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THE DYNAMIC BEHAVIOR OF ROTOR ENTRY VEHICLE CONFIGURATIONS

II. DIGITAL COMPUTER PROGRAM MANUAL

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For

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

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INTRODUCTION

This part of the document describes the digital computer program developed to evaluate the aerodynamic and performance characteristics and dynamic behavior of a rotor in autorotative flight operating in proximity of a re-entry capsule. The theory underlying the program formulation is presented in Reference 1.

The program has been subdivided into several distinct parts. The first phase allows calculation of rotor blade linear dynamic response in the flapping, feathering and lagging modes. The second part of the program permits determination of rotor blade airloads including nonlinear effects. The equations of motion describing the articulated rotor blades retained all nonlinear inertial terms and incorporated nonlinear aerodynamics to account for stall, compressibility and reversed flow effects. Provisions were also included to consider the effects on the rotor of the detached bow shock wave generated by the capsule. The final portion of the program features the dynamic stability of the re-entry vehicle. The nonlinear time history of the capsule rotor configuration features rotor force and moment contributions which are a function of the independent variable time.

DESCRIPTION

The digital computer program described in this section has been developed to study the dynamic behavior and evaluate the aerodynamics and performance characteristics of a rotor in autorotative flight while operating in proximity of a re-entry capsule.

The program is coded in FORTRAN IV (IBSYS Version 12) for the IBM 7040/7094 direct-coupled computing system at Ames Research Center. The program can also be executed on an IBM Model 360/40 digital computer system. Because the program exceeds the capacity of a single core load, the Loader Overlay capability is used. This feature permits the complete program to be subdivided into several smaller sections. These sections or links are executed in a manner which can be user controlled.

The complete program consists of seven sections. The main or calling program; the input data program; the program which calculates blade inertia properties, the coefficients of the linear differential equations of blade motion and the blade response matrices; the program which determines the linear time histories of blade flapping, feathering and lagging motion; the program which generates the nonlinear blade airloads; the program which achieves rotor blade autorotative equilibrium; and finally the program which evaluates the re-entry vehicle dynamic response.

The program initialization and execution is controlled by the subroutine REV01, a control program located in LINK 0 under the overlay structure. The control parameters that determine which program sections are necessary to process the particular condition are user supplied and are read by subroutine REV01. The program is presently limited to single case processing, but can be easily modified to include multiple case operation.

Detailed flow charts for the seven main programs (REV01 through REV07) are presented in Figures 3 through 9, respectively. Program listings of the source decks are included in Appendix A, input listings are in Appendix B, and a typical output listing is in Appendix C.

DATA INPUT SECTION

This part of the program designated REV02 supplies the data necessary for program operation. Included in this section is the NASA library subroutine AT62 which is coded in FORTRAN IV to approximate the U. S. Standard Atmosphere, 1962. The subroutine computes density, pressure, temperature and velocity of sound at any geometric altitude in the range -16,500 ft to 2,320,000 ft. If a wind tunnel condition is to be processed, the NASA library subroutine AT62 can be removed and the actual wind tunnel density, temperature and velocity of sound substituted in a modified AT62 subroutine. The input program also features the user controlled option of supplying an inflow distribution as a function of radius and azimuth station. One further user option regards the incorporation of nonlinear aerodynamic section data. This option allows the two-dimensional aerodynamic data to be read from cards or to be generated analytically in a subsequent subroutine AERDAT appearing in REV05. The remaining geometric, inertial and linear aerodynamic data necessary for processing a particular flight condition is described in the data input listing.

RESPONSE MATRIX SECTION

This phase of the program generates the inertial and aerodynamic components which form the coefficients of the linear differential equations describing the blade flapping, feathering and lagging motion under both steady and maneuvering flight conditions. The data required to establish the blade inertial and aerodynamic parameters are read from tape written in section REV02. The basic method is generally applicable to sets of differential equations which have coefficients which are arbitrary functions of time, in this instance, the independent variable. Except for the assumptions of linear aerodynamic force and moment coefficients and small induced angles, actual Mach number effects and reversed flow effects are treated exactly.

The application of an integrating matrix operator to the differential equations of flapping, feathering and lagging motion written in matrix form yields the response matrices of the system which depend only on the coefficients of the variables. The response matrices of the system are completely independent of the applied forcing function. These matrices are stored on tape and are employed in REV05 for calculation of the complete nonlinear response of the system.

LINEAR TIME HISTORIES

This portion of the program establishes the matrices which multiply the system initial conditions. The response matrices coupled with these initial condition matrices may be considered a numerical simulation of the system described by the equations of motion. System response to any forcing and initial condition may be obtained by simple matrix multiplication. These initial condition matrices are rectangular, having six columns, one for each initial value of flapping, feathering and lagging displacements and velocities. The matrix is composed of a maximum of twenty-five rows, one for each station considered from 0 to 360 degrees inclusive. The initial condition matrices represent the time history of the response of the system to initial displacements or velocities in the flapping, lagging, or feathering degrees of freedom when the forcing function is zero.

This phase of the program features an option for calculating only the linear time histories; subsequent nonlinear airloads without the linear time histories; or both time history and nonlinear airloads. Also, incorporated in this portion of the program is the determination of the maximum absolute displacement and velocity for the three degrees of freedom, for each cycle of time history response. The accompanying azimuth station at which the maximum response occurs is also indicated. All the matrix operations involve diagonal, rectangular or triangular matrices.

NONLINEAR AIRLOADS

This section of the program determines the nonlinear rotor blade airloads. An iterative procedure is established to achieve rotor blade equilibrium in the three degrees of freedom considered. Equilibrium is established when the values of flapping, feathering and lag angles are within a specified tolerance for two successive iterations. The aforementioned tolerance is user supplied on input.

The data necessary for processing this phase of the program is supplied on tape from REV02 and REV04. The fixed geometrical and inertial data are transmitted from parts REV02 and REV04. The matrices necessary to evaluate the initial condition matrix in the periodic solution are also obtained from REV04.

This phase of the program features all nonlinear aerodynamic effects including stall, reversed flow and compressibility effects. These effects are reflected in the program by employing two-dimensional aerodynamic data which is transmitted from REV02.

One added option is the ability to use analytically derived aerodynamic data as a substitute for the two-dimensional data. Subroutine AERDAT which is user supplied and controlled by NAERO allows calculation of the aerodynamic data. Finally, the program generates a tape input to REV06 including elemental airloads for integration into total rotor forces and moments.

TORQUE EQUILIBRIUM

This portion of the program establishes the procedure to achieve rotor torque equilibrium. Once rotor autorotation has been effected the program then determines the rotor disk shock wave intersection and associated flow conditions. Subroutines INFLOW and INTRSC are employed for these calculations. Data is then stored on tape, including the inflow ratio, advance ratio and density ratio distributions which were generated in the aforementioned subroutines. This information is supplied to REV03 and REV05.

If the zero torque condition has not been achieved, iteration is established between sections REV05 and REV06 with blade collective pitch angle as the independent variable. Torque iteration is initiated with a simplified relationship using linearized rotor theory (Reference 2), expressing rotor torque as a function of blade collective pitch angle. A first order interpolation is employed to estimate the third value of blade pitch angle based on the previous two values of torque and their respective blade pitch values. For all subsequent iterations, a second order function is used relating torque and blade collective pitch. The three most recent values of torque and associated blade angles are retained to evaluate the succeeding trial value for blade pitch angle. Once torque equilibrium has been effected and the rotor disk shock wave intersection determined, the program proceeds in normal fashion to REV03, and following sections to again establish rotor torque equilibrium.

When zero torque is obtained the second time, the blade pitch angle remains constant for future entry into the rotor airloads program. Subroutine OUT2 is then employed to print the rotor blade distributions of angle of attack, out-of-plane airloads, in-plane airloads and moments about the blade feathering axis. Subroutine OUT2 then calls, at user option, subroutines HRANAL, HRAlAR, and INTANG. These routines calculate the harmonic components of blade airloading, the harmonic components of blade flapping and feathering response and integer angle of attack variation as a function of radial and azimuth station respectively.

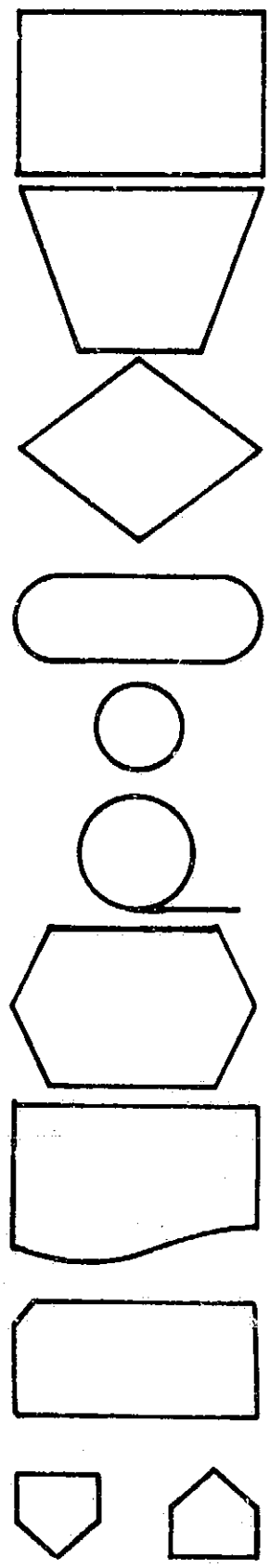
Subroutine FOROUT prints the total rotor forces and moments. The rotor force and moment data and rotor operating condition are transmitted on tape for processing of REV07.

VEHICLE STABILITY

This phase of the program, designated REV07, is comprised of several subroutines. The function of REV07 is, basically, to read the vehicle geometric and inertial data transmitted from REV02 and the rotor force and moment data transmitted from REV06 and call the necessary subroutines for program execution.

The first order differential equations of motion simulating the vehicle dynamic stability are integrated in subroutine ADAMS, which was supplied to the contractor by NASA Ames. The first derivatives of the equations of vehicle motion are computed in subroutine DERIV. These derivatives, which are the right-hand sides of the vehicle equations of motion, include all rotor forces and moments resolved into the body axes system as well as the body forces and moments. Subroutine CHECK investigates convergence of the integration process as reflected in the rotor shaft angle of attack, advance ratio, inflow ratio and rotational speed. If these parameters are not within a prescribed input supplied tolerance for two successive time increments, the program returns to the airloads phase via REV03. The return to REV03 is accomplished with new distributions of inflow ratio and advance ratio calculated in REV07. Further data transmitted are pitch and roll rates resolved about the rotor axes system, rotor angular speed, and rotor shaft angle of attack. This iteration procedure is followed until the actual time upper bound, which is also supplied on input is exceeded.

At the initial time, the vehicle is placed in trim by eliminating the moment contribution in the pitch, roll and yaw acceleration equations.



