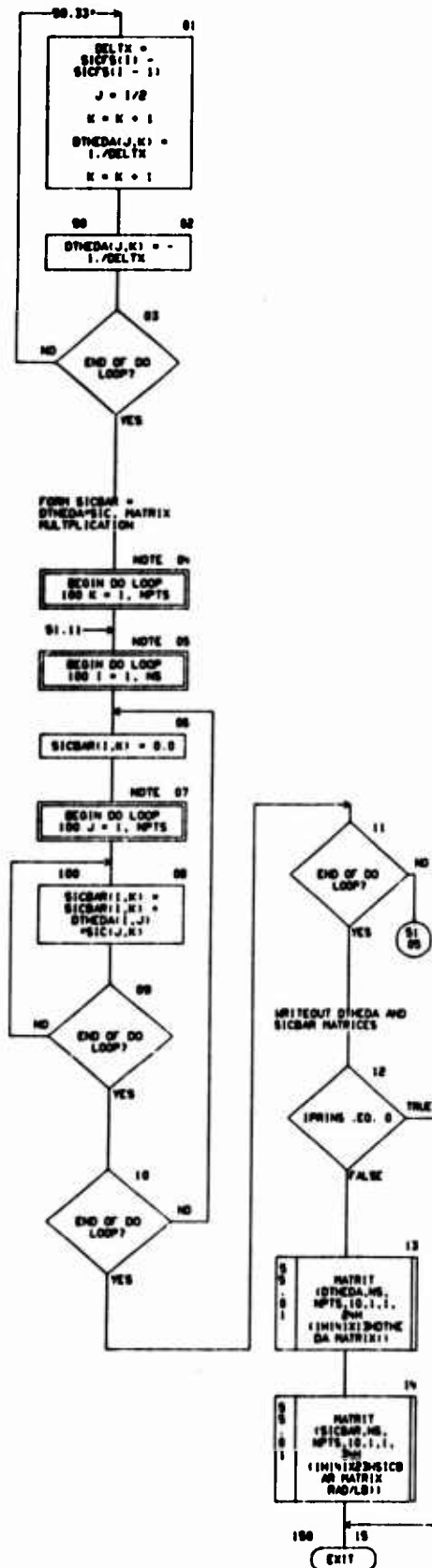
CHART TITLE - SUBROUTINE FLVSIC(SICBAR,VEIGJ,EI,GJ,CR,BQZ,BLBS,ANGLE,FSLERT,ANG



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AUTOFLOW CHART SET - B/CNTL FLEXIBLE AIRLOADS SA PROGRAM PAGE 51

CHART TITLE - SUBROUTINE FLYSIC/SICBAR,VEIGJ,E1,GJ,CR,BOP,BLOS,ANGLE,FLERT,ANG



05/04/73

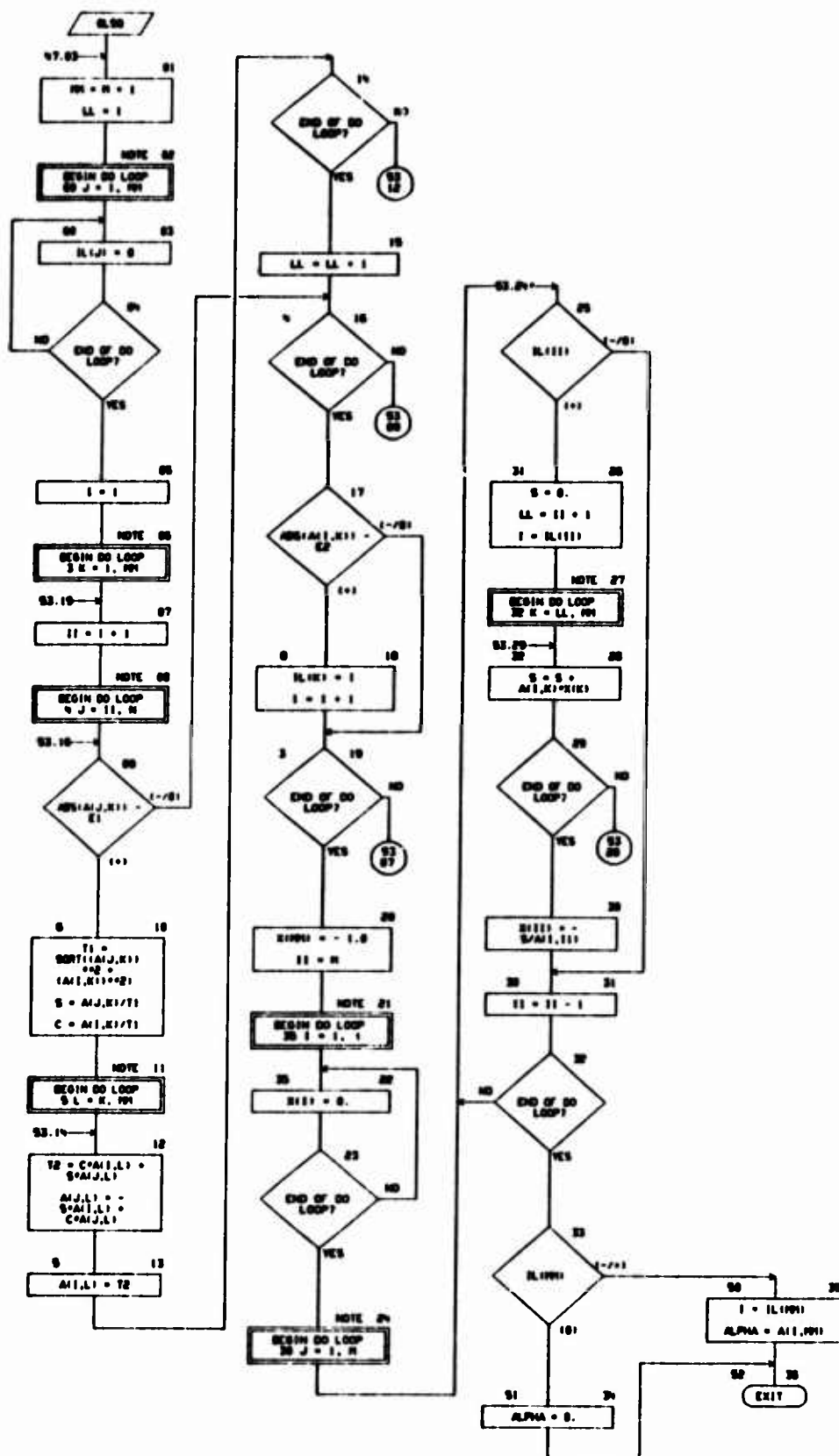
AUTOFLW CHART SET - BFCNTL FLEXIBLE AIRLOADS SA PROGRAM PAGE 52

CHART TITLE - NON-PROCEDURAL STATEMENTS

```

      DIMENSION XLE(20) ,XL(20) ,CL(20) ,SICFS(20) ,SICBL(20) ,
      XBAR(20) ,YBAR(20)
      DIMENSION VL(21) ,EL(11,21) ,GJ(1,21) ,VEIGJ(20) ,E1(20) ,
      GJ(20) ,FLAMDA(21),OSICB(20,20) ,OSICT(20,20) ,
      SIC(20,20),FLAMDA(21)
      DIMENSION OTMBA(10,20) ,SICBA(10,20)
      COMMON TCOM(4400)
20  FORMAT (1H) 24X,20H DATA FROM SUBROUTINE FLNSIC,/ 0H  NS =,113,
      17X,0H XEIGJ =,113,/ 0H  CR =,170.2,0H IN., 7X,0H BOZ =,170.
      2,0H IN., 0X,7H BLDS =,177.2,0H IN.,/ 10H  ANGLE =,177.3,0H
      DEG., 4X,0H FLERT =,170.2,0H IN.,/ 10H  ANGEA =,177.3,0H DE
      G., 4X,0H FDEAS =,170.2,0H IN.,/ 10H  ALAPDA =,170.3,10X,0H NO
      CFMD =,170.3,10X,0H HOCAPT =,170.3)
30  FORMAT (23H  EXECUTION STOPPED,/ 01H NEGATIVE VALUE OF Y IN TH
      E SHEET AXIS SYSTEM HAS BEEN FOUND IN SUBROUTINE FLNSIC )
  
```

CHART TITLE - SUBROUTINE GLOSSIA,N,IL,N,N,ALPHA,EI,EP)



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AUTOFLEX CHART SET - B747-100 FLEXIBLE AIRLOADS SA PROGRAM PAGE 04

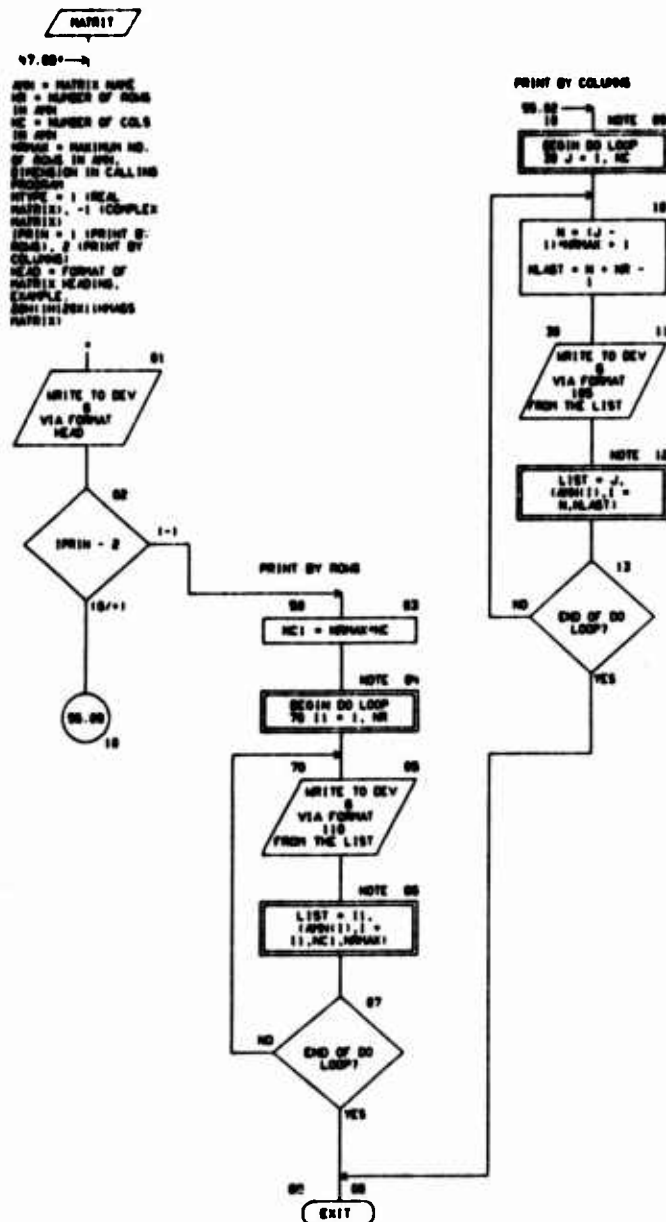
CHART TITLE - NON-PROCEDURAL STATEMENTS

DIMENSION A(25.00), B(25.00), C(25.00)

05/04/73

AUTOFLON CHART SET - B7CWL FLEXIBLE AIRLOADS SA PROGRAM PAGE 00

CHART TITLE - SUBROUTINE MATRIN:APN,NC,NRMAX,NTYPE,IPRIN,HEAD



05/04/75

AUTOFLW CHART SET - B7CHL FLEXIBLE AIRLOADS SA PROGRAM PAGE 05

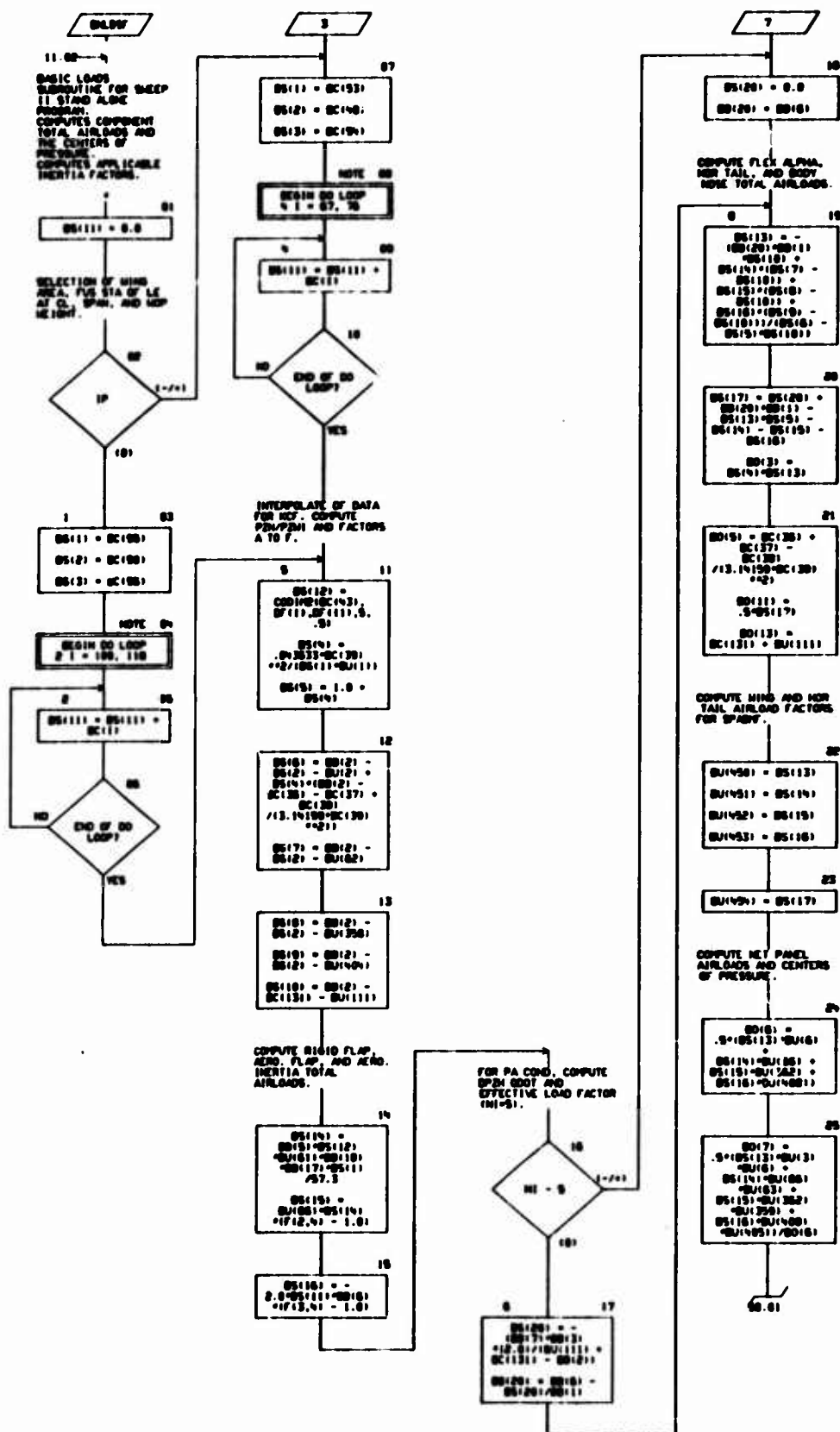
CHART TITLE - NON-PROCEDURAL STATEMENTS

DIMENSION AMW11,HEAD1001
100 FORMATIONSDIMENSION NO. =1477114 (PCE13.51)
110 FORMATIONSDIMENSION NO. =1477114 (PCE13.51)

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AUTOFLOW CHART SET - BFCNTL FLEXIBLE AIRLOADS SA PROGRAM PAGE 57

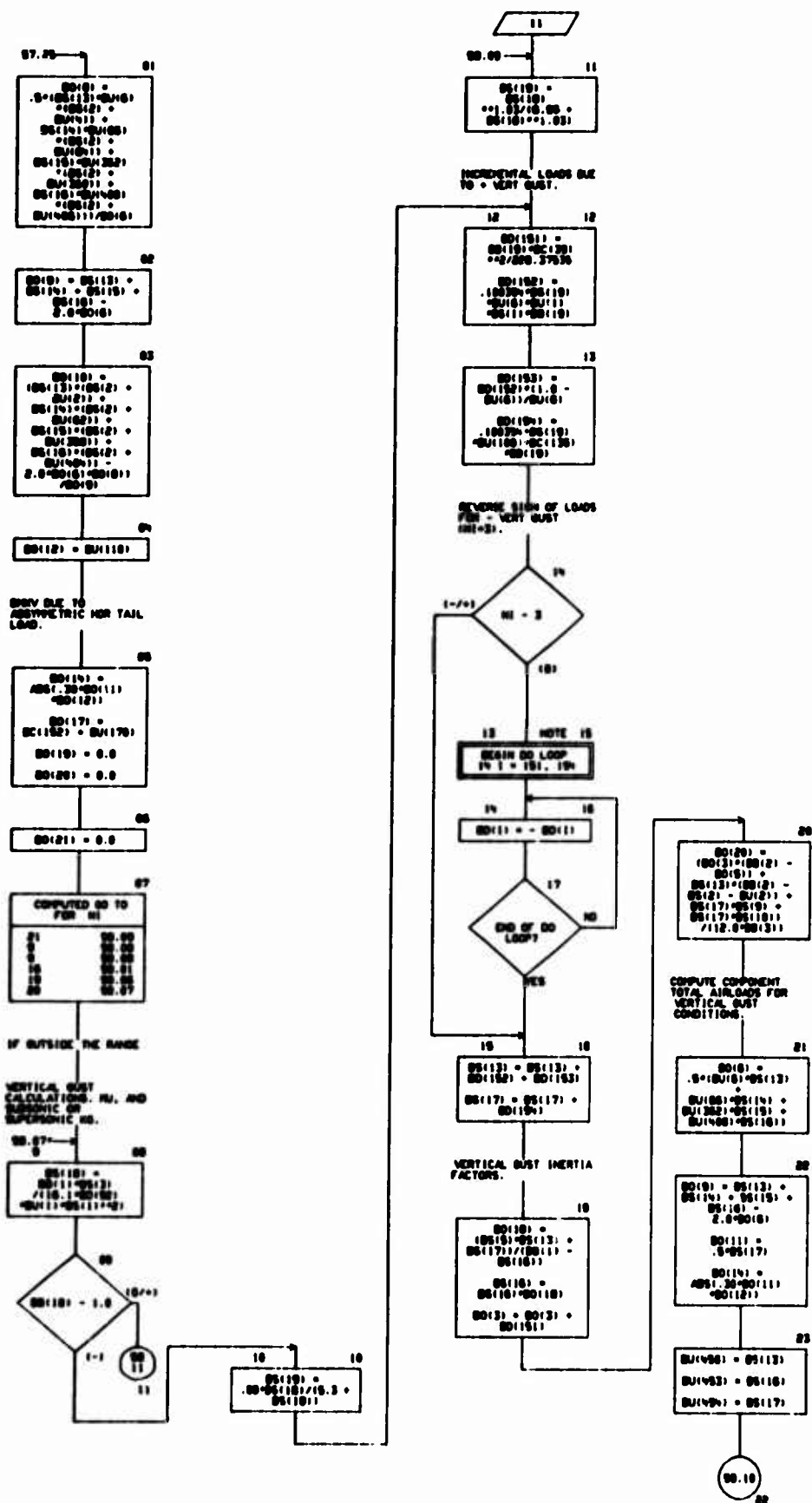
CHART TITLE - SUBROUTINE BLOW



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AUTOFLEX CHART SET - BFCNTL FLEXIBLE AIRLOADS SA PROGRAM PAGE 05

CHART TITLE - SUBROUTINE 04.007



08/04/73

AUTOFLEX CHART SET - EFCNVL FLEXIBLE AIRLOADS SA PROGRAM PAGE 00

CHART TITLE - NEW-PROCEDURAL STATEMENTS

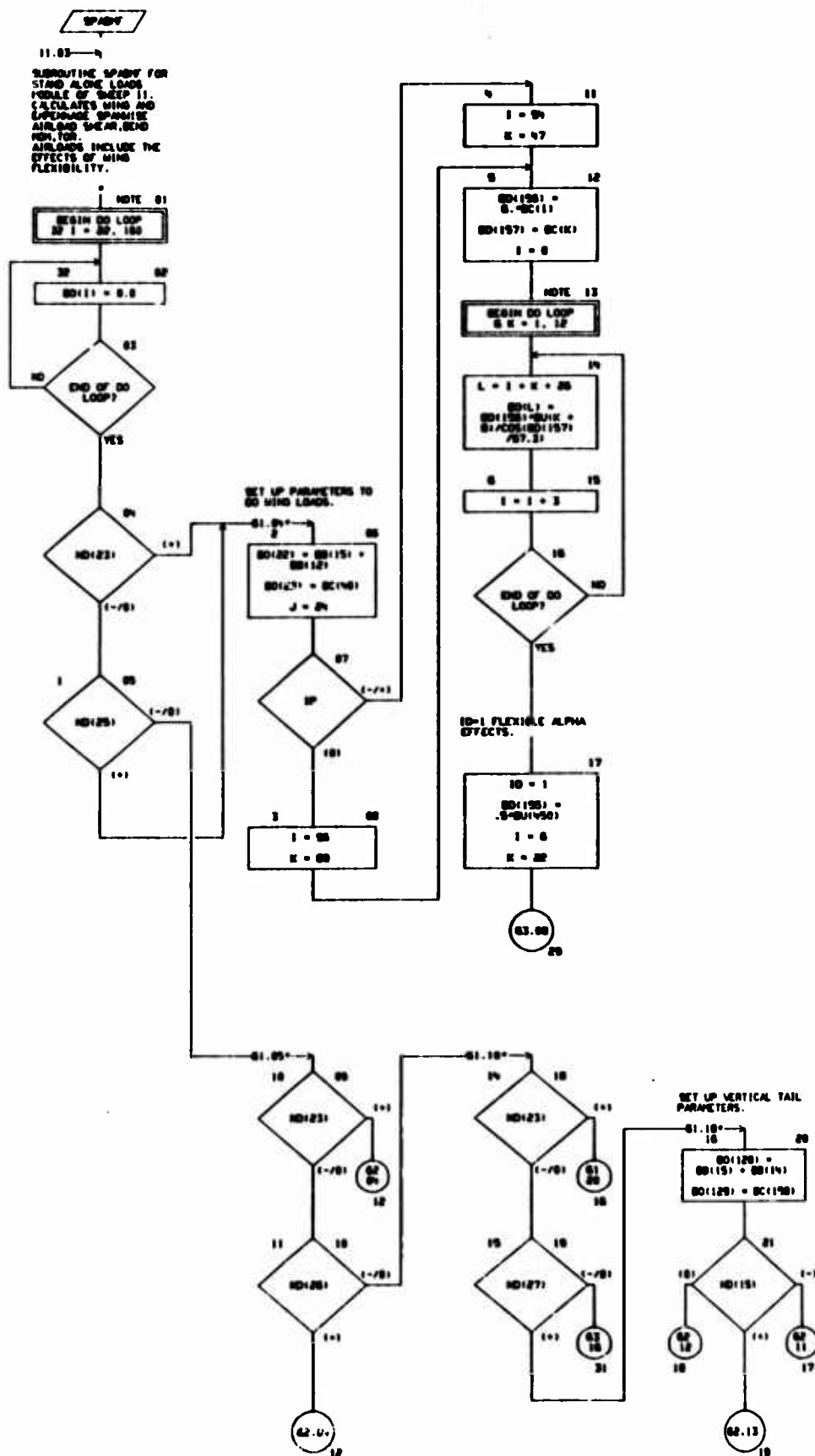
```

COMMON TCDN(400)
DIMENSION EF(110),EC(100),ED(20),EE(20),EF(100),EG(100),EH(20),
(100),F(13,4)
EQUIVALENCE (EF(1),TCDN(100)),(EC(1),TCDN(270)),(ED(1),TCDN(255)
), (EE(1),TCDN(273)),(EF(1),TCDN(200)),(EG(1),TCDN(315)),(EH(1)
),TCDN(255)),(ED(1),TCDN(400)),(F(1,1),EG(1,4)),(H(1),ED(100)),(IP,
ED(137)),(HT,ED(100)),(I,ED(15)),(J,ED(152)),(K,ED(153))
26 FORMAT(1H513CONDITION NO=F7.0,SIZE=N=F5.3,SMALLT=F7.0,SIZEOF=F
5.0)
27 FORMAT(1H513BODY LOADS/700PZM=F5.0,NX=FY=F7.0,NPWHM=F5.0/)
28 FORMAT(1H513WING PANEL LOAD/700PZM(1)/2=F5.0,NXNYM(1)=F7.2,N
XZM(1)=F5.0/)
29 FORMAT(1H513WING CARRY-OVER LOAD/700PZM(1)=F5.0,NXZM(1)=F5.
0/)
30 FORMAT(1H513HORIZONTAL TAIL LOADS/700PZM/2=F5.0,NXNYM=F5.0,N
XZM=F5.0,NYXZM=F5.0/)
31 FORMAT(1H513VERTICAL TAIL LOAD/700PZM=F5.0,NXNYM=F5.0,NXZM
=F5.0/)
32 FORMAT(1H513WING INERTIA FACTORS/700PZM=F5.0,NXZM=F5.0,NX
ZM(1)=F7.3,NXZM(2)=F7.3/)
33 FORMAT(1H513COMPONENT SPANWISE FACTORS/700PZM(1)=F5.0,SWPZM(2)
=F5.0,SWPZM(3)=F5.0,SWPZM(4)=F5.0,SWPZM(5)=F5.0)
  