Process Program Instructions

Process Input/Output Data

Decision and Branch

Program Terminal

Connector

Magnetic Tape

Predefined Programs

Printout Documentation

Punched Cards

Offpage Connectors

Figure 1 - Symbols Used In Flow Charts

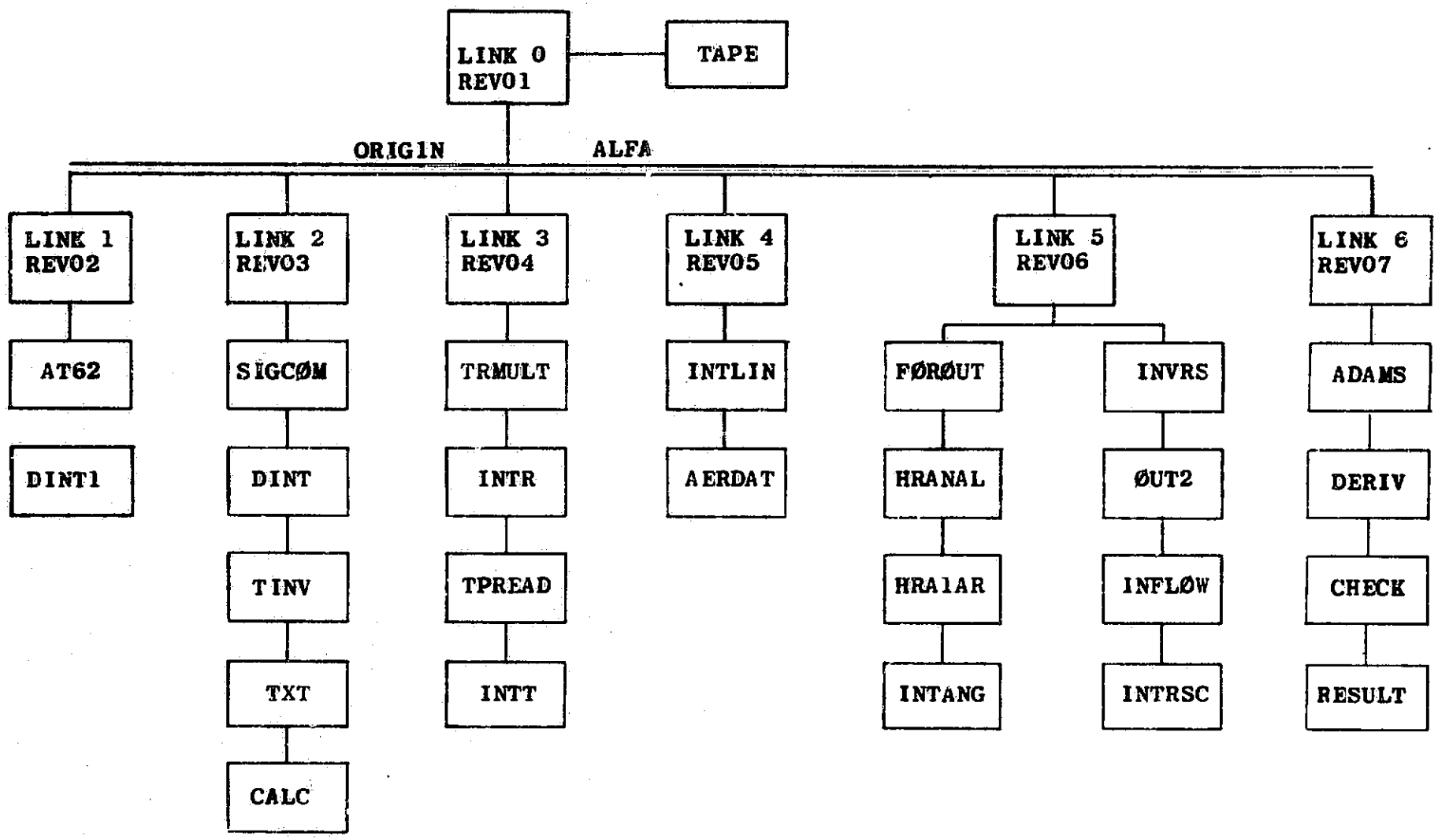


Figure 2. Overlay Diagram For REV Program

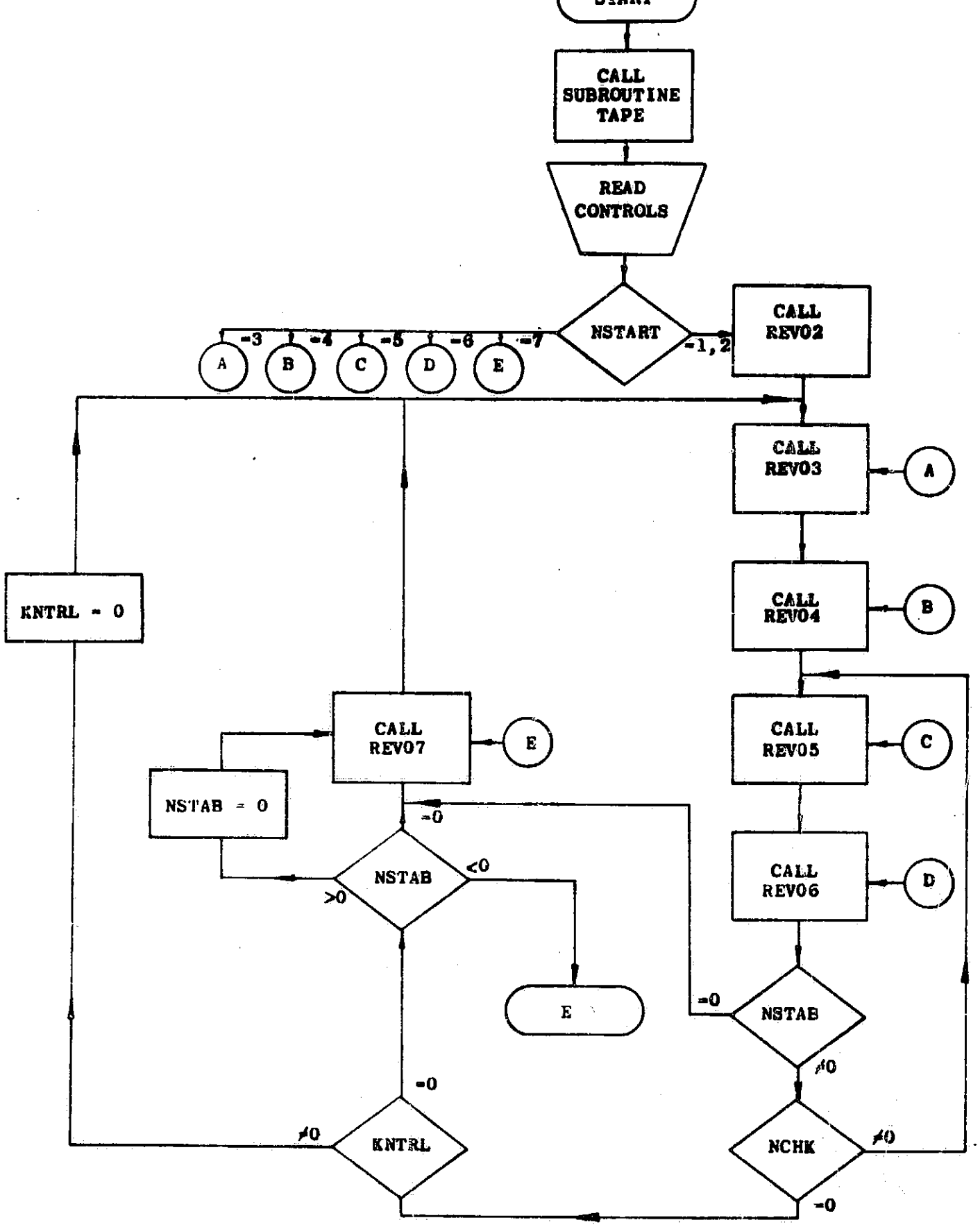