```

09/04/73

AUTOFLOW CHART SET - B/CNTL FLEXIBLE AIRLOADS SA PROGRAM PAGE 01

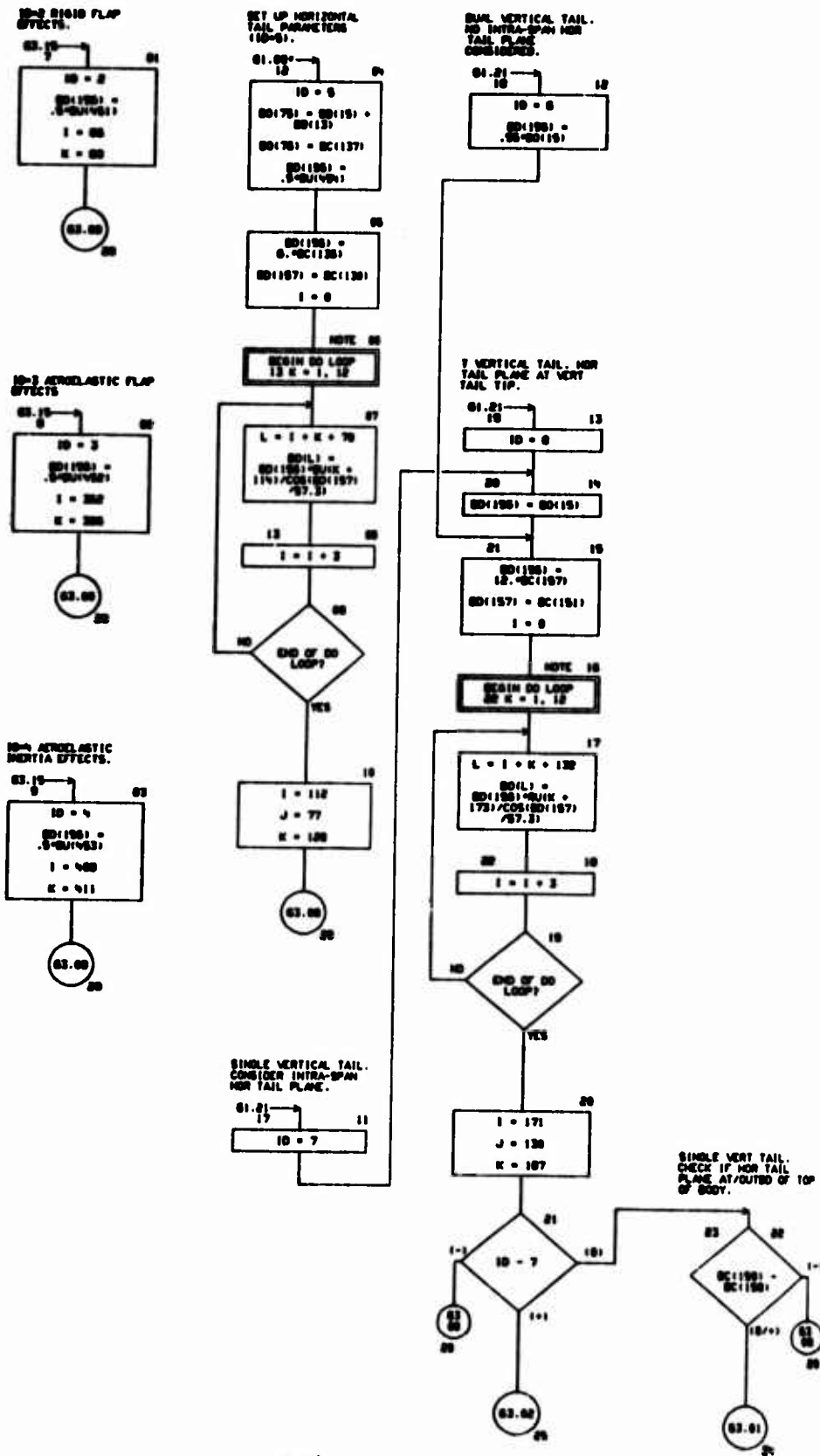
CHART TITLE - SUBROUTINE SPADY



05/04/73

AUTOFLW CHART SET - B7C7L FLEXIBLE AIRLOADS SA PROGRAM PAGE 02

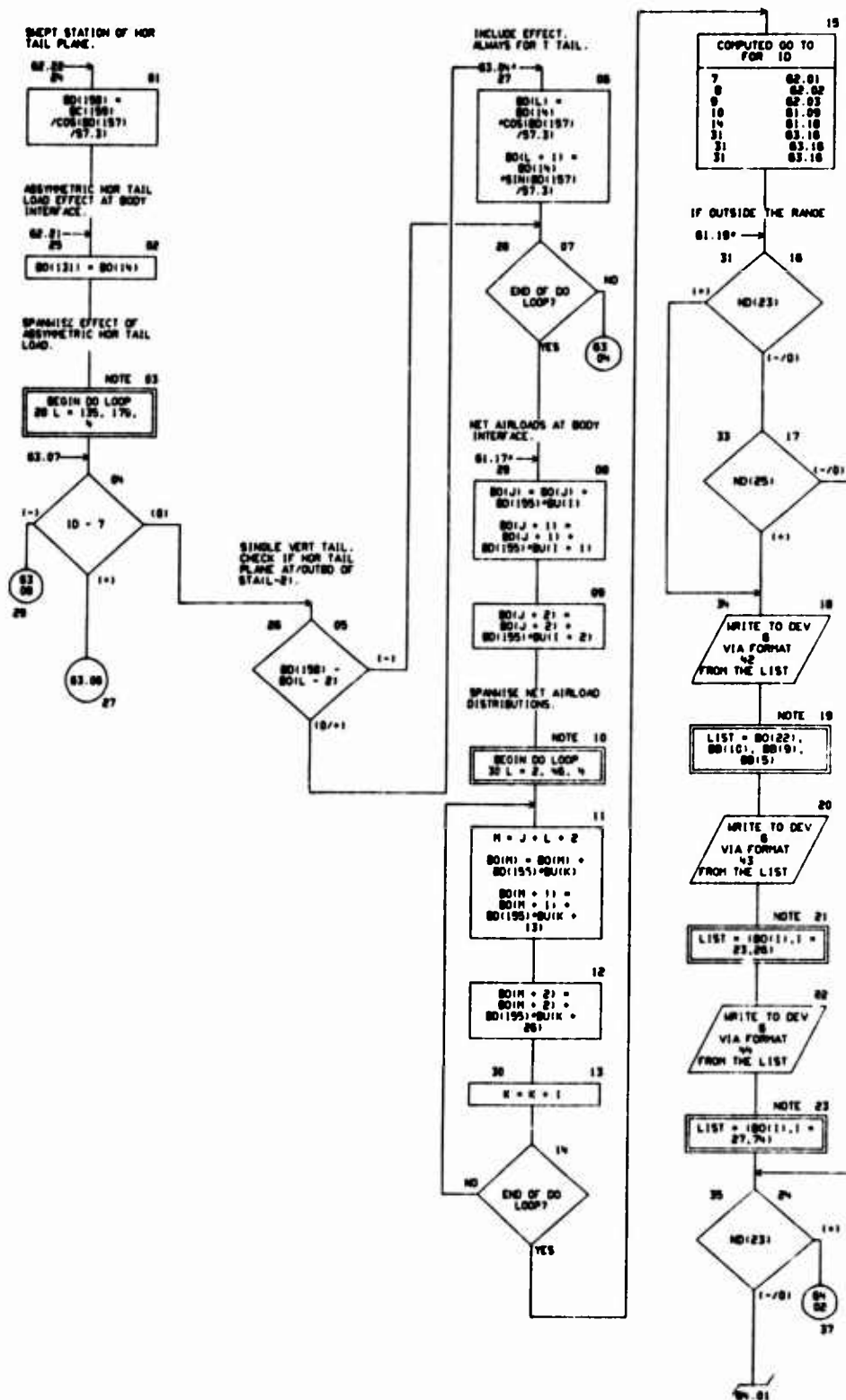
CHART TITLE - SUBROUTINE SPANV



09/04/75

AUTOFLOW CHART SET - BFCNTL FLEXIBLE AIRLOADS SA PROGRAM PAGE 63

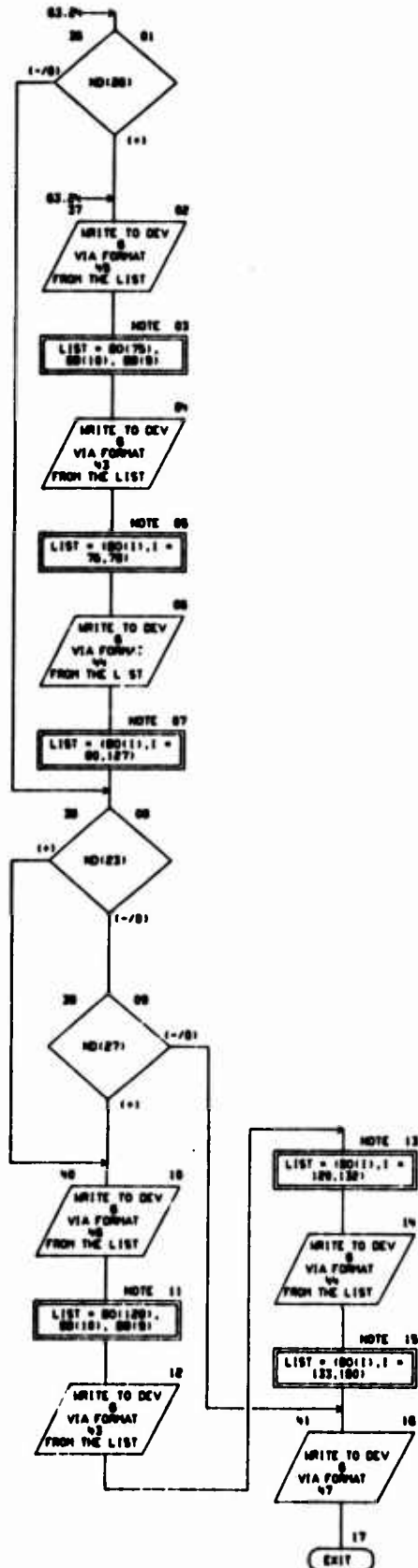
CHART TITLE - SUBROUTINE SPADVF



05/04/73

AUTOFLW CHART SET - BFCNHL FLEXIBLE AIRLOADS SA PROGRAM PAGE 04

CHART TITLE - SUBROUTINE SPABW



05/04/73	INPUT LISTING	AUTOFLIGHT SET - BFCNL	FLEXIBLE AIRLOADS SA PROGRAM
FORTRAN MODULE	(LIST, EBCDIC)		
CARD NO	****	CONTENTS	****
1	C	BFCNL IS THE STAND ALONE FLEXIBLE LOADS CONTROL PROGRAM.	BFCNL001
2	C	DETERMINES BASIC AIRLOAD CONDITIONS TO BE COMPUTED FOR A SPECIFIED BFCNL002	
3	C	SPEED-ALTITUDE CASE.	BFCNL003
4	C	IT PROVIDES LOGIC AND CONTROL FOR THE AIRLOAD SUBROUTINES.	BFCNL004
5		COMMON TCON(4400)	BFCNL005
6		DIMENSION ND(200),BD(340),BC(100),DD(20),DT(50),DD(55),DT(140),DP(BFCNL010	
7		(170),DT(200),DU(500)	BFCNL011
8		EXTERNALIZE (ND(1),TCON(4201),100(1),TCON(3003),100(1),TCON(2700)BFCNL020	
9		(1),100(1),TCON(2003),100(1),TCON(4001),100(1),TCON(1001),100(1),BFCNL021	
10		DTCON(1001),100(1),TCON(1000),100(1),TCON(1100),11,ND(101),1J,ND(BFCNL022	
11		3(1001),11C,ND(1001),11C,ND(1004),11R,ND(1071),11T,ND(1001),11F,ND(BFCNL023	
12		4(1001),10U(1),TCON(3103),11CALCS,ND(1001),11NE0,ND(1421),11NC,ND(1000)BFCNL024	
13		0)	BFCNL025
14		DO 97 I=400,405	BFCNL026
15		97 DU(1)=0.0	BFCNL028
16		DO 1 I=1,100	BFCNL030
17		1 BC(1)=0.0	BFCNL032
18		3 READ(5,4)(ND(1),I=1,3,40)	BFCNL040
19		4 FORMAT(3A12)	BFCNL041
20		10--1	BFCNL043
21		CALL RECDAT	BFCNL045
22		CALL SECND (DT)	BFCNL050
23		CALL SECND (DD)	BFCNL055
24		CALL SECND (DT)	BFCNL060
25		CALL SECND (DP)	BFCNL065
26		DO 9 I=100,131	BFCNL075
27		9 ND(1)=0	BFCNL077
28		10--40(40)	BFCNL080
29	C	SET UP REQUIRED CONDITIONS MAP.	BFCNL083
30		DU TO (7,7,10,10,10,7,20,20,7,7),NC	BFCNL085
31	C	POSITIVE NZ CONDITIONS.	BFCNL090
32		7 IF(ND(20)=10,10,0	BFCNL095
33		0 IF(1NC-0)11,12,0	BFCNL100
34		0 IF(1NC-7)13,11,10	BFCNL105
35		10 IF(1NC-1)14,10,10	BFCNL110
36		11 ND(112)=1	BFCNL115
37		12 ND(110)=1	BFCNL120
38		13 ND(120)=1	BFCNL125
39		IF(1NC-3)37,37,16	BFCNL130
40		14 ND(120)=1	BFCNL135
41		15 ND(130)=1	BFCNL140
42	C	NEGATIVE NZ CONDITIONS.	BFCNL145
43		16 IF(ND(20)=27,27,17	BFCNL150
44		17 IF(1NC-6)20,21,10	BFCNL155
45		10 IF(1NC-7)22,20,10	BFCNL160
46		10 IF(1NC-1)23,24,27	BFCNL165
47		20 ND(113)=1	BFCNL170
48		21 ND(117)=1	BFCNL175
49		22 ND(121)=1	BFCNL176
50		IF(1NC-8)27,27,37	BFCNL178
51		23 ND(120)=1	BFCNL180
52		24 ND(131)=1	BFCNL183
53		00 TO 27	BFCNL184
54	C	RECOVERING FLAP DOWN CONDITION.	BFCNL188
55		25 ND(124)=1	BFCNL190
56		00 TO 90	BFCNL193
57	C	FLAP DOWN IS TRIM CONDITION.	BFCNL195
58		26 ND(125)=1	BFCNL198
59		00 TO 90	BFCNL200
60	C	POSITIVE VERTICAL GUST CONDITIONS.	BFCNL203
61		27 IF(ND(32)=31,31,20	BFCNL205
62		28 IF(1NC-10)20,30,30	BFCNL208
63		29 ND(100)=1	BFCNL210
64		00 TO 31	BFCNL213
65		30 ND(100)=1	BFCNL215
66	C	NEGATIVE VERTICAL GUST CONDITIONS.	BFCNL218
67		31 IF(ND(33)=30,30,32	BFCNL220
68		32 IF(1NC-10)33,34,34	BFCNL223
69		33 ND(110)=1	BFCNL225
70		00 TO 35	BFCNL228

05/04/73	INPUT LISTING	AUTOFLEX CHART SET - BFCNTL	FLEXIBLE AIRLOADS SA PROGRAM
CARD NO	****	CONTENTS	****
71	34 MD1271=1		BFCNT230
72	00 TO 00		BFCNT233
73	C LATERAL GUST CONDITIONS.		BFCNT236
74	35 IF MD1271=100.00,35		BFCNT239
75	35 MD1111=1		BFCNT242
76	00 TO 00		BFCNT245
77	C PITCHING ACCELERATION CONDITIONS.		BFCNT248
78	37 IF MD1271=143.43,30		BFCNT251
79	38 IF MC-2140,41,30		BFCNT254
80	38 IF MC-7140,40,00		BFCNT257
81	40 MD1111=1		BFCNT260
82	41 MD1110=1		BFCNT263
83	42 MD1201=1		BFCNT266
84	C YAWING ACCELERATION CONDITIONS.		BFCNT269
85	43 IF MD1201=100.00,44		BFCNT272
86	44 IF MC-2140,47,40		BFCNT275
87	45 IF MC-7140,46,00		BFCNT278
88	46 MD1110=1		BFCNT281
89	47 MD1110=1		BFCNT284
90	48 MD1231=1		BFCNT287
91	C CONDITION PARAMETERS. REGION 100.		BFCNT290
92	00 MD1111=0.0		BFCNT293
93	00 MD1131=0.0		BFCNT296
94	00 MD1141=MD1101=0		BFCNT299
95	00 MD1101=0.0		BFCNT302
96	00 127 1=1.23		BFCNT305
97	IF MD111001127,127,00		BFCNT310
98	00 00 2 J=1.21		BFCNT312
99	2 MD111=0.0		BFCNT314
100	00 TO 173,73,73,00,00,00,00,00,00,00,00,00,70,70,70,61,04,77,77,71		BFCNT316
101	1,71,70,70,1		BFCNT318
102	C CASE 0 (FLAP DOWN HANGLER) PARAMETERS.		BFCNT320
103	01 MD111=0C111		BFCNT322
104	MD101=0C110		BFCNT324
105	MD1101=1.9*0C1241/001.3		BFCNT326
106	IF MD111102,02,63		BFCNT328
107	02 MD121=0C131		BFCNT330
108	00 TO 00		BFCNT332
109	03 MD121=0C121		BFCNT334
110	00 TO 00		BFCNT336
111	C CASE 0 (FLAPS DOWN 1.00 TRIM) PARAMETERS.		BFCNT340
112	04 MD111=0C111		BFCNT342
113	MD101=0C112		BFCNT344
114	MD101=1.0		BFCNT346
115	MD1101=1.2*0C1301/001.3		BFCNT348
116	05 MD131=0.0		BFCNT350
117	MD141=0.0		BFCNT352
118	MD101=0C144		BFCNT354
119	MD171=0.0		BFCNT356
120	MD101=0.0		BFCNT358
121	MD101=0.0		BFCNT360
122	IF MD1141100,00,07		BFCNT362
123	06 MD1121=1.0		BFCNT364
124	00 TO 112		BFCNT366
125	07 MD1121=2.0		BFCNT368
126	00 TO 112		BFCNT370
127	C FLAPS UP CONDITION ALTITUDE.		BFCNT372
128	08 MD101=0C110		BFCNT374
129	00 TO 00		BFCNT376
130	09 MD101=0C120		BFCNT378
131	00 TO 00		BFCNT380
132	10 MD101=0C121		BFCNT382
133	00 TO 00		BFCNT384
134	11 MD101=0C120		BFCNT386
135	00 TO 00		BFCNT388
136	12 MD101=0C130		BFCNT390
137	00 TO 00		BFCNT392
138	13 IF MC-5100,74,75		BFCNT394
139	14 IF 0C1201-20000.100,70,70		BFCNT396
140	15 IF 0C1211-20000.170,70,70		BFCNT398
141	C 104 GUST AT 20000 FT. WIND FIXED OR VARIABLE AFT.		BFCNT400

05/04/73	INPUT LISTING	AUTOFLOW CHART SET - BFCNTL	FLEXIBLE AIRLOADS SA PROGRAM
CARD NO	****	CONTENTS	****
142	75 00(01)-20000.		BFCNT402
143	00(10)-0C(20)		BFCNT404
144	00 TO 00		BFCNT406
145	77 IF(AC-11171,70,70		BFCNT408
146	70 IF(0C(30)-20000.170,70 70		BFCNT410
147	C M4 BUST AT 20000 FT. WIND VARIABLE FORWARD.		BFCNT412
148	70 00(01)-20000.		BFCNT414
149	00(10)-0C(33)		BFCNT416
150	00 TO 00		BFCNT418
151	00 00 TO 101,02,03,04,05,06,07,112,112,00,00)MC		BFCNT420
152	C FLAPS UP CONDITION PACH NUMBER.		BFCNT402
153	01 00(10)-0C(05)		BFCNT424
154	00 TO 00		BFCNT426
155	02 00(10)-0C(06)		BFCNT428
156	00 TO 00		BFCNT430
157	03 00(10)-0C(27)		BFCNT432
158	00 TO 00		BFCNT434
159	04 00(10)-0C(22)		BFCNT436
160	00 TO 00		BFCNT438
161	05 00(10)-0C(23)		BFCNT440
162	00 TO 00		BFCNT442
163	06 00(10)-0C(24)		BFCNT444
164	00 TO 00		BFCNT446
165	07 00(10)-00		BFCNT448
166	00 TO 00		BFCNT450
167	08 00(10)-0C(31)		BFCNT452
168	00 TO 00		BFCNT454
169	09 00(10)-0C(32)		BFCNT456
170	C FLAPS UP CONDITION M7,00,INERTIA FACTORS, AND MING ID.		BFCNT458
171	00 00(11)-0C(14)		BFCNT460
172	00(1) =0.0		BFCNT462
173	IF(10(14))01,01,03		BFCNT464
174	01 00(12)=1.0		BFCNT466
175	02 00(12)-0C(01)		BFCNT468
176	00(13)-0C(01)		BFCNT470
177	00(14)-0C(10)		BFCNT472
178	00 TO 00		BFCNT474
179	03 IF(AC-10104,30,05		BFCNT476
180	04 00(12)=3.0		BFCNT478
181	00 TO 00		BFCNT480
182	05 00(12)-0C(15)		BFCNT482
183	00(13)-0C(17)		BFCNT484
184	00(14)-0C(10)		BFCNT486
185	00(12)=2.0		BFCNT488
186	05 00(17)=0.0		BFCNT490
187	00(0)=0.0		BFCNT492
188	IF(1-0)100,00,07		BFCNT494
189	07 IF(1-15)0,00,100		BFCNT496
190	0 J=1-0		BFCNT498
191	00 TO 100,100,100,00,00,100,100,00)J		BFCNT499
192	00 00(17)-0C(17)		BFCNT500
193	00 TO 100		BFCNT502
194	00 00(0)-0C(10)		BFCNT504
195	C VERTICAL LOAD FACTOR INET.		BFCNT504
196	100 00 TO 107,107,107,101,105,100,107,101,105,100,107,101,105,100,107		BFCNT506
197	1,112 112,107,107,101,105,101,105)1		BFCNT508
198	101 IF(00(10)-1.0)102,103,103		BFCNT510
199	102 00(0)-0C(13)		BFCNT512
200	00 TO 112		BFCNT514
201	103 00(0)-0C(14)		BFCNT516
202	00 TO 112		BFCNT518
203	105 00(0)-0C(15)		BFCNT520
204	00 TO 112		BFCNT522
205	107 00(0)=1.0		BFCNT524
206	00 TO 112		BFCNT526
207	100 IF(00(10)-1.0)110,112,111		BFCNT528
208	110 00(0)=.5*0C(13)		BFCNT530
209	00 TO 112		BFCNT532
210	111 00(0)=.5*0C(14)		BFCNT534
211	112 00(0)=0*0C(15)+1000+1*10		BFCNT536
212	00(1)=10,0*00(15)+00(12)+00(14)		BFCNT538

06/04/75	INPUT LISTING	AUTOFLEX CHART SET - BFCNTL FLEXIBLE AIRLOADS SA PROGRAM
CARD NO	CONTENTS	CONTENTS
013	00(2)=00(10)	BFCNT000
014	C PACH 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	IF=1	BFCNT014
021	CALL UPM07	BFCNT016
022	IF(ICALS.E0.0) 00 TO 110	BFCNT018
023	00 00 J=1,100	BFCNT020
024	00(14)=J1=07(00+J)	BFCNT022
025	00 00(14)=J1=07(00+J)	BFCNT024
026	00(14)=00(12)	BFCNT026
027	110 CONTINUE	BFCNT028
028	00 TO 110,122,123,110,119,124,125,110,110,124,125,110,110,124,125	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 04L007	BFCNT056
042	CALL 07AD7	BFCNT058
043	IF(IND(4)100,00,40	BFCNT060
044	40 IC=1	BFCNT062
045	IC=1+1000000+IC+100000+1+1000+1	BFCNT064
046	00 01 J=1,100,5	BFCNT066
047	WRITE(14,50(1C,00(J1,00(J+1),00(J+2),00(J+3),00(J+4),10C	BFCNT068
048	00 FORMAT(112,1PSE12.5,10)	BFCNT070
049	IC=IC+5	BFCNT072
050	01 IC=IC+1	BFCNT074
051	00 IF(IND(4)1127,127,52	BFCNT076
052	52 WRITE(6,53)	BFCNT078
053	53 FORMAT(1H1)	BFCNT080
054	IC=1	BFCNT082
055	IC=1+1000000+IC+100000+1+1000+1	BFCNT084
056	00 00 J=1,100,5	BFCNT086
057	WRITE(6,54)IC,00(J1,00(J+1),00(J+2),00(J+3),00(J+4),10C	BFCNT088
058	04 FORMAT(1H 5X112,3X1PSE15.5,3X10)	BFCNT090
059	IC=IC+5	BFCNT092
060	05 IC=IC+1	BFCNT094
061	WRITE(6,55)	BFCNT096
062	127 CONTINUE	BFCNT098
063	00 TO 3	BFCNT100
064	END	BFCNT102
065	SUBROUTINE RECDAT	RECDAB01
066	C REARRANGES BC AND NEW BF DATA TO BFCNTL FORMAT.	RECDAB05
067	C SETS UP E1 AND OJ DATA FOR MFLX INPUT.	RECDAB07
068	COMMON TCON(400)	RECDAB10
069	DIMENSION BC(100),BF(200),NO(200)	RECDAB15
070	EQUIVALENCE (BC(1),TCON(2750)),(BF(1),TCON(400)),(NO(1),TCON(401)RECDAB20	
071	11,11,NO(132)),1J,NO(133)),1IR,NO(107)),1P,NO(1137))	RECDAB25
072	IF(1R)1,1,20	RECDAB27
073	1 CALL DECR0 (BC)	RECDAB30
074	CALL RECD0 (BF)	RECDAB32
075	WRITE(6,53)	RECDAB34
076	WRITE(6,54) (BC(1),1=1,100)	RECDAB36
077	WRITE(6,53)	RECDAB38
078	WRITE(6,54) (BF(1),1=1,100)	RECDAB40
079	00 2 1=11,113	RECDAB43
080	2 BF(1)=BC(1)+95)	RECDAB45
081	00 3 1=107,110	RECDAB48
082	3 BF(1)=BC(1)-7)	RECDAB50
083	00 4 1=170,101	RECDAB54

05/04/73	INPUT LISTING	AUTOFLOW CHART SET - BFCNCL	FLEXIBLE AIRLOADS SA PROGRAM
CARD NO	****	CONTENTS	****
204	J=353-1		REDA003
205	4 BC(1)+BC(1)-3		REDA006
206	BC(100)+BC(157)		REDA070
207	00 5 1=161,171		REDA075
208	5 BC(1)+BC(1)-15		REDA080
209	BC(100)+BC(104)		REDA085
210	00 6 1=150,150		REDA090
211	6 BC(1)+BC(1)-13		REDA095
212	BC(130)+BC(125)		REDA100
213	00 7 1=130,140		REDA105
214	7 BC(1)+BC(1)-25		REDA110
215	00 8 1=120,137		REDA115
216	8 BC(1)+BC(1)-24		REDA120
217	IF(ND(1))0,0,11		REDA125
218	0 00 10 1=07,120		REDA130
219	10 BC(1)+0 0		REDA135
220	00 10 10		REDA140
221	11 00 12 1=100,120		REDA145
222	12 BC(1)+BF(1)-02		REDA150
223	BC(07)+BC(00)		REDA155
224	00 13 1=00,100		REDA160
225	13 BC(1)+BC(1)-21		REDA165
226	00 14 1=02,06		REDA170
227	14 BC(1)+BC(1)-20		REDA175
228	BC(01)+BF(25)		REDA180
229	BC(00)+BC(71)		REDA185
230	BC(00)+BC(70)		REDA190
231	BC(00)+BF(25)		REDA195
232	BC(07)+BC(00)		REDA200
233	15 00 16 1=07,00		REDA205
234	16 BC(1)+BF(1)-02		REDA210
235	00 17 1=50,00		REDA212
236	J=124-1		REDA214
237	17 BC(1)+BC(1)-10		REDA216
238	BC(05)+BC(57)		REDA218
239	BC(57)+BC(47)		REDA220
240	BC(06)+BC(46)		REDA225
241	00 18 1=50,54		REDA230
242	18 BC(1)+BC(1)-01		REDA235
243	BC(49)+BF(4)		REDA240
244	BC(40)+BC(40)		REDA245
245	BC(47)+BC(30)		REDA250
246	BC(46)+BF(3)		REDA255
247	BC(45)+BC(30)		REDA260
248	00 19 1=41,44		REDA265
249	19 BC(1)+BF(1)+06		REDA270
250	00 20 1=34,40		REDA275
251	J=74-1		REDA278
252	20 BC(1)+BC(1)-3		REDA280
253	IF(ND(14))21,21,23		REDA285
254	21 00 22 1=29,33		REDA290
255	22 BC(1)+0 0		REDA295
256	00 20 24		REDA300
257	23 BC(33)+BF(2)		REDA305
258	BC(32)+BF(20)		REDA310
259	BC(31)+BC(20)		REDA315
260	BC(30)+BC(20)		REDA320
261	BC(29)+BC(25)		REDA325
262	24 BC(20)+BF(1)		REDA330
263	00 25 1=25,27		REDA335
264	25 BC(1)+BF(1)+06		REDA340
265	RETURN		REDA345
266	26 IF(1P)20,27,20		REDA355
267	27 BF(117)+BC(40)/COS(BC(00)/57.3)		REDA360
268	BF(174)+BC(06)+0.0/COS(BC(00)/57.3)		REDA365
269	00 20 20		REDA370
270	28 BF(117)+BC(40)/COS(BC(46)/57.3)		REDA375
271	BF(174)+BC(04)+0.0/COS(BC(46)/57.3)		REDA380
272	29 BF(114)+0 0		REDA385
273	BF(110)+.25*BF(117)		REDA390
274	BF(110)+.50*BF(117)		REDA395

05/04/73	INPUT LISTING	AUTOFLEX CHART SET - 07C01L	FLEXIBLE AIRLOADS SA PROGRAM
CARD NO	****	CONTENTS	****
305		07(110)=1.1*07(117)	RETURN00
306		07(137)=CODING(07(117),07(47),07(67),ND(42),.5)	RETURN05
307		07(157)=CODING(07(117),07(47),07(67),ND(42),.5)	RETURN10
308		00 30 1=13,135	RETURN15
309		07(1)=10.4*(137)	RETURN20
310		30 07(1+20)=10.4*07(137)	RETURN25
311		07(175)=07(174)-07(110)/15.0	RETURN30
312		00 31 1=110,135	RETURN35
313		31 07(1)-07(1)-11*07(175)	RETURN40
314		00 32 1=135,135	RETURN45
315		07(1)=CODING(07(1-20),07(47),07(67),ND(42),.5)	RETURN50
316		32 07(1-20)=CODING(07(1-20),07(47),07(67),ND(42),.5)	RETURN55
317		RETURN	RETURN60
318		33 FORMAT(1H)	RETURN65
319		34 FORMAT(1H SKIP(15.5))	RETURN70
370		END	RETURN80
371		SUBROUTINE SECNDIV	
372		DIMENSION V(1),T(5),A(10)	
373		DATA BLANK/0H /	
374		0 READ(5,1)ND,IT(1),N=1,5,(A(1),N=1,10)	
375		1 FORMAT(11,112,113,07(12.0,113,1045)	
376		IF(EOF(5))21,22	
377		21 CALL EXIT	
378		C	
379		22 IF(ND)7,0,7	
380		C	
381		0 WRITE(6,9) (A(1),N=1,10)	
382		9 FORMAT(17H NO DECK LOCATION,5X,1045/)	
383		00 TO 5	
384		C	
385		7 00 2 N=1,5	
386		ND = 2*N - 1	
387		IF(A(ND)) - BLANK(3,1),3	
388		11 IF(A(ND+1)) - BLANK(3,2),3	
389		3 11 = (ABS(ND)) + N - 1	
390		V(11) = T(1)	
391		2 CONTINUE	
392		IF(ND)6,5,5	
393		6 RETURN	
394		END	
395		SUBROUTINE USPF	USPF0001
396		C STAND ALONE FLEXIBILITY SUBROUTINE FOR SHEEP 11.	USPF0002
397		C DERIVES FLEXIBLE WING AND RIGID EXPENDABLE FACTORS AND UNIT AIRLOADS	USPF0003
398		C DISTRIBUTIONS. FLEXIBILITY INCLUDES ANGLE OF ATTACK, REFLECTED	USPF0004
399		C FLAP, AND AEROELASTIC INERTIA EFFECTS.	USPF0005
400		COMMON TCDH(400)	USPF0010
401		DIMENSION ND(200),DT(20),DD(20),07(145),DP(70),BC(105),BD(20),SDUSPF0020	
402		1(20),BD(100),BU(200),DD(340),YAH(1),YB(10),YC(1),CD(1),CDS(13),YBSUSPF0021	
403		2(3),DPA(1),DP(1),AFM(10,3),AFMCP(10,3),AFM(10,3),AFMDF(10,3),FUSPF0022	
404		3(3,4),VE(16),E(120),GJ(20),ECP(1),ULN(1),DMS(13),UTN(1),07(2)USPF0023	
405		400)	USPF0024
406		0 EQUIVALENCE (DT(1),TCDH(100)),(DB(1),TCDH(150)),(DF(1),TCDH(100))USPF0030	
407		1,DP(1),TCDH(110)),(ND(1),TCDH(20)),(BC(1),TCDH(270)),(BD(1),TUSPF0031	
408		2CDH(200)),(DB(1),TCDH(297)),(DD(1),TCDH(200)),(BU(1),TCDH(315))USPF0032	
409		3),(DD(1),TCDH(303)),(DF(1),TCDH(400)),(AFM(1,1),BU(200)),(AFMCPUSPF0033	
410		41,1),BU(250)),(AFM(1,1),BU(200)),(AFMDF(1,1),BU(310)),(F(1,1),BUUSPF0034	
411		SD(1),VE(16),07(114)),(E(1),07(13)),GJ(1),07(19)),TCDH(80)USPF0035	
412		00(1),VT(00(14)),YAH(1),BD(1),YB(1),BD(5),YC(1),BD(21)),ED(1),USPF0036	
413		YBD(25)),(CDS(1),BD(31)),YBS(1),BD(45)),DPA(1),BD(50)),DPF(1),SDUSPF0037	
414		9(70)),(ECP(1),BD(95)),(ULN(1),BD(100)),(DMS(1),BD(117)),(UTN(1),SDUSPF0038	
415		9(130)),ND(43)),ICALCS,ND(105)),INDEX(6J,ND(103)),(IR,ND(107)) USPF0039	
416		0 EQUIVALENCE (NF,ND(100)),(1,ND(132)),(J,ND(133)),(K,ND(134)),(L,NDUSPF0040	
417		1130)),IN,ND(130)),IP,ND(137)),INT,ND(140))	USPF0041
418		00 1 =1,500	USPF0050
419		1 BU(1)=0.0	USPF0055
420		NT=1	USPF0060
421		IF(CDH-1.0)2,0,0	USPF0065
422		2 IF(CDH-.0014,4,3	USPF0070
423		3 00(2)=.05	USPF0075
424		00 TO 5	USPF0080
425		4 00(2)=CDH	USPF0085

DS/DA/75	INPUT LISTING	AUTOFLON CHART SET - 87CHTL	FLEXIBLE AIRLOADS SA PROGRAM
CARD NO	****	CONTENTS	****
426	C SUBSONIC 8/N PARAMETER.		USPF0000
427	6 DS(11)=COSINE(05(2),07(0),07(21),12.,0)		USPF0005
428	00 TO 9		USPF0100
429	6 IF(CM=1.17,0.0		USPF0105
430	7 DS(2)=1.1		USPF0110
431	00 TO 9		USPF0115
432	6 DS(2)=CM		USPF0120
433	9 IF(NT=010,10,10		USPF0125
434	C MIND ANALYSIS.		USPF0130
435	10 DS(3)=COSINE(CM,07(0),07(33),12.,0)		USPF0135
436	DS(4)=DS(40)		USPF0140
437	1P=DS(12)+2.0		USPF0145
438	IF(1P)14,11,14		USPF0150
439	C MIND VARIABLE SHEEP FND.		USPF0155
440	11 DO 12 1=5,13		USPF0160
441	12 DS(11)=DS(11)+0.1		USPF0165
442	DS(14)=DS(14)+0.0		USPF0170
443	DS(16)=DS(16)		USPF0175
444	00 13 1=1,11		USPF0180
445	13 DS(11)=DS(11)+DS(14)		USPF0185
446	00 TO 17		USPF0190
447	C MIND FIXED OR VARIABLE SHEEP AT.		USPF0195
448	14 DO 15 1=5,13		USPF0200
449	15 DS(11)=DS(11)+0.1		USPF0205
450	DS(14)=DS(14)+0.0		USPF0210
451	DS(16)=DS(16)		USPF0215
452	00 15 1=1,11		USPF0220
453	16 DS(11)=DS(11)+DS(14)		USPF0225
454	17 DS(11)=1.0		USPF0230
455	DS(15)=DS(15)/DS(14)		USPF0235
456	DS(17)=DS(17)/DS(14)		USPF0240
457	DS(18)=DS(18)/DS(14)		USPF0245
458	00 TO 25		USPF0250
459	C EXPONENTIAL (1/C) OF CP.		USPF0255
460	18 DS(3)=COSINE(CM,07(0),07(45),12.,0)		USPF0260
461	IF(NT=010,20,20		USPF0265
462	C HORIZONTAL TAIL PARAMETERS.		USPF0270
463	19 DS(4)=DS(137)		USPF0275
464	DS(5)=DS(120)		USPF0280
465	DS(7)=DS(130)		USPF0285
466	DS(8)=DS(131)		USPF0290
467	00 20 1=10,13		USPF0295
468	20 DS(11)=DS(120)+1		USPF0300
469	DS(14)=DS(130)+0.0		USPF0305
470	DS(15)=DS(14)/DS(14)		USPF0310
471	DS(16)=DS(130)		USPF0315
472	00 21 1=1,11		USPF0320
473	21 DS(11)=DS(130)+DS(14)		USPF0325
474	DS(115)=1.0		USPF0330
475	00 TO 25		USPF0335
476	C VERTICAL TAIL PARAMETERS.		USPF0340
477	22 DS(4)=DS(130)		USPF0345
478	DS(5)=DS(130)		USPF0350
479	DS(7)=DS(131)		USPF0355
480	DS(8)=DS(132)		USPF0360
481	00 23 1=10,13		USPF0365
482	23 DS(11)=DS(11)+143		USPF0370
483	DS(14)=DS(137)+12.0		USPF0375
484	DS(15)=DS(14)/DS(14)		USPF0380
485	DS(16)=DS(130)		USPF0385
486	00 24 1=1,11		USPF0390
487	24 DS(11)=DS(130)+DS(14)/DS(14)		USPF0395
488	DS(17)=1.0		USPF0400
489	DS(12)=DS(12)+2.0		USPF0405
490	25 IF(CM=1.0)26,30,30		USPF0410
491	C SUBSONIC AERO DATA.		USPF0415
492	26 DS(10)=ATAN(ATAN(05(0)/07.3)+1.0-05(11)/05(12)+1.0-05(11)/05(12)/05(12)+20		USPF0420
493	1007(1.0-05(2)+21)+07.3		USPF0425
494	DS(20)=DS(11)+05(12)		USPF0430
495	C SUBSONIC CLARK TABLE VALUES.		USPF0435
496	L=0		USPF0440