Figure 3. Flow Diagram For REV Main Program

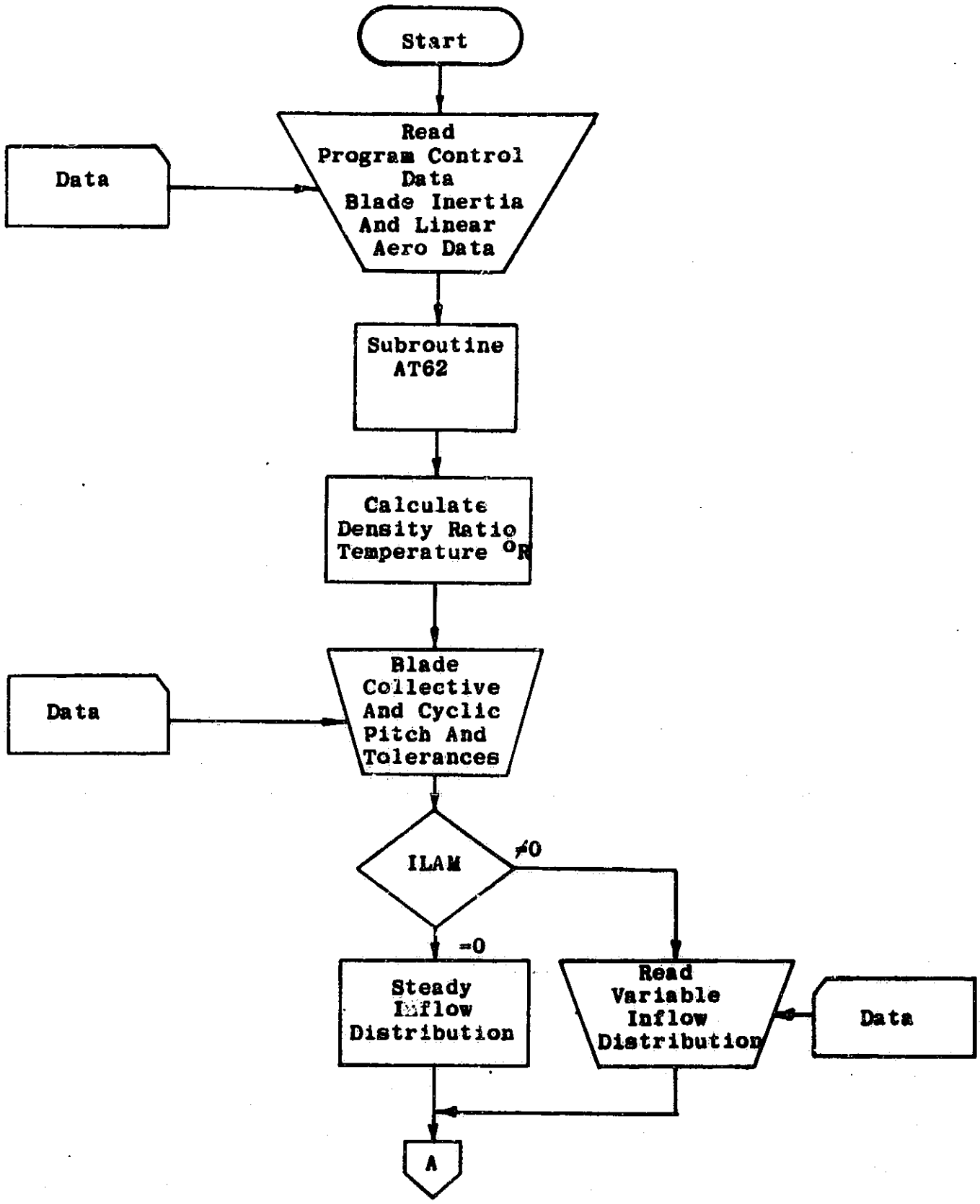


Figure 4. Flow Diagram For REV02 Program

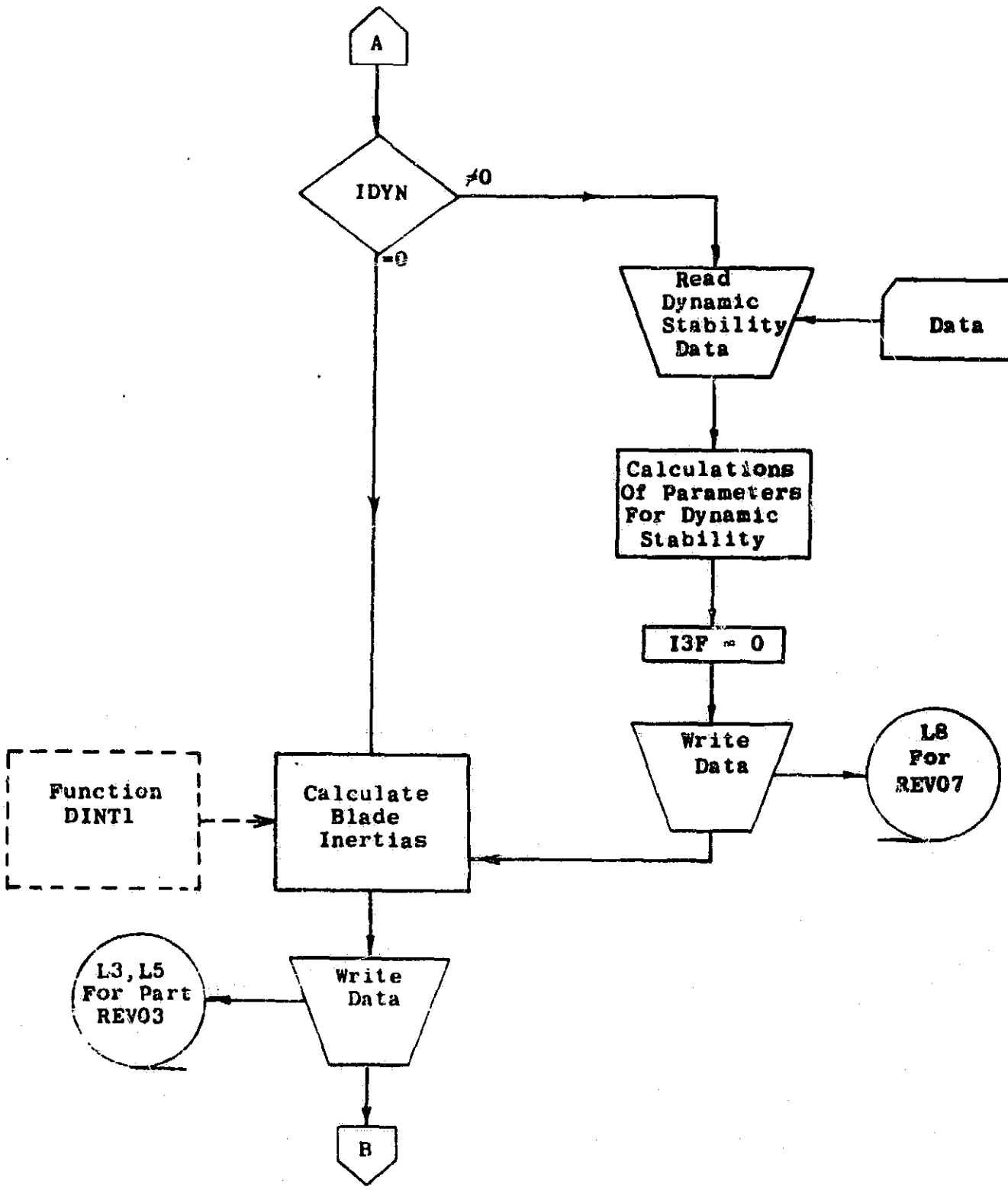
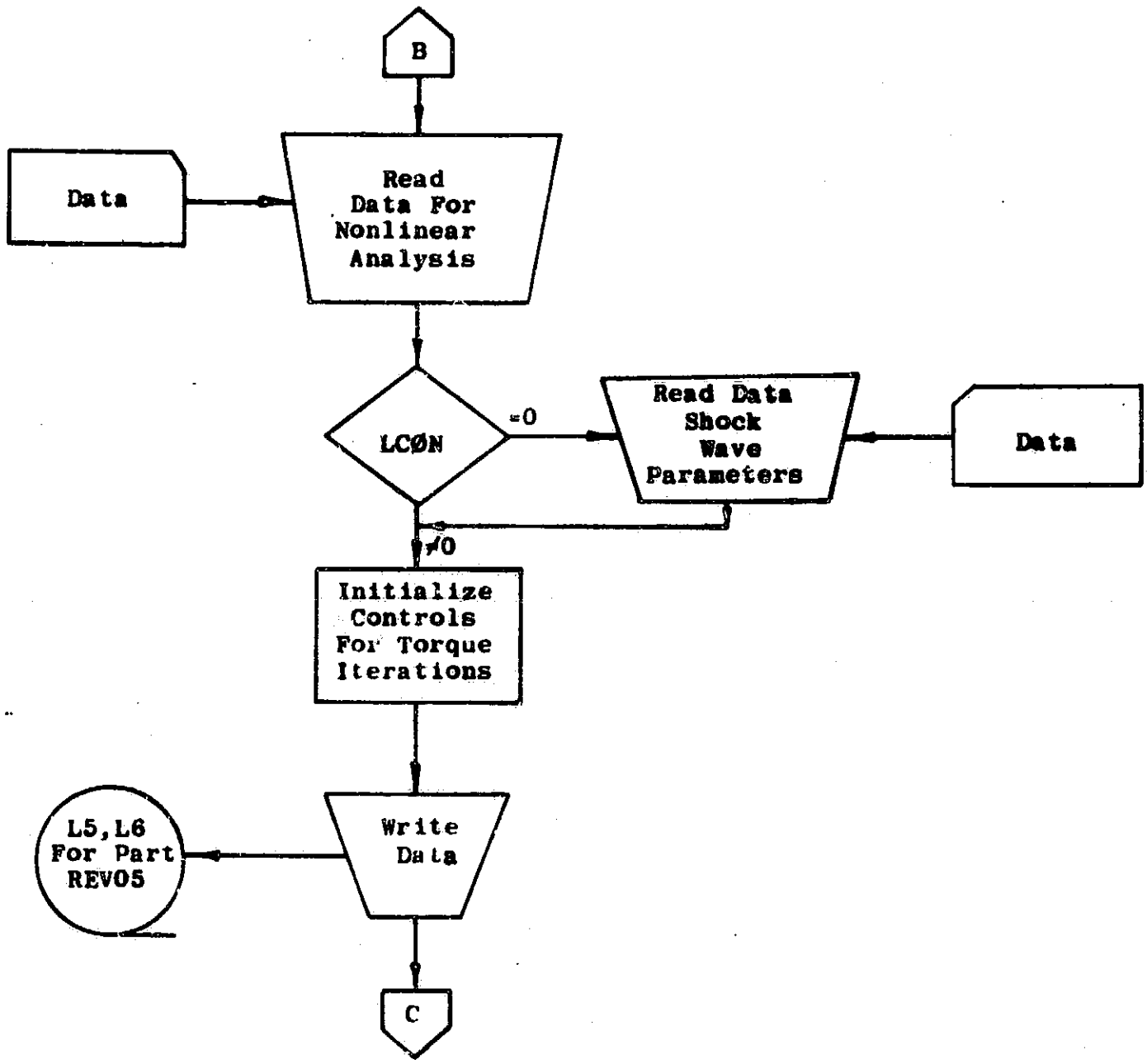


Figure 4 (Continued)



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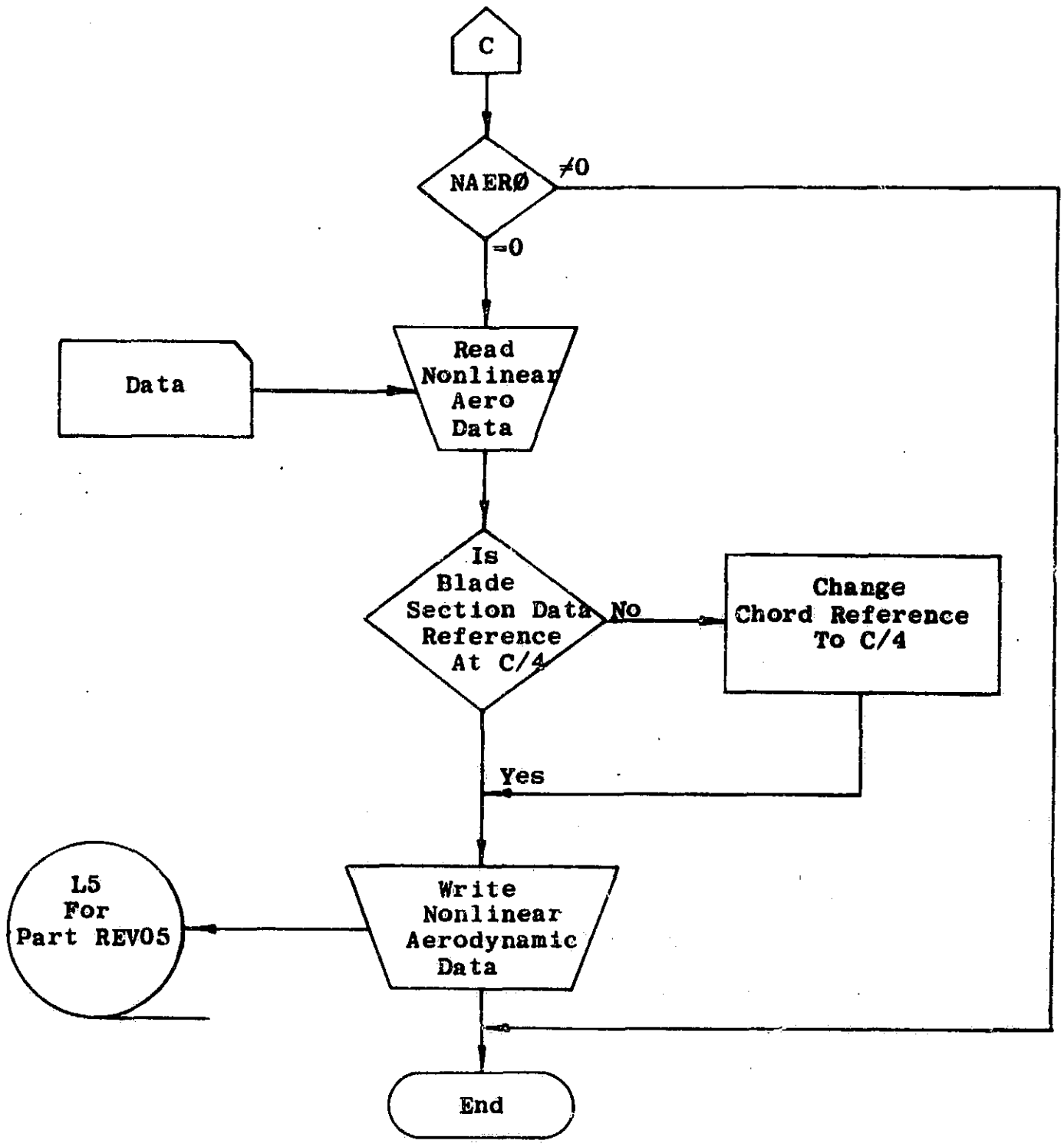


Figure 4 (Concluded)

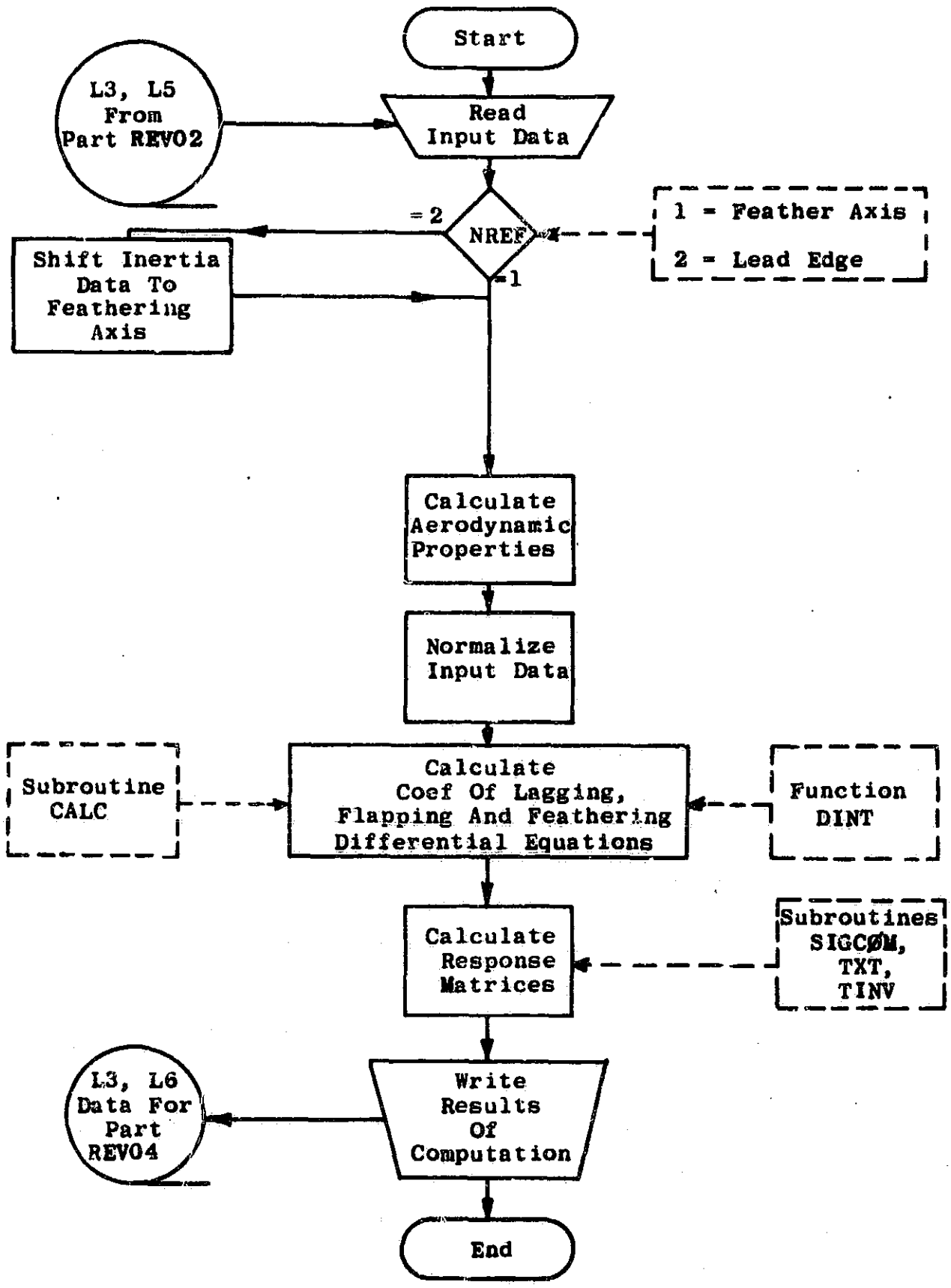


Figure 5. Flow Diagram For REV03 Program

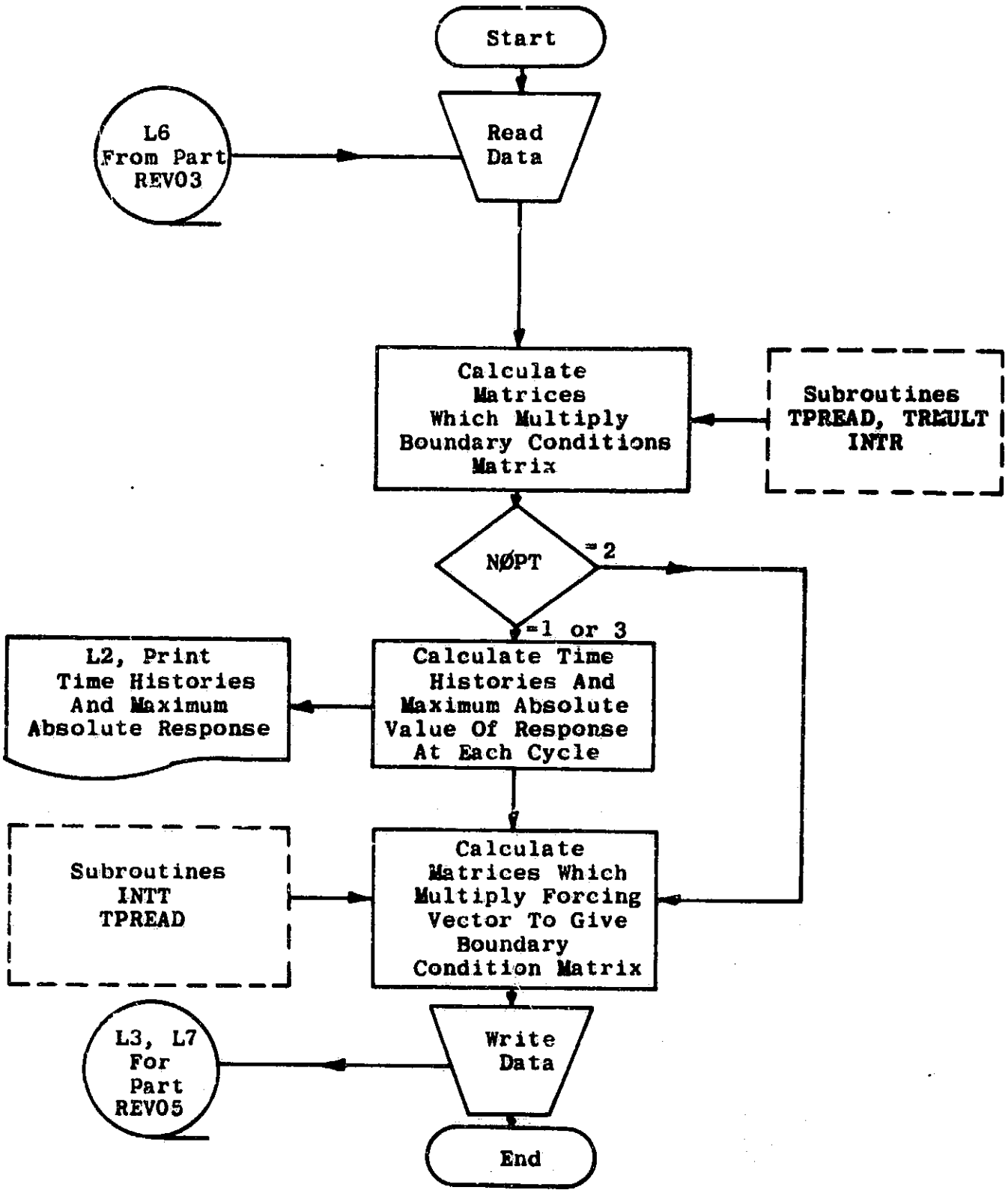


Figure 6. Flow Diagram For REV04 Program

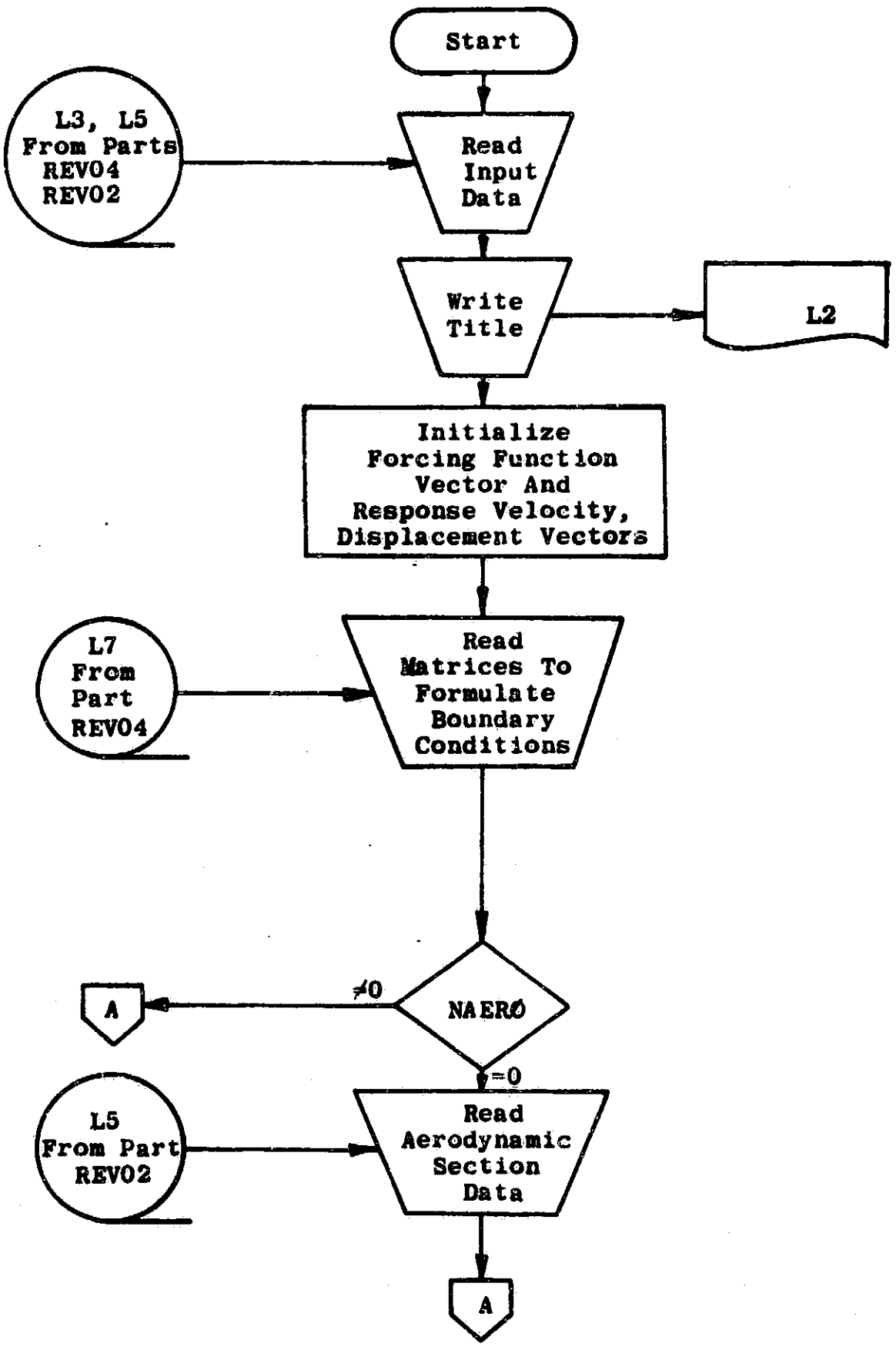
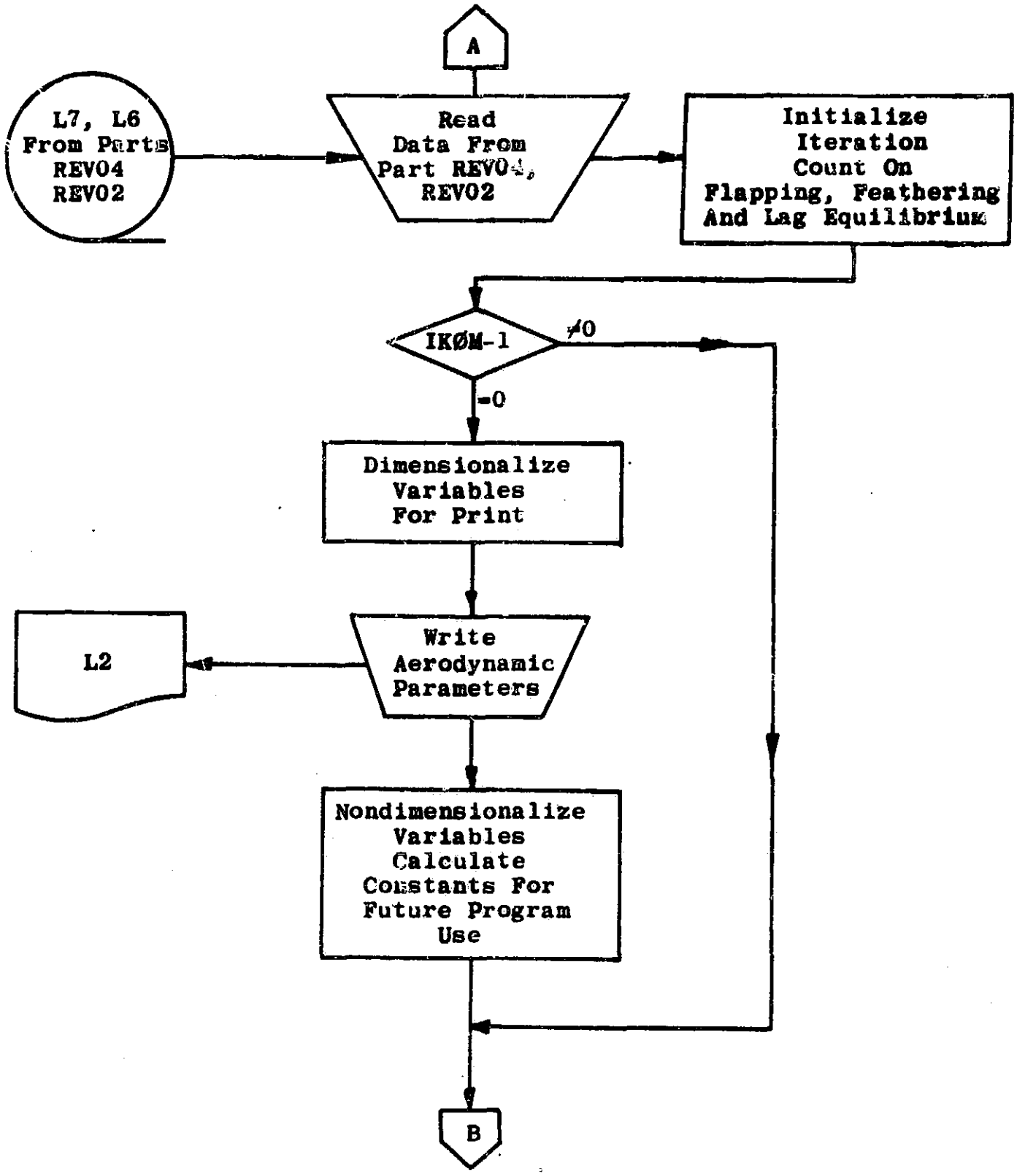