06/04/73	INPUT LISTING	AUTOFLOW CHART SET - EPCNTL	FLEXIBLE AIRLOADS SA PROGRAM
CARD NO	****	CONTENTS	****
007	DO 27 I=1,4		USPF 0445
008	K=1,4,005		USPF 0450
009	YA(1)=CODIME(05(10),05(20),00(11),00(7),00(K),7,6,.5)		USPF 0455
010	27 L=4,41		USPF 0460
011	WRITE(6,20)05(12),05(10),05(11),05(20)		USPF 0465
012	WRITE(6,20)07(1),1=5,0),YA(1),1=1,4)		USPF 0470
013	IF INT=0)30,32,34		USPF 0475
014	C MIND RIGID CLAS.		USPF 0480
015	30 00(10)=CODIME(05(11),07(5),YA,4,.5)*57.3/05(1)		USPF 0500
016	WRITE(6,31)		USPF 0505
017	GO TO 37		USPF 0515
018	32 I=100		USPF 0520
019	WRITE(6,33)		USPF 0525
010	GO TO 38		USPF 0535
011	34 I=107		USPF 0540
012	WRITE(6,35)		USPF 0545
013	C EXPERIENCE LIFT CURVE SLOPE.		USPF 0555
014	35 00(11)=CODIME(05(11),07(5),YA,4,.5)*57.3/05(1)		USPF 0560
015	C SUPERSONIC (CLC/CLCAV) TABLE VALUES.		USPF 0565
016	37 L=0		USPF 0570
017	DO 38 I=1,10		USPF 0575
018	K=1,4,13		USPF 0580
019	YB(1)=CODIME(05(10),05(20),00(11),00(7),00(K),7,6,.5)		USPF 0585
020	38 L=4,41		USPF 0590
021	GO TO 40		USPF 0595
022	C SUPERSONIC AERO DATA.		USPF 0600
023	39 05(10)=05(12)+SORT(05(2)**2-1,0)		USPF 0605
024	05(20)=SORT(05(2)**2-1,0)/TAN(05(5)/57.3)		USPF 0610
025	C SUPERSONIC (2T/VAR) TABLE VALUES.		USPF 0615
026	L=0		USPF 0620
027	DO 40 I=1,10		USPF 0625
028	K=1,4,14		USPF 0630
029	YB(1)=CODIME(05(20),05(10),07(5),07(1),07(K),5,0,.5)		USPF 0635
030	40 L=4,44		USPF 0640
031	WRITE(6,41)05(12),05(11),05(10),05(20)		USPF 0645
032	WRITE(6,42)07(1),1=5,0)		USPF 0650
033	IF INT=0)43,44,45		USPF 0655
034	43 WRITE(6,31)		USPF 0670
035	GO TO 46		USPF 0675
036	44 WRITE(6,33)		USPF 0680
037	GO TO 46		USPF 0685
038	45 WRITE(6,35)		USPF 0690
039	46 WRITE(6,47)CPM		USPF 0695
040	J=1		USPF 0705
041	K=4		USPF 0710
042	L=1		USPF 0715
043	48 WRITE(6,49)YB(1),1=J,K),DT(1)		USPF 0720
044	J=J+4		USPF 0730
045	K=K+4		USPF 0735
046	L=L+1		USPF 0740
047	IF L=4)40,46,50		USPF 0745
048	C LOADING AT AERO DATA STATIONS.		USPF 0750
049	50 DO 51 I=1,4		USPF 0755
050	L=1-1)4=1		USPF 0760
051	51 YC(1)=CODIME(05(11),07(5),YB(1),4,.5)		USPF 0765
052	YC(5)=0.0		USPF 0770
053	IF INT=0)52,52,54		USPF 0775
054	52 L=5		USPF 0780
055	DO 53 I=1,4		USPF 0785
056	53 ED(1)=07(1)		USPF 0790
057	ED(5)=1.0		USPF 0795
058	GO TO 56		USPF 0800
059	54 L=3		USPF 0805
060	ED(1)=0.0		USPF 0810
061	ED(2)=.042		USPF 0815
062	ED(3)=1.0		USPF 0820
063	55 WRITE(6,56)CPM		USPF 0825
064	WRITE(6,57)ED(1),YC(1),1=1,L)		USPF 0835
065	IF INT=0)58,120,120		USPF 0845
066	C WIND STRIP BOUNDARY STATIONS.		USPF 0850
067	58 E55(1)=1.0		USPF 0855

05/04/73	INPUT LISTING	AUTOFLEX CHART SET - 07CHL	FLEXIBLE AIRLOADS SA PROGRAM
CARD NO	****	CONTENTS	****
060	ESG(ND+1)=SG(10)		USPF0000
060	ESG(ND+2)=0.0		USPF0000
070	SD(44)=SD(43)		USPF0070
071	DO 00 I=2,ND		USPF0070
072	DO ESG(1)=ESG(1)-1-11.0-ESG(ND+1)/SD(44)		USPF0000
073	C STRIP LOADING DUE TO RIGID ALPHA EFFECTS.		USPF0000
074	J=ND+2		USPF0000
075	DO 00 I=1,J		USPF0000
076	DO YSG(1)=CODIME(ESG(1),CD,YC,L,.0)		USPF0000
077	C STRIP NET RIGID UNIT ALPHA EFFECTS LOAD.		USPF0000
078	SD(00)=0.0		USPF0010
079	DO 01 I=0,J		USPF0010
080	SPA(1-1)=0.0+ESG(1-1)-ESG(11)*(YSG(1-1)+YSG(11))		USPF0020
081	01 SD(00)=SD(00)+SPA(1-1)		USPF0020
082	C MODIFY CARRYOVER STRIP LOAD AND NORMALIZE.		USPF0030
083	SD(00)=SD(00)-0.5*SPA(ND+1)		USPF0030
084	SPA(ND+1)=0.5*SPA(ND+1)		USPF0040
085	DO 02 I=0,J		USPF0040
086	02 SPA(1-1)=SPA(1-1)/SD(00)		USPF0040
087	IF(CM=1.0)04,03,03		USPF0000
088	C SUPERSONIC CLAD RIGID.		USPF0000
089	03 SD(10)=SD(12)+SD(00)		USPF0000
090	C MODIFY CLA RIGID.		USPF0070
091	04 SD(10)=SD(10)+SD(00)/SD(00)		USPF0070
092	C FIRST COLUMN IN AFM AND AFMP MATRICES.		USPF0000
093	DO 00 I=1,ND		USPF0000
094	K=ND+1-I		USPF0007
095	AFM(I,1)=SPA(K)		USPF0000
096	00 AFMP(I,1)=SD(3)		USPF0000
097	C RIGID STRIP LOADING DUE TO FLAP DEFLECTION.		USPF1000
098	WRITE(6,00)CM,SD(5)		USPF1000
099	DO 00 I=1,J		USPF1000
100	YSG(1)=CODIME(ESG(1),SG(17),DF(20),DF(10),DF(37),10,11,.0)		USPF1020
101	YB(1)=CODIME(ESG(1),SG(10),DF(26),DF(10),DF(37),10,11,.0)		USPF1030
102	WRITE(6,07)ESG(1),YSG(1),YB(1)		USPF1030
103	C NET RIGID FLAP DEFLECTION INCREMENT.		USPF1040
104	YSG(1)=YSG(1)+YB(1)		USPF1050
105	00 WRITE(6,00)YSG(1)		USPF1050
106	C COMPUTE HSF AND NORMALIZED STRIP LOADS.		USPF1000
107	SU(0)=0.0		USPF1070
108	DO 70 I=2,J		USPF1070
109	0FF(1-1)=0.0+ESG(1-1)-ESG(11)*(YSG(1-1)+YSG(11))		USPF1000
110	70 SU(0)=SU(0)+0FF(1-1)		USPF1000
111	DO 71 I=2,J		USPF1000
112	71 0FF(1-1)=0FF(1-1)/SU(0)		USPF1000
113	C SECOND COLUMN IN AFM AND AFMP MATRICES.		USPF1100
114	SD(00)=CODIME(BC(43),DF(1),DF(0),0,.0)		USPF1100
115	DO 72 I=1,ND		USPF1110
116	K=ND+1-I		USPF1110
117	AFM(I,2)=0FF(K)		USPF1110
118	72 AFMP(I,2)=SD(00)		USPF1120
119	C THIRD COLUMN IN AFM AND AFMP MATRICES.		USPF1120
120	IF(1P)74,73,74		USPF1120
121	73 J=100		USPF1120
122	DO 70 70		USPF1140
123	74 J=00		USPF1140
124	70 SD(0)=0.0		USPF1140
125	DO 100 I=1,ND		USPF1147
126	K=I+J		USPF1140
127	100 SD(0)=SD(0)+BC(K)		USPF1140
128	DO 70 I=1,ND		USPF1150
129	K=I+J		USPF1150
130	70 K=10		USPF1100
131	AFM(I,3)=BC(K)/SD(0)		USPF1100
132	70 AFMP(I,3)=BC(K)		USPF1170
133	C COMPUTE DYNAMIC PRESSURE, PERCENT OF EXPOSED LOAD, AND CALL MFLX.		USPF1170
134	CALL ATWDS(SD(0),SD(02),SD(03),SD(04))		USPF1100
135	SD(17)=0.5*SD(02)*SD(04)**2+SD(10)**2		USPF1102
136	SD(10)=SQRT(200.*SD(17))		USPF1104
137	SD(0)=1.0		USPF1100
138	IF(ND(14))110,110,100		USPF1100

05/04/73	INPUT LISTING	AUTOFLEX CHART SET - 05CNFL	FLEXIBLE AIRLOADS SA PROGRAM
CARD NO	CONTENTS		****
030	100 IF(00112)-BU(495)+1102,110,102		USPF1100
040	110 DO 112 1-1,40		USPF1102
041	IF(07105+1)-BU(495)+11102,112,102		USPF1104
042	112 CONTINUE		USPF1106
043	ICALCS=0		USPF1108
044	DO 10 103		USPF1200
045	103 ICALCS=1		USPF1202
046	103 NDE16J=20		USPF1204
047	NR=1		USPF1206
048	CALL RENDAT		USPF1208
049	CALL MFLX (AFM,AFMCP,AFM,AFMCF,F,VE10J,C1,0J,05(10),05(14),05(14)USPF1210		
050	1,05(5),05(6),05(6),05(6),05(11),05(17),05(18),05(19),05(13),NDE16JUSPF1211		
051	2,ND(43),ICALCS,ND(44),ND(45))		USPF1212
052	C COMPUTE STRIP CP STATIONS AND FLEXIBLE CLA.		USPF1214
053	BD(00)=0.0		USPF1216
054	BD(00)=0.0		USPF1218
055	ECF(0)=1+.5*05(15)		USPF1220
056	DO 77 1-1,40		USPF1222
057	BD(03)=0-1		USPF1224
058	ECF(1)=05(15)+.5*(1.0-05(15))/(BD(44)+BD(03)+(1.0-05(15))/BD(44)		USPF1240
059	BD(00)=BD(00)+AFM(1,1)		USPF1242
060	77 BD(00)=BD(00)+AFM(1,1)		USPF1250
061	BU(1)=BU(1)+(CPAINB+1)*BD(00)/(CPAINB+1+BD(00))		USPF1252
062	C COMPUTE RUNNING NORMAL LOAD.		USPF1260
063	C NT=1 (FLEXIBLE ALPHA EFFECT).		USPF1262
064	C NT=2 (RIGID FLAP EFFECT).		USPF1270
065	C NT=3 (FLAP AEROELASTIC INCREMENT).		USPF1272
066	C NT=4 (INERTIA AEROELASTIC INCREMENT).		USPF1280
067	70 DO 70 (70,01,03,05),NT		USPF1282
068	70 K=1		USPF1284
069	ULN(0)=CPAINB+1/05(15)		USPF1286
070	DO 00 1-1,40		USPF1300
071	J=0-1-1		USPF1302
072	00 ULN(1)=AFM(J,1)*BD(44)/(1.0-05(15))		USPF1304
073	GO TO 00		USPF1310
074	01 K=2		USPF1312
075	ULN(0)=OFF(00)+1/05(15)		USPF1320
076	DO 02 1-1,40		USPF1322
077	J=0-1-1		USPF1324
078	02 ULN(1)=AFM(J,2)*BD(44)/(1.0-05(15))		USPF1330
079	GO TO 00		USPF1332
080	03 DO 04 1-1,40		USPF1340
081	J=0-1-1		USPF1342
082	04 ULN(1)=AFM(J,3)*BD(44)/(1.0-05(15))		USPF1344
083	GO TO 07		USPF1350
084	05 DO 06 1-1,40		USPF1352
085	J=0-1-1		USPF1354
086	05 ULN(1)=AFM(J,4)*BD(44)/(1.0-05(15))		USPF1360
087	07 K=1		USPF1362
088	ULN(0)=1+0.0		USPF1370
089	C COMPUTE SHEET TORSION ARMS AND TORSIONAL LOADING.		USPF1372
090	00 BD(14)=4.0*(1.0-05(11))*SIN(05(7)/57.3)*COS(05(7)/57.3)/05(12)+USPF1380		
091	11.0-05(11))		USPF1382
092	BD(142)=05(16)*(1.0-BD(14))*(1.0-05(16))		USPF1384
093	BD(145)=1.0-BD(14)*(1.0-05(16))-BD(142))		USPF1390
094	DO 00 1-1,40		USPF1392
095	J=0-1-1		USPF1394
096	BD(143)=AFMCP(J,K)*(1.0-BD(14))*(1.0-AFMCP(J,K))		USPF1400
097	BD(144)=(1.0-ECF(1))*(1.0-05(11))*05(10)*COS(05(7)/57.3)/BD(145)		USPF1402
098	0RS(1)=BD(144)+BD(143)-BD(142))		USPF1410
099	00 UTH(1)=ULN(1)*0RS(1)		USPF1420
100	0RS(0)=1+0RS(0)+(ECF(0)-ECF(0))*(05(14)*SIN(05(7)/57.3)		USPF1422
101	UTH(0)=1+ULN(0)*0RS(0)		USPF1430
102	C DETERMINE LOADINGS AT NT ANALYSIS STATIONS.		USPF1432
103	VB(1)=0.0		USPF1440
104	YSS(1)=0.0		USPF1442
105	J=0-1		USPF1444
106	DO 02 1-2,13		USPF1450
107	IF(BU(1+0)-05(15))/01,00,00		USPF1452
108	00 VB(1)=COD(12)(BU(1+0),ECP,ULN,J,.5)		USPF1454
109	YSS(1)=COD(12)(BU(1+0),ECP,UTH,J,.5)		USPF1456

06/04/73	INPUT LISTING	AUTOFLEX CHART SET - BFCNL	FLEXIBLE AIRLOADS SA PROGRAM
CARD NO	****	CONTENTS	****
710	GO TO 02		USPF 1470
711	01 YB(1)=LXNH(1)		USPF 1475
712	YB(1)=LXNH(1)		USPF 1480
713	02 CONTINUE		USPF 1485
714	WRITE(6,93)		USPF 1490
715	GO TO (94,95,96,100),MT		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 KXZ=SD(147).		USPF 1585
727	GO TO (105,107,100,111),MT		USPF 1595
728	105 K=02		USPF 1600
729	GO TO 113		USPF 1610
730	107 K=00		USPF 1625
731	GO TO 113		USPF 1645
732	100 K=200		USPF 1655
733	GO TO 113		USPF 1665
734	111 K=11		USPF 1670
735	113 SD(146)=0.0		USPF 1685
736	GO 114 1=0,13		USPF 1690
737	114 SD(146)=SD(146)+.5*(BU(1+7)-BU(1+0))*(YB(1)-1)+YB(1)		USPF 1695
738	SD(147)=1.0/SD(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	GO 115 1=0,13		USPF 1725
744	M=1E-1		USPF 1730
745	BUIN(1)=BUIN(1)+.5*SD(147)*(BU(1+7)-BU(1+0))*(YB(1)-1)+YB(1)		USPF 1735
746	BUIN(13)=BUIN(13)+.5*SD(147)*(BU(1+7)-BU(1+0))*(BUIN(1)-BUIN(13))/COS(USPF 1740		
747	105(7)/57.3)		USPF 1745
748	115 BUIN(25)=BUIN(25)+.5*SD(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(05(15),BU(10),BUK(1),12,.5)		USPF 1780
755	SD(148)=CODINE(05(15),BU(10),BUK(14),12,.5)		USPF 1785
756	SD(149)=CODINE(05(15),BU(10),BUK(27),12,.5)		USPF 1790
757	BUIN(1)=SD(148)*COS(05(7)/57.3)+SD(149)*SIN(05(7)/57.3)		USPF 1795
758	BUIN(2)=SD(148)*COS(05(7)/57.3)-SD(149)*SIN(05(7)/57.3)		USPF 1800
759	C CHORDWISE CP OF TOTAL LOAD.		USPF 1805
760	BUIN(4)=05(10)*05(10)-(BUK(20)*COS(05(7)/57.3)-BUK(25)*SIN(05(7)/57.3)/		USPF 1810
761	(/57.3)/BUK(12)		USPF 1815
762	C EXPOSED LOAD YCP AND MCP.		USPF 1820
763	BUIN(3)=05(14)*BUIN(1)/BUIN(1)		USPF 1825
764	BUIN(2)=05(10)*05(10)+05(14)*TAN(05(7)/57.3)-BUIN(2)/BUIN(1)		USPF 1830
765	C CHORDWISE CP OF CARRYOVER LOAD.		USPF 1835
766	BUIN(1)=05(10)*05(10)-(BUK(20)*SD(148)*COS(05(7)/57.3)-(BUK(25)*SD(149)		USPF 1840
767	11-SD(148)*05(14)*BUIN(1)/COS(05(7)/57.3)+SIN(05(7)/57.3)/(BUIN(12)-USPF 1845		
768	BUIN(1))		USPF 1850
769	MT=MT+1		USPF 1855
770	IF(NT=170,76,110		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 HBR TAIL STATIONS.		USPF 1885
776	121 K=114		USPF 1890
777	GO TO 123		USPF 1895
778	C VERT TAIL STATIONS.		USPF 1900
779	122 K=1175		USPF 1905
780	123 C96(11)=BUK(1)		USPF 1910

05/04/73	INPUT LISTING	AUTOFLOW CHART SET - B7CNL	FLEXIBLE AIRLOADS SA PROGRAM
CARD NO	****	CONTENTS	****
701	C	EMPNAGE RIGID LOADING.	USPF1010
702		124 YSS(1)=CODING(ESS(1),ED,VC,L,,5)	USPF1020
703		WRITE(6,125)	USPF1025
704		IF INT=6:126,127,127	USPF1035
705		126 WRITE(6,33)	USPF1040
706		GO TO 128	USPF1045
707		127 WRITE(6,35)	USPF1050
708		128 WRITE(6,57)(ESS(1),YSS(1),1=1,13)	USPF1055
709	C	INTEGRATION OF EMPNAGE LOADING.	USPF1060
710		BD(146)=0.0	USPF1065
711		DO 129 I=2,13	USPF1070
712		129 BD(146)=BD(146)+.5*(ESS(1)-ESS(1))*YSS(1)-YSS(1))	USPF1075
713		IF CPM=1:0:133,130,130	USPF1080
714	C	EMPNAGE SUPERSONIC LIFT CURVE SLOPE (CLAM OR CYBV).	USPF1085
715		130 IF INT=6:131,132,132	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	EMPNAGE DX SHEEP CALCULATIONS.	USPF2010
800		133 BD(141)=4.0*(1.0-BD(111))*SIN(BS(7)/57.3)*COS(ES(7)/57.3)/(BS(12)+USPF2015	
801		11.0-BD(111))	USPF2020
802		BD(142)=BS(16)*(1.0-BD(141))*(1.0-BD(16))	USPF2025
803		BD(143)=BS(13)*(1.0-BD(141))*(1.0-BD(13))	USPF2030
804		BD(144)=1.0-BD(141)*(1.0-BD(16)-BD(142))	USPF2035
805		BD(144)=1.0-BD(15)*(1.0-BD(111))*BS(10)*COS(BS(7)/57.3)/BD(141)	USPF2040
806		IF INT=6:134,135,135	USPF2045
807		134 K=114	USPF2050
808		GO TO 1	USPF2055
809		135 K=173	USPF2060
810	C	EMPNAGE DX SHEEP AT BODY INTERFACE.	USPF2065
811		136 BD(150)=BD(144)*(BD(143)-BD(142))	USPF2070
812		DO 139 I=1,13	USPF2075
813		K=K+1	USPF2080
814		IF(BU(K)-BS(15))137,137,138	USPF2085
815	C	EMPNAGE DX SHEEP INBD OF BODY INTERFACE.	USPF2090
816		137 DXS(1)=BD(150)*(BS(15)-BU(K))*BS(14)*SIN(BS(7)/57.3)	USPF2095
817		GO TO 139	USPF2100
818	C	EMPNAGE DX SHEEP OUTDO OF BODY INTERFACE.	USPF2105
819		138 DXS(1)=(BD(143)-BD(142))*(1.0-BU(K))*(1.0-BD(111))*BS(10)*COS(BS(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 EMPNAGE UNIT SPANNISE DISTRIBUTIONS.	USPF2145
825		DO 145 I=2,13	USPF2150
826		IF INT=6:142,143,143	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))/COS(USPF2200	
836		BS(7)/57.3)	USPF2205
837	C	SPANNISE UNIT TORSION.	USPF2210
838		145 BU(J+25)=BU(J+25)-.5*(ESS(1)-ESS(1))*YSS(1)-DXS(1)-YSS(1))*DU(USPF2215	
839		1XS(1))	USPF2220
840	C	EMPNAGE UNIT AIRLOADS AT BODY INTERFACE.	USPF2225
841		IF INT=6:146,147,147	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	HE(0) AND UNIT SHEAR.	USPF2260
848		148 BU(1)=CODING(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)=CODING(BS(15),BU(1+7),BU(K+13),12,,5)	USPF2280

CARD NO	CONTENTS	****
002	BD(140)=COS(PS(10))*BU(17)*BU(18)*12.5)	USPF2295
003	C RESOLVE UNIT SHEET MOMENTS INTO BODY SYSTEM.	USPF2296
004	BU(141)=BD(140)*COS(PS(7)/57.3)+BD(140)*SIN(PS(7)/57.3)	USPF2295
005	BU(142)=BD(140)*COS(PS(7)/57.3)+BD(140)*SIN(PS(7)/57.3)	USPF2300
006	C DETERMINE CENTERS OF PRESSURE.	USPF2305
007	IF(NT=0)149,150,150	USPF2310
008	149 BU(110)=BU(103)*COS(PS(7)/57.3)+BU(103)*SIN(PS(7)/57.3)	USPF2315
009	BU(111)=BD(110)*PS(10)+BU(103)*COS(PS(7)/57.3)+BU(103)*SIN(PS(7)/57.3)	USPF2320
010	1.3)	USPF2325
011	IF(IND(23))151,151,153	USPF2330
012	150 BU(100)=BU(212)*COS(PS(7)/57.3)+BU(220)*SIN(PS(7)/57.3)	USPF2335
013	BU(170)=BD(110)*PS(10)+BU(225)*COS(PS(7)/57.3)+BU(212)*SIN(PS(7)/57.3)	USPF2340
014	1.3)	USPF2345
015	GO TO 156	USPF2350
016	151 IF(IND(24))152,152,153	USPF2355
017	152 IF(IND(27))156,156,153	USPF2360
018	153 IF(NT=0)154,154,155	USPF2365
019	154 NT=6	USPF2370
020	GO TO 9	USPF2375
021	155 NT=7	USPF2380
022	GO TO 9	USPF2385
023	156 IF(IND(23))157,157,160	USPF2390
024	157 IF(IND(25))158,158,160	USPF2395
025	158 IF(IND(26))159,159,160	USPF2400
026	159 IF(IND(27))161,161,171	USPF2405
027	C PRINT WING FACTORS AND UNIT SPANWISE DISTRIBUTIONS.	USPF2410
028	160 DO 167 I=1,4	USPF2415
029	GO TO 161,162,163,164,1	USPF2420
030	161 WRITE(6,173)BD(10),BU(1)	USPF2425
031	J=2	USPF2430
032	K=13	USPF2435
033	GO TO 165	USPF2440
034	162 WRITE(6,174)BD(15),BU(11),BD(10)	USPF2445
035	J=62	USPF2450
036	K=68	USPF2455
037	GO TO 165	USPF2460
038	163 WRITE(6,175)BD(15),BD(10)	USPF2465
039	J=358	USPF2470
040	K=358	USPF2475
041	GO TO 165	USPF2480
042	164 WRITE(6,176)BD(1),BD(2),BD(10)	USPF2485
043	J=484	USPF2490
044	K=482	USPF2495
045	165 L=J+6	USPF2500
046	WRITE(6,177)(BU(I),I=J,L)	USPF2505
047	DO 166 L=9,21	USPF2510
048	M=L+K	USPF2515
049	166 WRITE(6,178)BU(L),BU(M),BU(M+13),BU(M+25)	USPF2520
050	167 CONTINUE	USPF2525
051	IF(NT=100)168,168,161	USPF2530
052	168 IF(IND(23))158,158,160	USPF2535
053	C PRINT HOR TAIL FACTORS AND UNIT SPANWISE DISTRIBUTIONS.	USPF2540
054	169 WRITE(6,179)CMH,(BU(1),I=108,114)	USPF2545
055	DO 170 L=115,127	USPF2550
056	M=L+13	USPF2555
057	170 WRITE(6,178)BU(L),BU(M),BU(M+13),BU(M+25)	USPF2560
058	IF(IND(23))159,159,171	USPF2565
059	C PRINT VERT TAIL FACTORS AND UNIT SPANWISE DISTRIBUTIONS.	USPF2570
060	171 WRITE(6,180)CMV,(BU(1),I=167,173)	USPF2575
061	DO 172 L=174,186	USPF2580
062	M=L+13	USPF2585
063	172 WRITE(6,178)BU(L),BU(M),BU(M+13),BU(M+25)	USPF2590
064	181 *TURN	USPF2600
065	26 FORMATTING VALUES FROM BCLARK TABLES FOR AR=0.4, XNHSB=76.2,USPF2605	
066	1,XNHSR=77.4,XNHSB=76.2	USPF2606
067	29 FORMAT(1M7X)NTR=710.2//11X710.5)	USPF2610
068	31 FORMAT(1M=5X)H(MIND)	USPF2615
069	33 FORMAT(1M=5X)H(MOR TAIL)	USPF2620
070	35 FORMAT(1M=5X)H(MVERT TAIL)	USPF2625
071	41 FORMAT(1M7X)NTR=710.2,XNHSR=77.4,XNHSB=76.2,XNHSB=76.2)	USPF2630
072	42 FORMAT(1M7X)NTR=710.2)	USPF2635

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00-04/73	INPUT LISTING	AUTOFLOW CHART SET - BFCNTL	FLIGHTABLE AIRLOADS SA PROGRAM
CARD NO	****	CONTENT	****
004	70 GO=17204.5		00000310
005	TVB=500.700		00000320
006	TVH=-.00130000		00000330
007	PSABE=.00040000		00000340
008	GO TO 100		00000350
009	GO GO=40003.		00000360
1000	TVB=304.340		00000370
1001	PSABE=.00037000		00000380
1002	GO TO 110		00000390
1003	100 GO=RE 44/10000		00000400
1004	TVH=TVB+TVH*(GO-00)		00000410
1005	VP=-100/(GO+TVH))*ALOG(TVH/TVB)		00000420
1006	PH=PSABE*EXP(VP)		00000430
1007	AM=0.021177*SQRT(TVH)		00000440
1008	ROD=ROD+PH*TVB/(PO+TVH)		00000450
1009	GO TO 120		00000460
1010	110 GO=RE 44/10000		00000470
1011	TVB=TVB		00000480
1012	VP=-00*(GO-00)/(RO+TVH)		00000490
1013	PH=PSABE*EXP(VP)		00000500
1014	AM=0.021177*SQRT(TVH)		00000510
1015	ROD=ROD+PH*TVB/(PO+TVH)		00000520
1016	120 RETURN		
1017	END		
1018	FUNCTION FCODE(X,Y,XI,YI,ZI,M1,M2,MK)		FC000001
1019	C TWO DIMENSION CURVE FIT SUBPROGRAM....FCODE		FC000010
1020	C CALLING SEQUENCE		FC000020
1021	C Z = FCODE(X,Y,XI,YI,ZI,M1,M2,MK)		FC000030
1022	C X = ARGUMENT - 1ST VARIABLE		FC000040
1023	C Y = ARGUMENT - 2ND VARIABLE		FC000050
1024	C XI = ARRAY OF 1ST VARIABLE		FC000060
1025	C YI = ARRAY OF 2ND VARIABLE		FC000070
1026	C ZI = ARRAY OF THE DEPENDENT VARIABLE		FC000080
1027	C M1 = NO. OF POINTS - Y1		FC000090
1028	C M2 = NO. OF POINTS - X1		FC000100
1029	C MK = END INTERVAL INTERPOLATION CONTROL CONSTANT		FC000110
1030	COMMON TCOM(4400)		FC000120
1031	DIMENSION GO(100),NO(200),X(1),Y(1),ZI(1),V(1),YX(1)		FC000130
1032	EQUIVALENCE (NO(1),TCOM(2003)),(NO(1),TCOM(4003)),(Y(1),GO(01)),(YCODE002		FC000140
1033	X(1),GO(05)),(X3,NO(130)),(X4,NO(130)),(I,NO(140)),(K,NO(141)),(L,FC000093		FC000150
1034	NO(142))		FC000160
1035	100 IF(M1-4)110,110,120		FC000170
1036	110 NO = 1		FC000180
1037	M1 = M1		FC000190
1038	GO TO 200		FC000200
1039	120 M1 = 4		FC000210
1040	K = 1		FC000220
1041	125 IF(YI(K)-YI130,150,150		FC000230
1042	130 K = K+1		FC000240
1043	IF(K-M1)125,125,105		FC000250
1044	150 IF(K-3)155,155,100		FC000260
1045	155 M2 = 1		FC000270
1046	GO TO 200		FC000280
1047	100 IF(K-M1)170,105,105		FC000290
1048	105 M2 = M1-3		FC000300
1049	GO TO 200		FC000310
1050	170 M2 = K - 2		FC000320
1051	200 GO 300 I = 1,M1		FC000330
1052	L = (M2-1)*M2 + 1		FC000340
1053	YX(1) = YI(M2)		FC000350
1054	Y(1) = CODE102(X,XI,ZI(L),M2,MK)		FC000360
1055	300 M2 = M2+1		FC000370
1056	FCODE = CODE102(Y,YX,T,M1,MK)		FC000380
1057	RETURN		FC000390
1058	END		FC000400
1059	FUNCTION CODE102(X,XI,YI,M,MK)		CD010010
1060	COMMON TCOM(4400)		CD010015
1061	DIMENSION NO(200),X(1),Y(1)		CD010020
1062	EQUIVALENCE (NO(1),TCOM(4003)),(M1,NO(143)),(I,NO(144)),(J,NO(145)),CD010024		
1063	(1), (K,NO(146)),(L,NO(147)),(M,NO(148))		CD010025
1064	M = X		CD010027