Figure 7. Flow Diagram For REV05 Program



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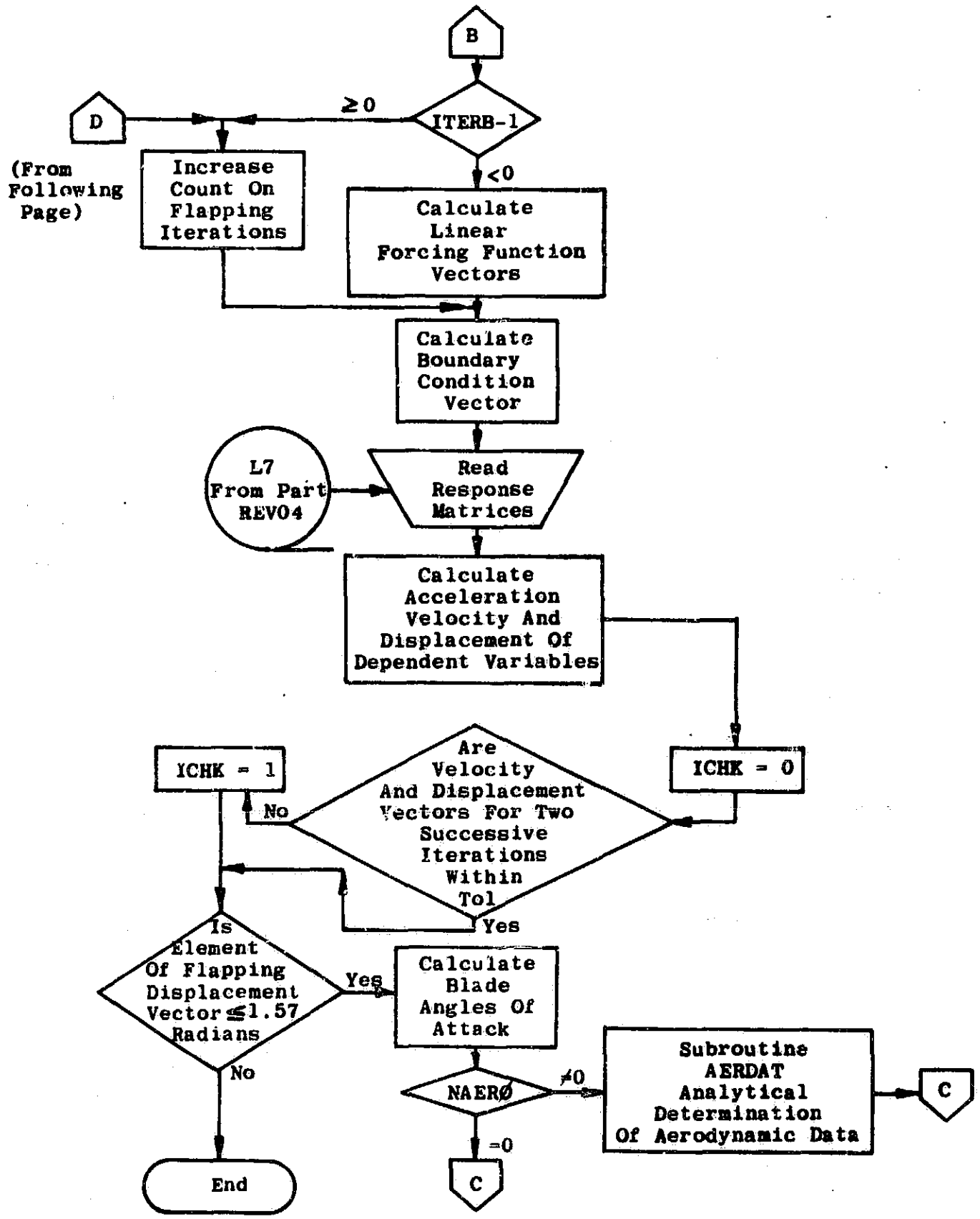

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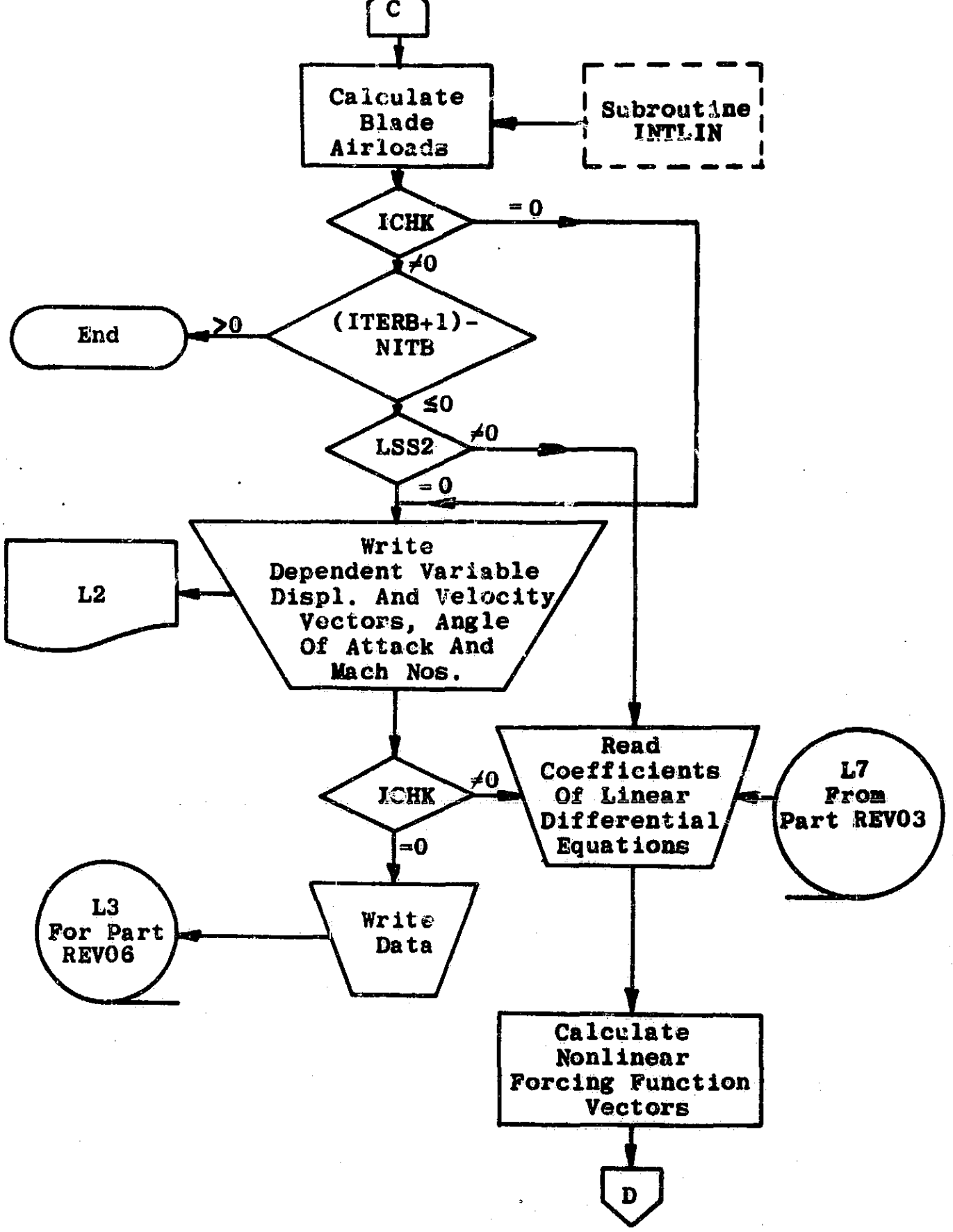