05/04/73	INPUT LISTING	AUTOFLOW CHART SET - BFWHL	FLEXIBLE AIRLOADS SA PROGRAM
CARD NO	****	CONTENTS	****
1000	N1 = N		COO10000
1005	IF (N1-2) 100,110,190		COO10030
1007	100 CODEME = Y1(N1)		COO10035
1008	GO TO 900		COO10040
1009	110 N1 = 2		COO10045
1070	140 CODEME = (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(1) - X1(2)) 100,100,170		COO10065
1074	100 GO 170 J = 1,N1		COO10070
1075	IF (M - X1(J)) 100,200,170		COO10075
1076	170 CONTINUE		COO10080
1077	GO TO 100		COO10085
1078	170 GO 100 J = 1,N1		COO10090
1079	IF (X1(J) - M) 100,200,100		COO10095
1080	100 CONTINUE		COO10100
1081	100 N1 = N		COO10105
1082	GO TO 140		COO10110
1083	100 IF (J - 2) 110,210,250		COO10115
1084	210 J = 3		COO10120
1085	JJ = 1		COO10125
1086	GO TO 205		COO10130
1087	200 CODEME = Y1(J)		COO10135
1088	GO TO 900		COO10140
1089	200 IF (J - N1) 300,305,100		COO10145
1090	200 J = N1-1		COO10150
1091	JJ = 2		COO10155
1092	GO TO 205		COO10160
1093	200 JJ = 3		COO10165
1094	200 IF (N1-3)200,200,295		COO10170
1095	200 J = 3		COO10175
1096	200 K = J-1		COO10180
1097	N = N-1		COO10185
1098	L = J-1		COO10190
1099	X1M = X1(N1)		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 (N1-3)305,305,310		COO10250
1111	305 P2 = P1		COO10255
1112	GO TO 315		COO10260
1113	310 X1L = X1(L)		COO10265
1114	AM = M-X1L		COO10270
1115	C4 = AM*A3/((X1K-X1J)*(X1K-X1L))		COO10275
1116	C5 = A2*AM/((X1J-X1K)*(X1J-X1L))		COO10280
1117	C6 = A3*AM/((X1L-X1K)*(X1L-X1J))		COO10285
1118	S = AL * Y1(J) + (1. - AL) * Y1(K)		COO10290
1119	P2 = C4*Y1(K)+C5*Y1(J)+C6*Y1(L)		COO10295
1120	315 GO TO (320,330,350),JJ		COO10300
1121	320 P2 = P1		COO10305
1122	AL = (M-X1(1))/(X1(2)-X1(1))		COO10310
1123	S = AL*Y1(2) + (1.0-AL)*Y1(1)		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 CODEME = S		COO10365
1134	GO TO 900		COO10370
1135	410 BT = (E1+AL)/(E1+AL+(1.-AL)*E2)		COO10375

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05/04/73	INPUT LISTING	AUTOFLOW CHART SET - BFCNVL FLEXIBLE AIRLOADS SA PROGRAM
CARD NO	****	*****
1207	F1J,1) = F1J,2)-F1J,1)	WFLN020
1208	117 F1J,1) = F1J,2)/F1J,1)	WFLN021
1209	C WRITEOUT LOADS ON STRIPS. (RIGID, RIGID X/C, FLEX, AND DELTA FLEX)	WFLN023
1210	CALL MATRIT (AFM,MS,3,10,1,2,20HIMIZINRIGID LOAD ON STRIPS (ALFLEMS2)	WFLN025
1211	IPMA, DELTA FLAP, AND M21)	WFLN027
1212	CALL MATRIT (AFMCP,MS,3,10,1,2,20HIMIZINRIGID C.P. ON STRIPFLEMS2)	WFLN029
1213	IPS (X/C), RIGID LOADS)	WFLN030
1214	CALL MATRIT (AFM,MS,3,10,1,2,20HIMIZINRIGID FLEXIBLE LOAD ON STRIPFLEMS2)	WFLN032
1215	1)	WFLN033
1216	CALL MATRIT (AFMCP,MS,3,10,1,2,20HIMIZINRIGID DELTA FLEX LOAD ON STRIPFLEMS2)	WFLN035
1217	1IPS)	WFLN036
1218	C WRITEOUT RIGID, FLEX, DELTA FLEX LOADS, AND F/R RATIOS	WFLN038
1219	CALL MATRIT (F,3,4,3,1,1,20HIMIZINRIGID, FLEX, DELTA FLEX LOADFLEMS2)	WFLN040
1220	IS, AND F/R RATIOS)	WFLN042
1221	RETURN	WFLN043
1222	100 WRITE (0,100) MS,NDE10J	WFLN045
1223	100 FORMAT (20H) PROGRAM DIMENSIONS EXCEEDED, / END MS = .113,12H	WFLN047
1224	110J = .113)	WFLN048
1225	CALL EXIT	WFLN049
1226	STOP	WFLN050
1227	END	WFLN051
1228	SUBROUTINE FLNSIC (SICBAR,YE10J,E1,6J,CR,B02,BL05,ANGLE,FBLERT, FSI0010	
1229	1 ANDEA,FSEAD,MLANDA,NOCFMD,NOCAPT,NDE10J,MS, FSI0015	
1230	2 (PRIME) FSI0020	
1231	C THIS SUBROUTINE COMPUTES ELASTIC AXIS GEOM, SIC, DTNEDA, AND SICBAR FSI0040	
1232	DIMENSION XLE(20),BL(20),C(20),SICPS(20),SICBL(20),FSI0060	
1233	1 XBAR(20),YBAR(20) FSI0070	
1234	DIMENSION YL(21),E11(21),6J1(21),YE10J(20),E1120, FSI0080	
1235	1 6J(20),FLANDA(21),DSICB(20,20),DSICT(20,20),FSI0090	
1236	2 SIC(20,20),FLANDA(21) FSI0100	
1237	DIMENSION DTNEDA(10,20),SICBAR(10,20) FSI0110	
1238	COMMON YCOM(400) FSI0115	
1239	C WRITEOUT INPUT DATA, CONTROL CONST, GEOMETRY, AND E1, 6J FSI0123	
1240	IF (PRIME.CO.0) GO TO 30 FSI0125	
1241	WRITE (0,20) MS,NDE10J,CR,B02,BL05,ANGLE,FBLERT,ANDEA,FSEAD,MLANDAFSI0127	
1242	1 ,NOCFMD,NOCAPT FSI0130	
1243	20 FORMAT (1H) 2X,20H DATA FROM SUBROUTINE FLNSIC, / END MS = .113,FSI0130	
1244	1 17H,2H NDE10J = .113, / END CR = .170,2,2H IN., 7H,2H B02 = .170,FSI0130	
1245	20,2H IN., 8H,7H BL05 = .177,2,2H IN., / 12H0 ANGLE = .177,3,2H FSI0131	
1246	3 00., 4H,2H FBLERT = .170,2,2H IN., / 12H0 ANDEA = .177,3,2H DEFSIC(132	
1247	40., 4H,2H FSEAD = .170,2,2H IN., / 13H0 MLANDA = .170,3,10H,2H NOFSIC(133	
1248	50H0 = .170,3,10H,2H NOCAPT = .170,3) FSI0134	
1249	CALL MATRIT (YE10J,NDE10J,1,20,1,2,20HIMIZINRIGID ELASTIC AXIS Y COOFSIC(135	
1250	1RDINATES FOR WIND E1 AND 6J) FSI0136	
1251	CALL MATRIT (E1,NDE10J,1,20,1,2,12HIMIZINRIGID FSI0137	
1252	CALL MATRIT (6J,NDE10J,1,20,1,2,12HIMIZINRIGID FSI0138	
1253	C FORM SIC POINT FUELAKL STATIONS AND BUTT LINE COORDINATES FSI0140	
1254	30 DEL = (B02-BL05)/(MS*2) FSI0170	
1255	ANDEAR = ANGLE/57.3 FSI0180	
1256	SLOPE = TAN(ANDEAR) FSI0190	
1257	DO 40 N = 1,MS FSI0200	
1258	1 = 2*H-1 FSI0210	
1259	BL(IN) = (DEL*1)+BL05 FSI0220	
1260	XLE(IN) = FBLERT+BL(IN)*SLOPE FSI0230	
1261	C(IN) = CR*(1-BL(IN)/B02)*(1-MLANDA) FSI0240	
1262	SICPS(1) = NOCFMD*C(IN)*XLE(IN) FSI0250	
1263	SICPS(1) = NOCAPT*C(IN)*XLE(IN) FSI0260	
1264	SICBL(1) = BL(IN) FSI0270	
1265	40 SICBL(1) = BL(IN) FSI0280	
1266	C CONVERT SIC COORDINATES TO THE SHEET ELASTIC AXIS SYSTEM FSI0310	
1267	1ERROR = 0 FSI0315	
1268	NPTS = 2*MS FSI0320	
1269	ANDEAR = ANDEA/57.3 FSI0330	
1270	CANDEA = COS(ANDEAR) FSI0340	
1271	SANDEA = SIN(ANDEAR) FSI0350	
1272	DO 50 N=1,NPTS FSI0370	
1273	XBAR(IN) = (SICPS(IN)-FSEAD)*CANDEA-SICBL(IN)*SANDEA FSI0380	
1274	YBAR(IN) = (SICPS(IN)-FSEAD)*SANDEA-SICBL(IN)*CANDEA FSI0390	
1275	IF (YBAR(IN).LT.0.) 1ERROR=1 FSI0392	
1276	50 CONTINUE FSI0395	
1277	IF (1ERROR.EQ.1) GO TO 55 FSI0397	

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05/04/78	INPUT LISTING	AUTOFLEX CHART SET - 05001L FLEXIBLE AIRLOADS SA PROGRAM
CARD NO	CONTENTS	****
1349	DO 100 J=1,NPTS	PSIC1029
1350	100 SICBAR(I,K) = SICBAR(I,K)+DTHEDA(I,J)*SIC(I,J,K)	PSIC1030
1351	C WRITEOUT DTHEDA AND SICBAR MATRICES	PSIC1035
1352	IF (IPRIN.EQ.0) GO TO 135	PSIC1035
1353	CALL MATRIT (DTHEDA,M,NPTS,10,1,1,PMHIMINIXI,DTHEDA MATRIX)	PSIC1070
1354	CALL MATRIT (SICBAR,M,NPTS,10,1,1,PMHIMINIXI,SICBAR MATRIX	PSIC1080
1355	(AD/LB))	PSIC1081
1356	100 RETURN	PSIC1100
1357	END	PSIC1120
1358	SUBROUTINE QLSQ(A,K,IL,N,M,ALPHA,E1,E2)	QLS00010
1359	DIMENSION A(25,25),X(25),IL(25)	QLS00015
1360	MM=M+1	QLS00020
1361	LL=1	QLS00025
1362	DO 30 J=1,MM	QLS00030
1363	10 IL(I)=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= SORT((A(I,J,K))**2+(A(I,K))**2)	QLS00065
1370	S=A(I,J,K)/T1	QLS00070
1371	C=A(I,K)/T1	QLS00075
1372	DO 5 L=K,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=M	QLS00135
1384	DO 30 I=1,M	QLS00140
1385	30 X(II)=0.	QLS00145
1386	DO 30 J=1,M	QLS00150
1387	IF (IL(II))30,30,31	QLS00155
1388	31 S=0.	QLS00160
1389	LL=II+1	QLS00165
1390	I=IL(II)	QLS00170
1391	DO 32 K=LL,MM	QLS00175
1392	32 S=S+A(I,K)*X(K)	QLS00180
1393	X(II)=S/A(I,II)	QLS00185
1394	30 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(MN,NR,NC,NMAX,MTYPE,IPRIN,HEAD)	MRIT0010
1403	C MN = MATRIX NAME	MRIT0030
1404	C NR = NUMBER OF ROWS IN MN	MRIT0040
1405	C NC = NUMBER OF COLS IN MN	MRIT0050
1406	C NMAX = MAXIMUM NO. OF ROWS IN MN, DIMENSION IN CALLING PROGRAM	MRIT0060
1407	C MTYPE = 1 (REAL MATRIX), -1 (COMPLEX MATRIX)	MRIT0070
1408	C IPRIN = 1 (PRINT BY ROWS), 2 (PRINT BY COLUMNS)	MRIT0080
1409	C HEAD = FORMAT OF MATRIX HEADING, EXAMPLE: ZENIMIZOKIIMMARS MATRIX)	MRIT0090
1410	DIMENSION MN(1),HEAD(100)	MRIT0110
1411	WRITE(6,HEAD)	MRIT0130
1412	IF (IPRIN -2) 50,10,10	MRIT0150
1413	C PRINT BY COLUMNS	MRIT0160
1414	10 DO 30 J=1,NC	MRIT0170
1415	N = (J-1)*NMAX+1	MRIT0180
1416	LAST = N+NR-1	MRIT0190
1417	30 WRITE(6,105) J,(MN(I),I=N,LAST)	MRIT0200
1418	GO TO 80	MRIT0210
1419	C PRINT BY ROWS	MRIT0220