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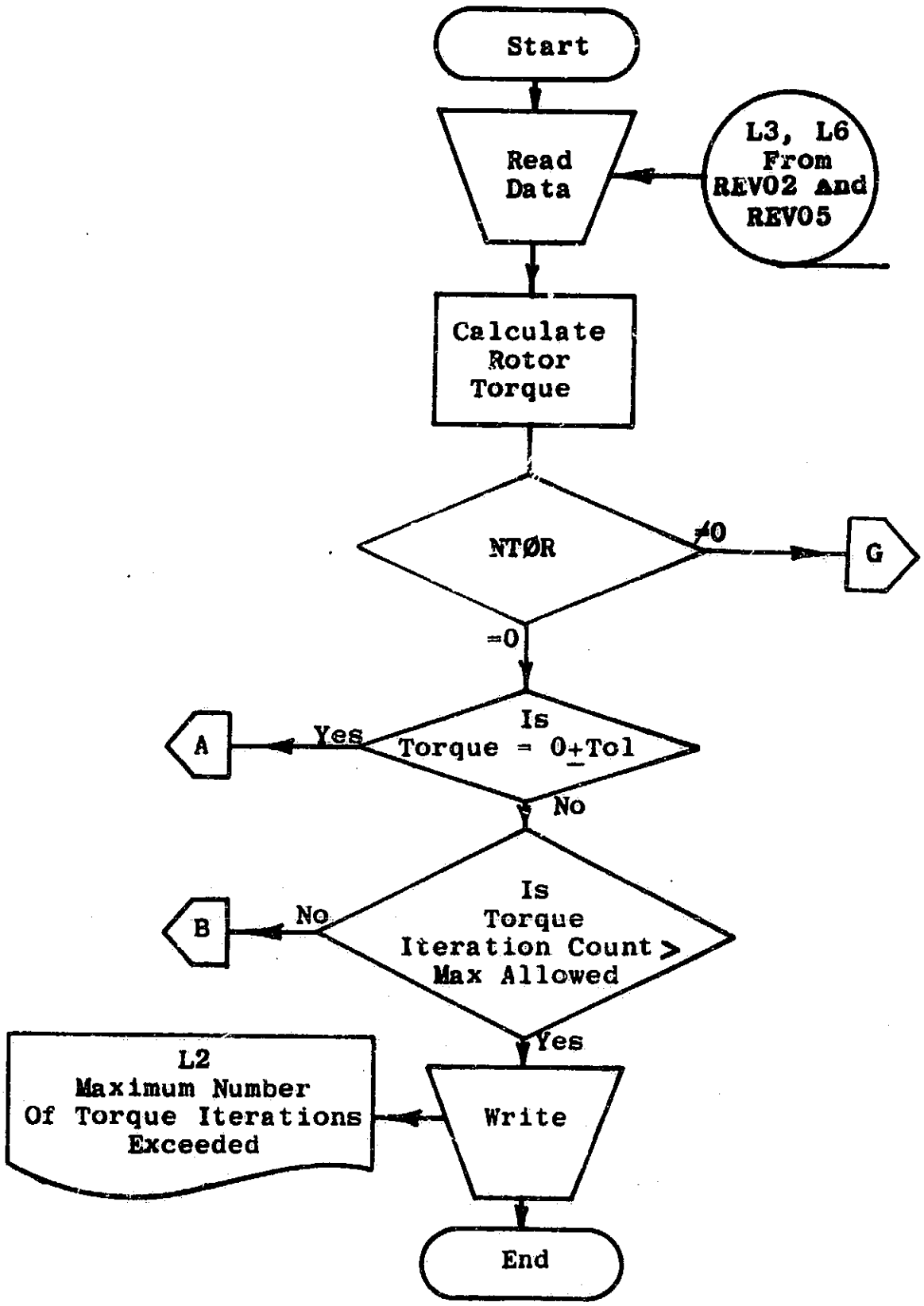
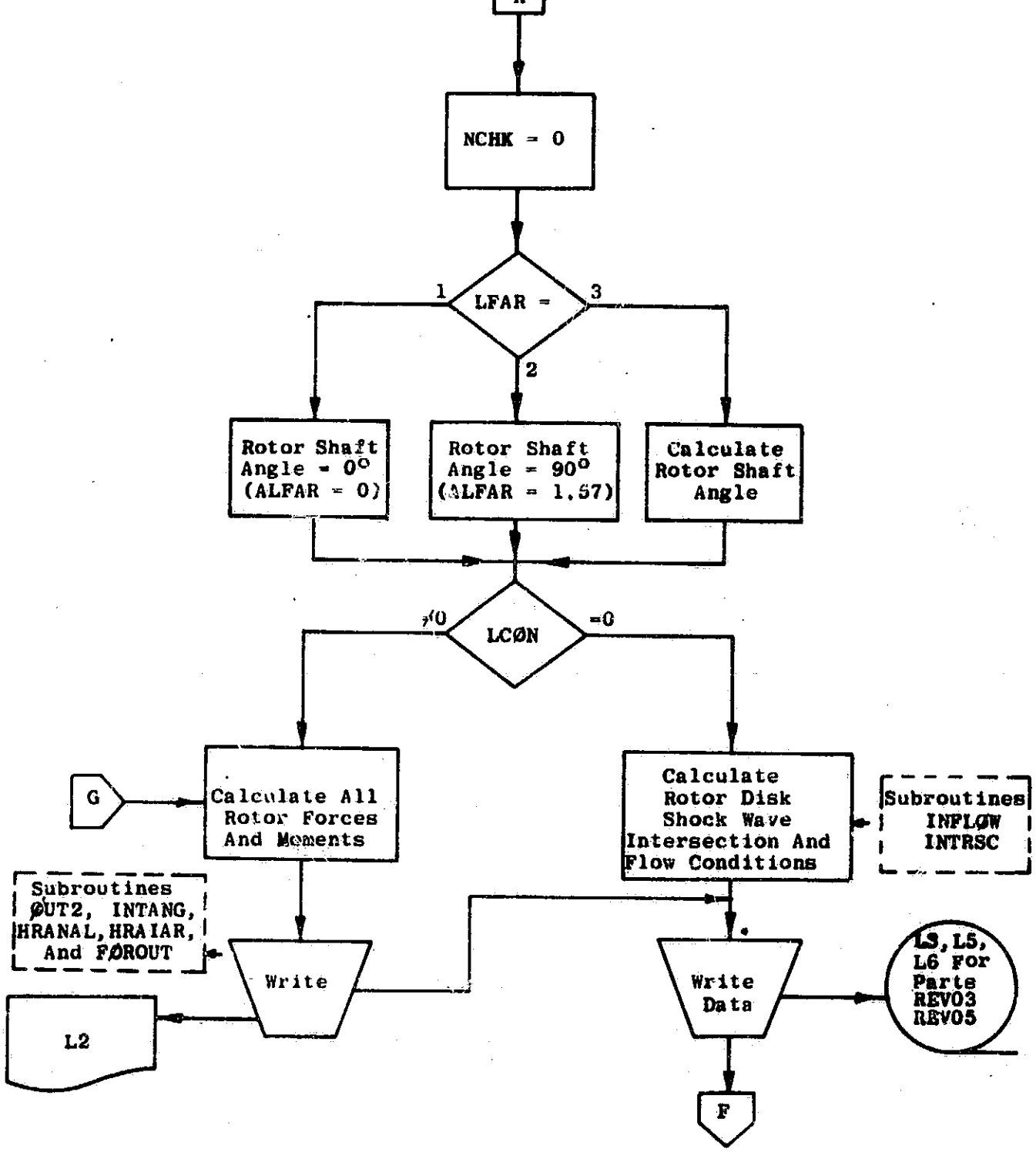


Figure 8. Flow Diagram For REV06 Program



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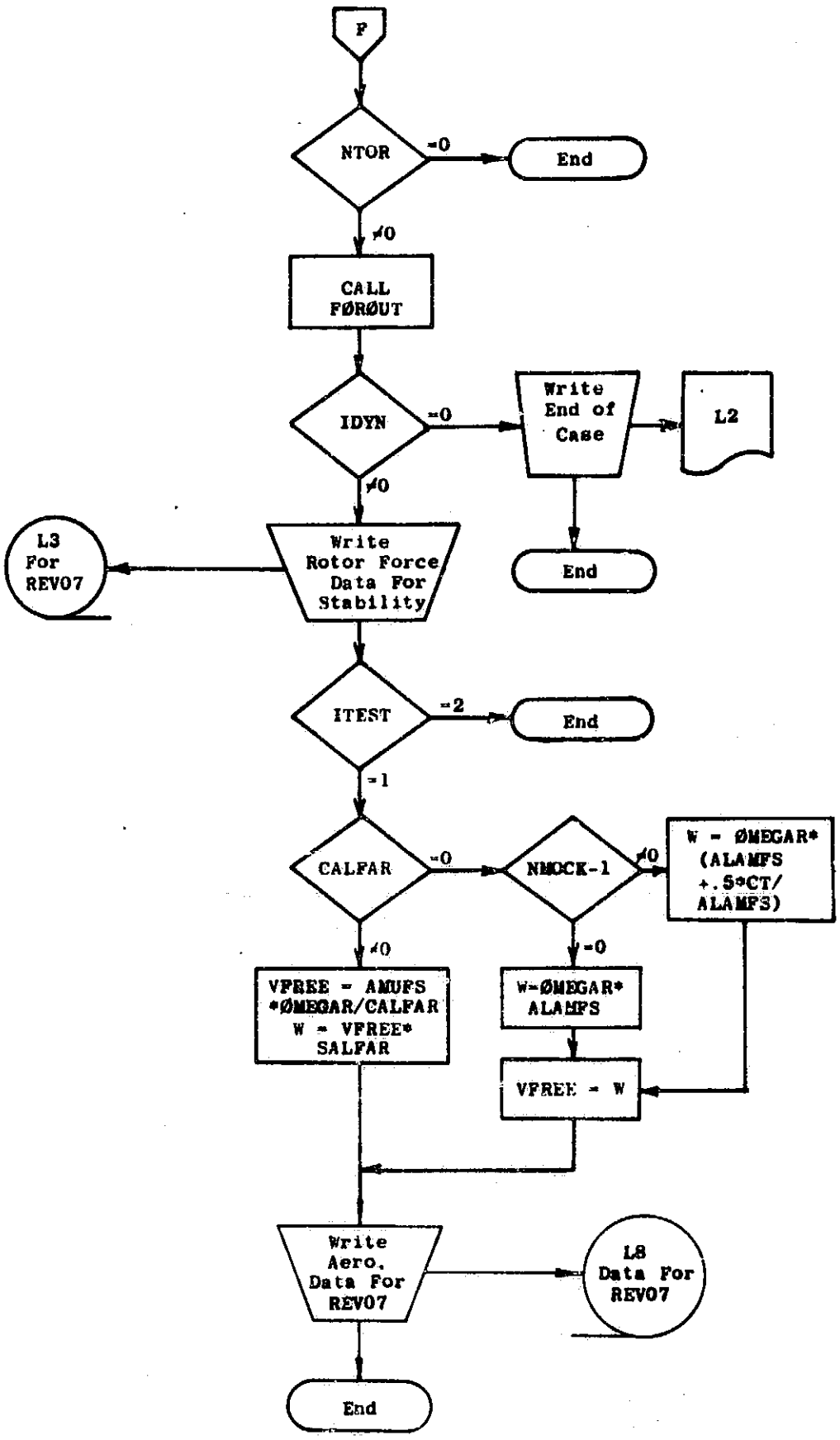

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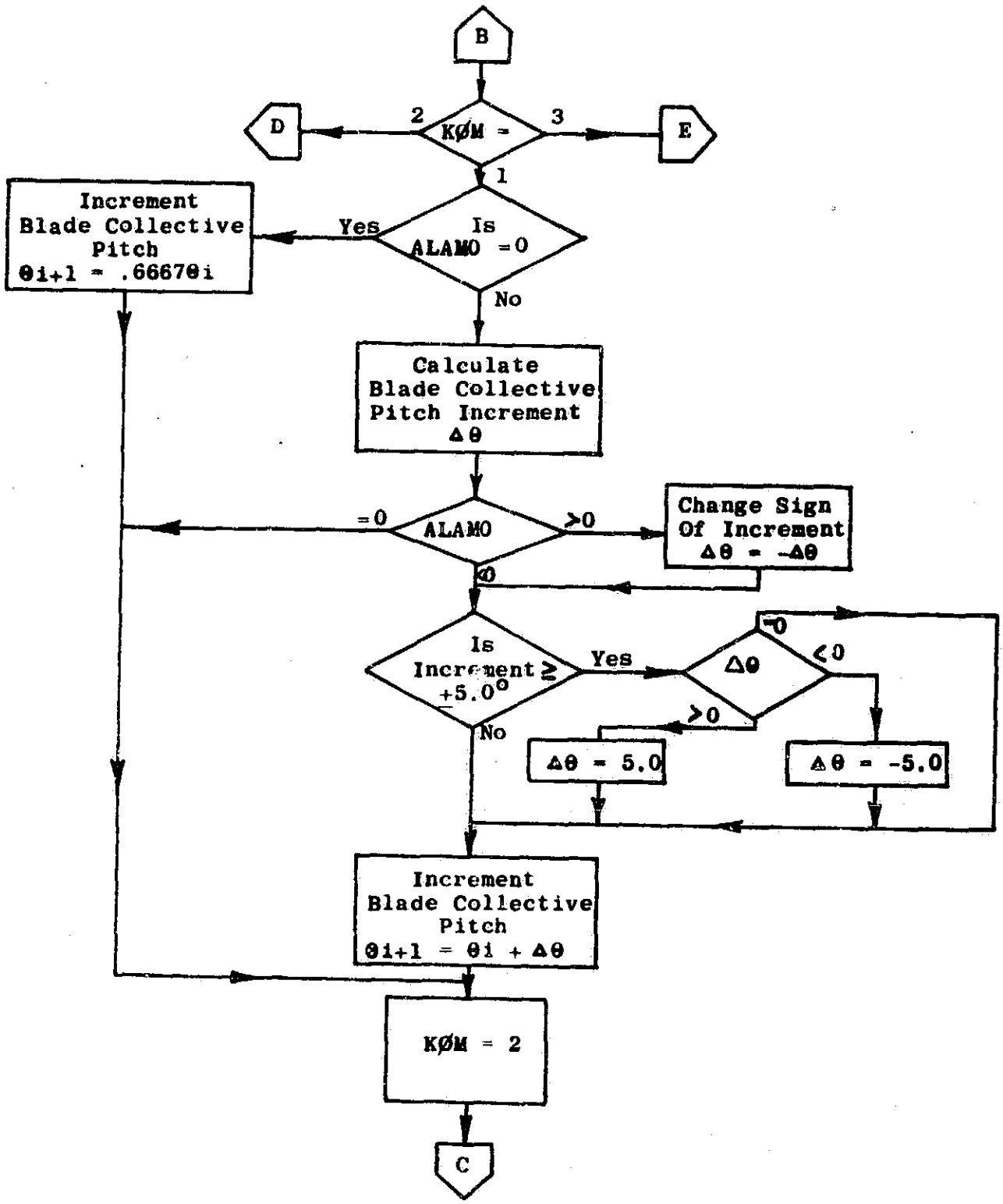

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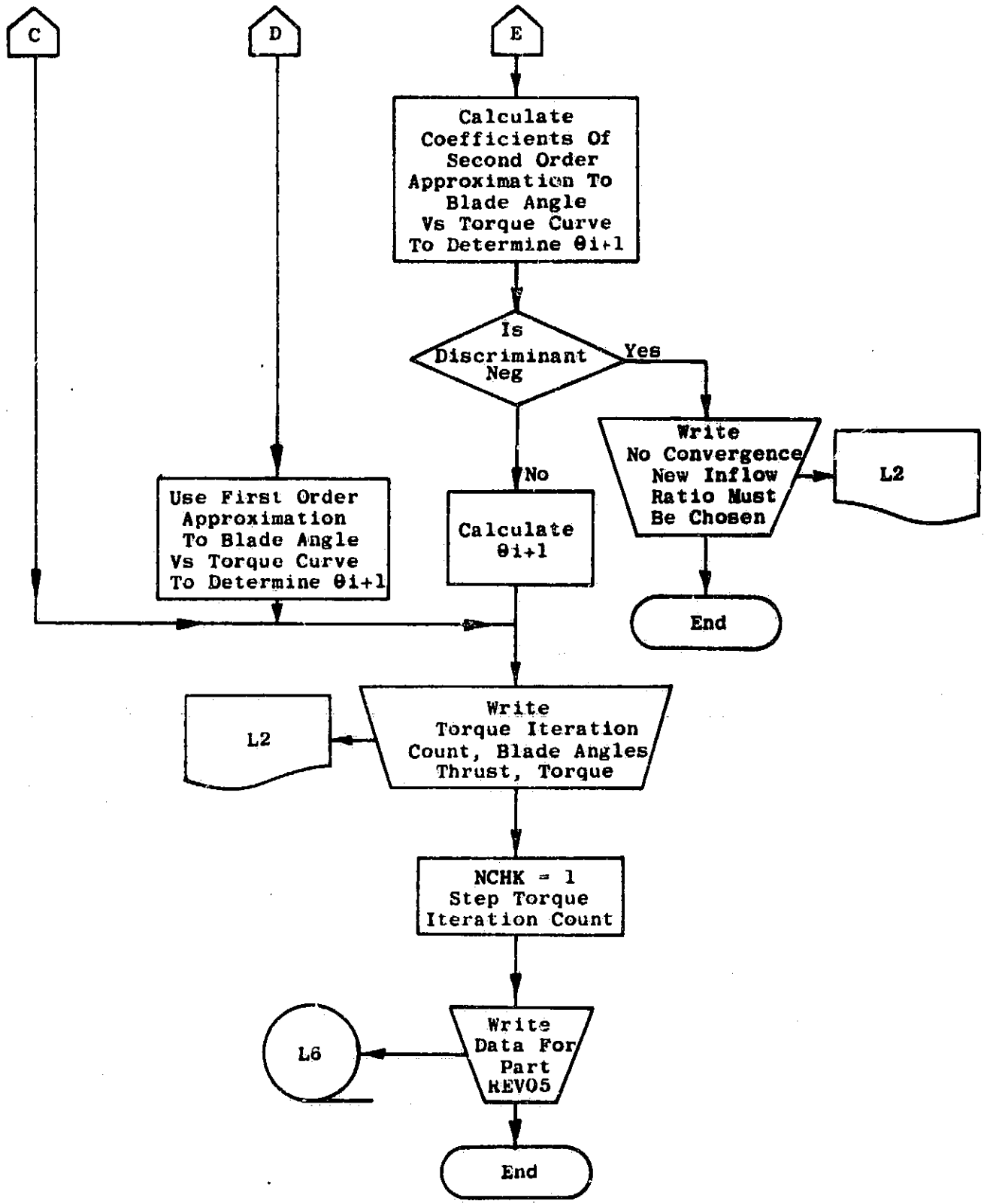

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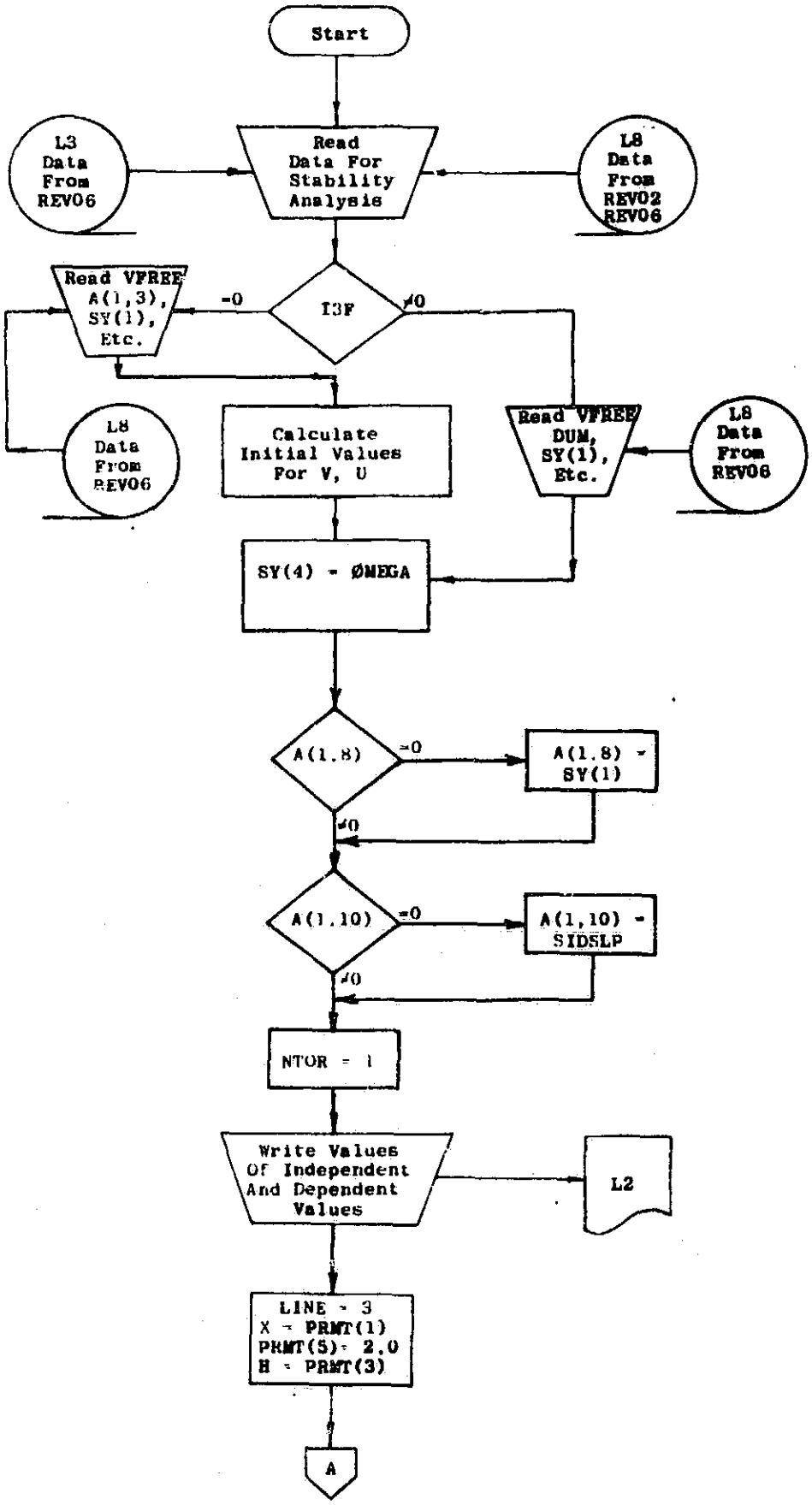

Figure 9. Flow Diagram For REV07 Program And Subroutines

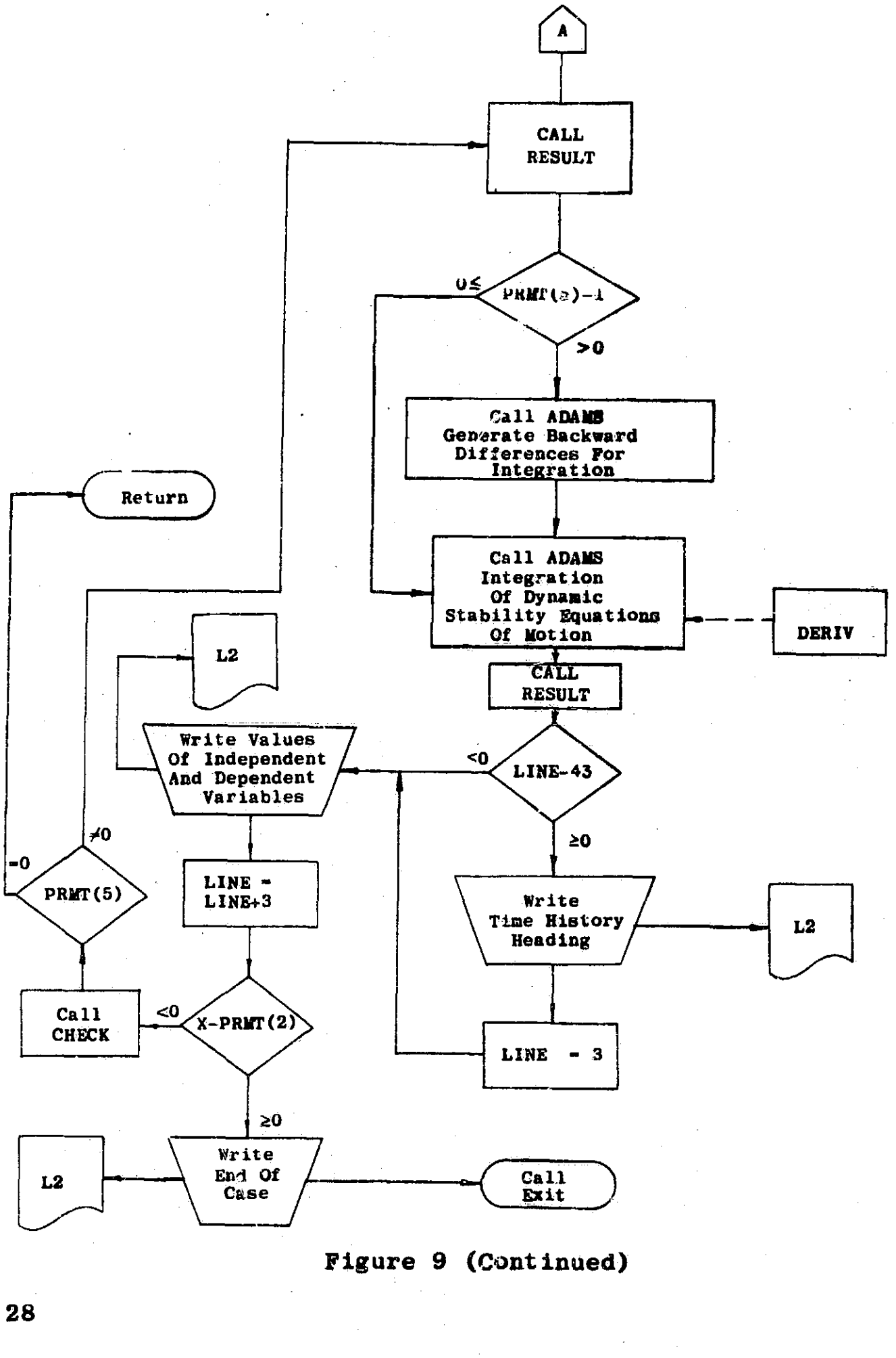

Figure 9 (Continued)