05/04/73	INPUT LISTING	AUTOFLOW CHART SET - 07CNL	FLEXIBLE AIRLOADS SA PROGRAM
CARD NO	****	CONTENTS	****
1420	00 NC1 = MAXIMUM		NR10230
1421	00 70 11=1, NR		NR10240
1422	70 WRITE(6,110) 11,(APN(1),1=1,NC1,MAX)		NR10250
1423	00 RETURN		NR10270
1424	105 FORMAT(105H12NCOLUPH NO. =1477(1H 1PBE13.5))		NR10290
1425	110 FORMAT(105H12NCOLUPH NO. =1477(1H 1PBE13.5))		NR10300
1426	END		NR10320
1427	SUBROUTINE BALDF		BALDF001
1428	C BASIC LOADS SUBROUTINE FOR SHEEP 11 STAND ALONE PROGRAM.		BALDF002
1429	C COMPUTES COMPONENT TOTAL AIRLOADS AND THE CENTERS OF PRESSURE.		BALDF003
1430	C COMPUTES APPLICABLE INERTIA FACTORS.		BALDF004
1431	COMMON TCOM(1400)		BALDF007
1432	DIMENSION OF(140),BC(105),BB(20),BS(20),BD(100),BU(500),BO(340),MODL(010		BALDF010
1433	(1200),F(13,4)		BALDF011
1434	EQUIVALENCE (OF(1),TCOM(1000)),(BC(1),TCOM(2750)),(BB(1),TCOM(2953)),(BS(1),		BALDF015
1435	TCOM(2973)),(BD(1),TCOM(2983)),(BU(1),TCOM(3153)),(BO(1),		BALDF016
1436	TCOM(3953)),(ND(1),TCOM(4201)),(F(1,1),BU(340)),(IN(1),ND(106)),(IP,		BALDF017
1437	ND(137)),(INT,ND(150)),(1,ND(151)),(J,ND(152)),(K,ND(153))		BALDF018
1438	BS(1)=0.0		BALDF020
1439	C SELECTION OF WING AREA, FUS STA OF LE AT CL, SPAN, AND HOP HEIGHT.		BALDF025
1440	IF(IP(1),1,3		BALDF030
1441	1 BS(1)=BC(95)		BALDF035
1442	BS(2)=BC(90)		BALDF040
1443	BS(3)=BC(85)		BALDF045
1444	00 2 1=109,110		BALDF050
1445	2 BS(1)=BS(11)+BC(1)		BALDF055
1446	00 3 5		BALDF060
1447	3 BS(1)=BC(53)		BALDF065
1448	BS(2)=BC(48)		BALDF070
1449	BS(3)=BC(44)		BALDF075
1450	00 4 1=87,70		BALDF080
1451	4 BS(1)=BS(11)+BC(1)		BALDF085
1452	C INTERPOLATE DF DATA FOR KCF. COMPUTE P2H/P2H1 AND FACTORS A TO F.		BALDF090
1453	5 BS(12)=CODING(BC(43),DF(1),DF(11),S,5)		BALDF095
1454	BS(4)=.043633*BC(30)**2/(BS(1)*BU(1))		BALDF100
1455	BS(5)=1.0+BS(4)		BALDF105
1456	BS(6)=BS(2)-BS(2)-BU(2)+BS(4)*(BB(2)-BC(35)-BC(37)+BC(30)/13.14159)*2		BALDF110
1457	1*BC(30)**2)		BALDF115
1458	BS(7)=BS(2)-BS(2)-BU(62)		BALDF120
1459	BS(8)=BS(2)-BS(2)-BU(358)		BALDF125
1460	BS(9)=BS(2)-BS(2)-BU(404)		BALDF130
1461	BS(10)=BS(2)-BC(131)-BU(111)		BALDF135
1462	C COMPUTE RIGID FLAP, AERO. FLAP, AND AERO. INERTIA TOTAL AIRLOADS.		BALDF140
1463	BS(14)=BS(5)*BS(12)*BU(61)*BS(18)*BS(17)*BS(11)/57.3		BALDF145
1464	BS(15)=BU(60)*BS(14)*(F(2,4)-1.0)		BALDF150
1465	BS(16)=2.0*BS(11)*BS(6)*(F(3,4)-1.0)		BALDF155
1466	C FOR PA COND, COMPUTE OPDM GDOT AND EFFECTIVE LOAD FACTOR IN(5).		BALDF160
1467	IF(IN(5)7.0,7		BALDF165
1468	6 BS(20)=(BS(7)+BS(3)*12.0)/(BU(111)+BC(131)-BS(2))		BALDF170
1469	BS(20)+BS(8)-BS(20)/BS(1)		BALDF175
1470	00 7 8		BALDF180
1471	7 BS(20)=0.0		BALDF185
1472	BS(20)+BS(8)		BALDF190
1473	C COMPUTE FLEX ALPHA, HOR TAIL, AND BODY NOSE TOTAL AIRLOADS.		BALDF195
1474	8 BS(13)=(BS(20)+BS(11)*BS(10)+BS(14)*(BS(7)-BS(10))+BS(15)+BS(8)-BS(16)+		BALDF200
1475	BS(18))+BS(10)*(BS(8)-BS(10))/((BS(8)-BS(5)+BS(10))		BALDF205
1476	BS(17)+BS(20)+BS(20)+BS(11)+BS(13)*BS(9)-BS(14)-BS(15)-BS(16)		BALDF210
1477	BS(3)+BS(4)+BS(13)		BALDF215
1478	BS(9)+BC(35)+BC(37)+BC(30)/13.14159*BC(30)**2)		BALDF220
1479	BS(11)=.5*BS(17)		BALDF225
1480	BS(12)=BC(131)+BU(111)		BALDF230
1481	C COMPUTE WING AND HOR TAIL AIRLOAD FACTORS FOR SPAPF.		BALDF235
1482	BU(450)=BS(13)		BALDF240
1483	BU(451)=BS(14)		BALDF245
1484	BU(452)=BS(15)		BALDF250
1485	BU(453)=BS(16)		BALDF255
1486	BU(454)=BS(17)		BALDF260
1487	C COMPUTE NET PANEL AIRLOADS AND CENTERS OF PRESSURE.		BALDF265
1488	BS(61)=.5*(BS(13)+BU(451)+BS(14)+BU(452)+BS(15)+BU(453)+BS(16)+BU(454)+BS(17)+		BALDF270
1489	1)		BALDF271
1490	BS(71)=.5*(BS(13)+BU(451)+BS(14)+BU(452)+BS(15)+BU(453)+BS(16)+BU(454)+BS(17)+		BALDF275

05/04/73	INPUT LISTING	AUTOFLOW CHART SET - 05CNFL FLEXIBLE AIRLOADS SA PROGRAM
CARD NO	****	*****
1401	1U(300)*05(10)*BU(400)*BU(400)/BO(10)	04LDF200
1402	BO(0)*.5*(05(13)*BU(0)*05(2)*BU(4)*05(14)*BU(00)*05(2)*BU(04)*04LDF205	
1403	105(15)*BU(362)*05(2)*BU(360)*05(10)*BU(400)*05(2)*BU(400)/BO(04LDF200	
1404	20	04LDF201
1405	BO(0)*05(13)*05(14)*05(15)*05(16)*2.0*BO(0)	04LDF205
1406	BO(10)*05(13)*05(2)*BU(2)*05(14)*05(2)*BU(02)*05(15)*05(2)*04LDF300	
1407	1U(300)*05(10)*05(2)*BU(400)*2.0*BO(0)*BO(0)/BO(0)	04LDF305
1408	BO(12)*BU(110)	04LDF310
1409	C DRY DUE TO ASYMMETRIC HOR TAIL LOAD.	04LDF315
1400	BO(14)*05(1.30*BO(11)*BO(12))	04LDF320
1501	BO(17)*05(152)*BU(170)	04LDF322
1502	BO(10)*0.0	04LDF324
1503	BO(20)*0.0	04LDF326
1504	BO(21)*0.0	04LDF328
1505	GO TO (21,0.0,10,10,20),N1	04LDF330
1506	C VERTICAL GUST CALCULATIONS. MU, AND SUBSONIC OR SUPERSONIC NO.	04LDF335
1507	0 05(10)*BO(1)*05(2)/10.1*BO(02)*BU(1)*05(1)*2	04LDF340
1508	IF(BO(10)*1.0)10,11,11	04LDF345
1509	10 05(10)*.00*05(10)/15.3*05(10)	04LDF350
1510	GO TO 12	04LDF355
1511	11 05(10)*05(10)**1.03/10.05*05(10)**1.03	04LDF360
1512	C INCREMENTAL LOADS DUE TO VERT GUST.	04LDF365
1513	12 BO(10)*BO(10)*BO(30)**2/220.37535	04LDF370
1514	BO(152)*.100354*05(10)*BU(0)*BU(1)*05(1)*BO(10)	04LDF375
1515	BO(153)*BO(152)*11.0*BU(0)/BU(0)	04LDF380
1516	BO(154)*.100354*05(10)*BU(00)*BO(125)*BO(10)	04LDF385
1517	C REVERSE SIGN OF LOADS FOR - VERT GUST (N1=3).	04LDF390
1518	IF(N1=3)15,13,15	04LDF395
1519	13 DO 14 1=151,154	04LDF400
1520	14 BO(11)*BO(11)	04LDF405
1521	15 05(13)*05(13)*BO(152)*BO(153)	04LDF407
1522	05(17)*05(17)*BO(154)	04LDF410
1523	C VERTICAL GUST INERTIA FACTORS.	04LDF412
1524	BO(10)*05(0)*05(13)*05(17)/100(11)*05(10)	04LDF414
1525	05(10)*05(10)*BO(10)	04LDF416
1526	BO(3)*BO(3)*BO(151)	04LDF420
1527	BO(20)*BO(3)*BO(12)*BO(0)*05(13)*BO(2)*05(2)*BU(21)*05(17)*05(04LDF425	
1528	1*05(17)*05(10)/112.0*BO(3)	04LDF426
1529	C COMPUTE COMPONENT TOTAL AIRLOADS FOR VERTICAL GUST CONDITIONS.	04LDF430
1530	BO(0)*.5*(BU(0)*05(13)*BU(00)*05(14)*BU(362)*05(15)*BU(400)*05(10)04LDF435	
1531	1)	04LDF436
1532	BO(0)*05(13)*05(14)*05(15)*05(16)*2.0*BO(0)	04LDF440
1533	BO(11)*.5*05(17)	04LDF445
1534	BO(14)*05(1.30*BO(11)*BO(12))	04LDF450
1535	BU(450)*05(13)	04LDF455
1536	BU(453)*05(10)	04LDF460
1537	BU(454)*05(17)	04LDF465
1538	GO TO 22	04LDF470
1539	C LATERAL GUST CALCULATIONS WITH UDE=50 FPS (N1=4).	04LDF475
1540	16 BO(14)*.0043700*BO(10)*BO(30)**2	04LDF480
1541	BO(15)*.100354*BU(167)*BO(156)*BO(10)	04LDF485
1542	IF(ND(15))10,17,10	04LDF490
1543	C DUAL VERT TAIL.	04LDF495
1544	17 BO(10)*BO(15)*2.	04LDF500
1545	18 BO(10)*BU(100)	04LDF505
1546	BO(10)*BO(14)*BO(15)/BO(11)	04LDF510
1547	BO(21)*BO(14)*BO(2)*BO(15)*BO(15)*BO(17)*BO(21)/100(14)*12.1	04LDF515
1548	GO TO 21	04LDF520
1549	C PITCHING ACCELERATION (N1=5).	04LDF525
1550	19 BO(20)*BO(17)	04LDF530
1551	GO TO 21	04LDF535
1552	C YAWING ACCELERATION (N1=6).	04LDF540
1553	20 BO(10)*BO(0)*BO(14)*12.1/BO(17)*BO(21)	04LDF545
1554	BO(10)*BU(100)	04LDF550
1555	BO(10)*BO(10)/BO(11)	04LDF555
1556	BO(21)*BO(0)	04LDF560
1557	21 BO(10)*BO(0)	04LDF565
1558	22 IF(ND(23))23,23,24	04LDF570
1559	23 IF(ND(24))25,25,24	04LDF575
1560	24 WRITE(0,26)BO(2),BO(10),BO(0),BO(0)	04LDF580
1561	WRITE(0,27)BO(1),1,3,5)	04LDF585

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05/04/73	INPUT LISTING	AUTOFLEX CHART SET - 07CNFL	FLEXIBLE AIRLOADS SA PROGRAM
CARD NO	CONTENTS		
1033	GO TO 20		SPAF105
1034	C 10-4 AERODELASTIC INERTIA EFFECTS.		SPAF200
1035	0 10-4		SPAF205
1036	BD(195)=.5*BU(453)		SPAF210
1037	I=00		SPAF215
1038	K=11		SPAF220
1039	GO TO 20		SPAF225
1040	10 IF(ND(23))11,11,12		SPAF230
1041	11 I=ND(20)114,14,12		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(170)=BC(137)		SPAF250
1046	BD(195)=.5*BU(404)		SPAF255
1047	BD(195)=.5*BC(130)		SPAF260
1048	BD(197)=BC(130)		SPAF265
1049	I=0		SPAF270
1050	DO 13 K=1,12		SPAF275
1051	L=1+K*70		SPAF280
1052	BD(L)=BD(195)*BU(K+114)/COS(BD(197)/57.3)		SPAF285
1053	13 I=1+3		SPAF290
1054	I=112		SPAF295
1055	J=77		SPAF300
1056	K=100		SPAF305
1057	GO 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(180)=BD(15)+BD(14)		SPAF327
1062	BD(170)=BC(190)		SPAF330
1063	IF(ND(15))17,10,19		SPAF335
1064	C SINGLE VERTICAL TAIL. CONSIDER INTRA-SPAN HOR TAIL PLANE.		SPAF340
1065	17 10-7		SPAF345
1066	GO 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	GO 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(197)		SPAF390
1075	BD(197)=BC(195)		SPAF395
1076	I=0		SPAF400
1077	DO 22 K=1,12		SPAF405
1078	L=1+K*132		SPAF410
1079	BD(L)=BD(195)*BU(K+173)/COS(BD(197)/57.3)		SPAF415
1080	22 I=1+3		SPAF420
1081	I=171		SPAF425
1082	J=130		SPAF430
1083	K=107		SPAF435
1084	IF(10-7)29,23,25		SPAF440
1085	C SINGLE VERT TAIL. CHECK IF HOR TAIL PLANE AT/OUTED OF TOP OF BODY.		SPAF445
1086	23 IF(BC(190)-BC(190)120,24,24		SPAF450
1087	C SHEET STATION OF HOR TAIL PLANE.		SPAF455
1088	24 BD(190)=BC(190)/COS(BD(197)/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	DO 26 L=170,170,4		SPAF480
1093	IF(10-7)29,26,27		SPAF485
1094	C SINGLE VERT TAIL. CHECK IF HOR TAIL PLANE AT/OUTED OF STAIL-2).		SPAF490
1095	26 IF(BD(190)-BD(L)-2)120,27,27		SPAF495
1096	C INCLUDE EFFECT. ALWAYS FOR T TAIL.		SPAF500
1097	27 BD(L)=BD(14)*COS(BD(197)/57.3)		SPAF505
1098	BD(L+1)=BD(14)*SIN(BD(197)/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(J+1)=BD(J+1)+BD(195)*BU(1+1)		SPAF530
1703	BD(J+2)=BD(J+2)+BD(195)*BU(1+2)		SPAF535

05/04/73	INPUT LISTING	AUTOFLEX CHART SET - 070001 FLEXIBLE AIRLOADS SA PROGRAM
CARD NO	CONTENTS	
1704	C SPANNING NET AIRLOAD DISTRIBUTIONS.	SPAF040
1705	00 30 1-2,40,4	SPAF040
1706	00 40 1-2	SPAF040
1707	00 10 1-2 00 10 1-2 00 10 1-2 00 10 1-2	SPAF040
1708	00 10 1-2 00 10 1-2 00 10 1-2 00 10 1-2	SPAF040
1709	00 10 1-2 00 10 1-2 00 10 1-2 00 10 1-2	SPAF040
1710	30 00 1-2	SPAF040
1711	00 30 17,0,0,10,14,31,31,10	SPAF040
1712	31 00 17,0,0,10,14,31,31,10	SPAF040
1713	32 00 17,0,0,10,14,31,31,10	SPAF040
1714	33 00 17,0,0,10,14,31,31,10	SPAF040
1715	00 17,0,0,10,14,31,31,10	SPAF040
1716	00 17,0,0,10,14,31,31,10	SPAF040
1717	30 00 17,0,0,10,14,31,31,10	SPAF040
1718	31 00 17,0,0,10,14,31,31,10	SPAF040
1719	32 00 17,0,0,10,14,31,31,10	SPAF040
1720	00 17,0,0,10,14,31,31,10	SPAF040
1721	00 17,0,0,10,14,31,31,10	SPAF040
1722	30 00 17,0,0,10,14,31,31,10	SPAF040
1723	31 00 17,0,0,10,14,31,31,10	SPAF040
1724	00 17,0,0,10,14,31,31,10	SPAF040
1725	00 17,0,0,10,14,31,31,10	SPAF040
1726	00 17,0,0,10,14,31,31,10	SPAF040
1727	41 00 17,0,0,10,14,31,31,10	SPAF040
1728	RETURN	SPAF040
1729	42 00 17,0,0,10,14,31,31,10	SPAF040
1730	1,00 17,0,0,10,14,31,31,10	SPAF040
1731	43 00 17,0,0,10,14,31,31,10	SPAF040
1732	1,00 17,0,0,10,14,31,31,10	SPAF040
1733	00 17,0,0,10,14,31,31,10	SPAF040
1734	00 17,0,0,10,14,31,31,10	SPAF040
1735	44 00 17,0,0,10,14,31,31,10	SPAF040
1736	45 00 17,0,0,10,14,31,31,10	SPAF040
1737	00 17,0,0,10,14,31,31,10	SPAF040
1738	46 00 17,0,0,10,14,31,31,10	SPAF040
1739	00 17,0,0,10,14,31,31,10	SPAF040
1740	47 00 17,0,0,10,14,31,31,10	SPAF040
1741	END	SPAF040