Subroutine CHECK

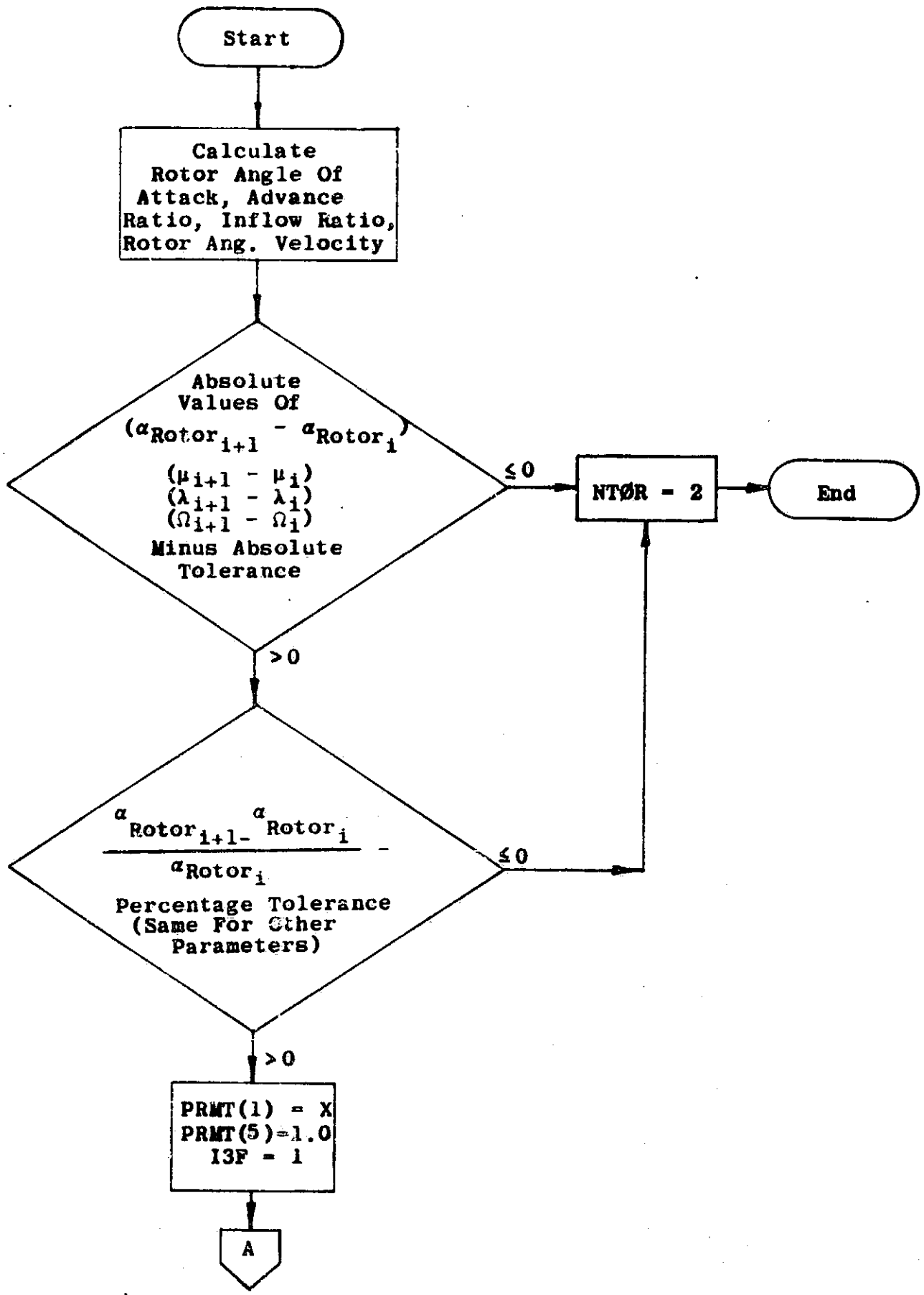

Figure 9 (Continued)

Subroutine CHECK (Concluded)

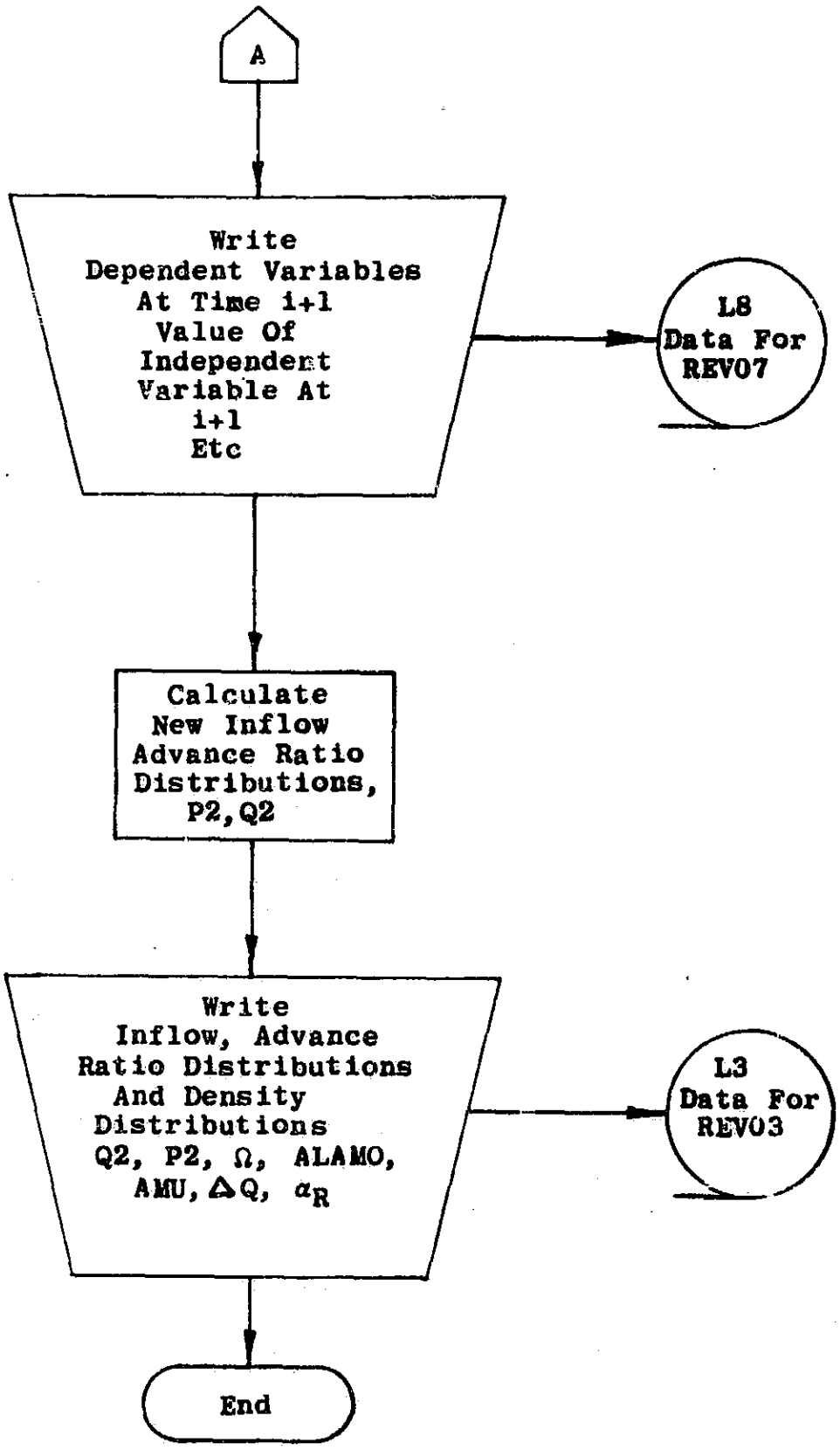

Figure 9 (Continued)

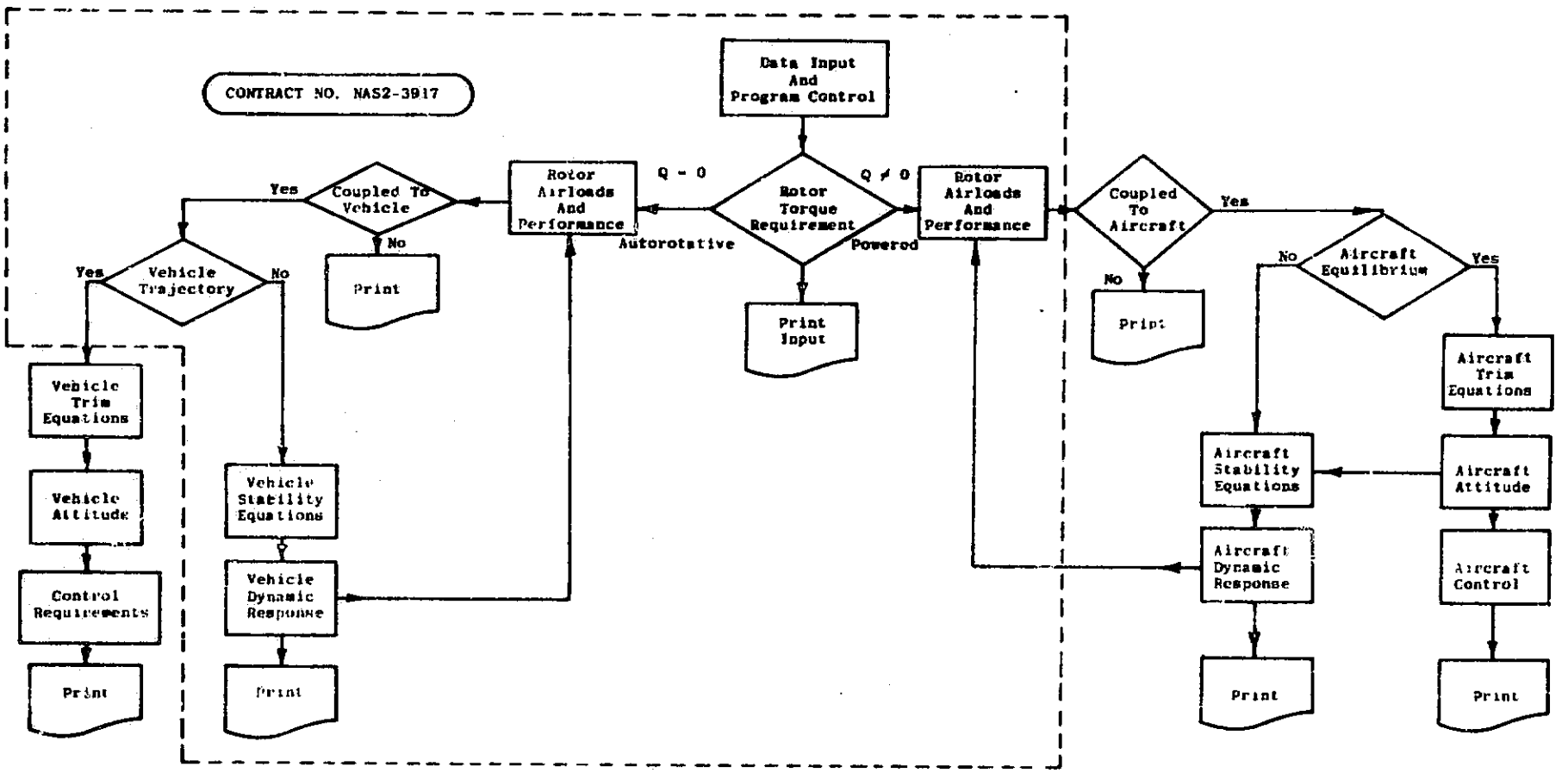

Figure 10. Extensions To Rotor Re-Entry Vehicle (REV) Stability Analysis

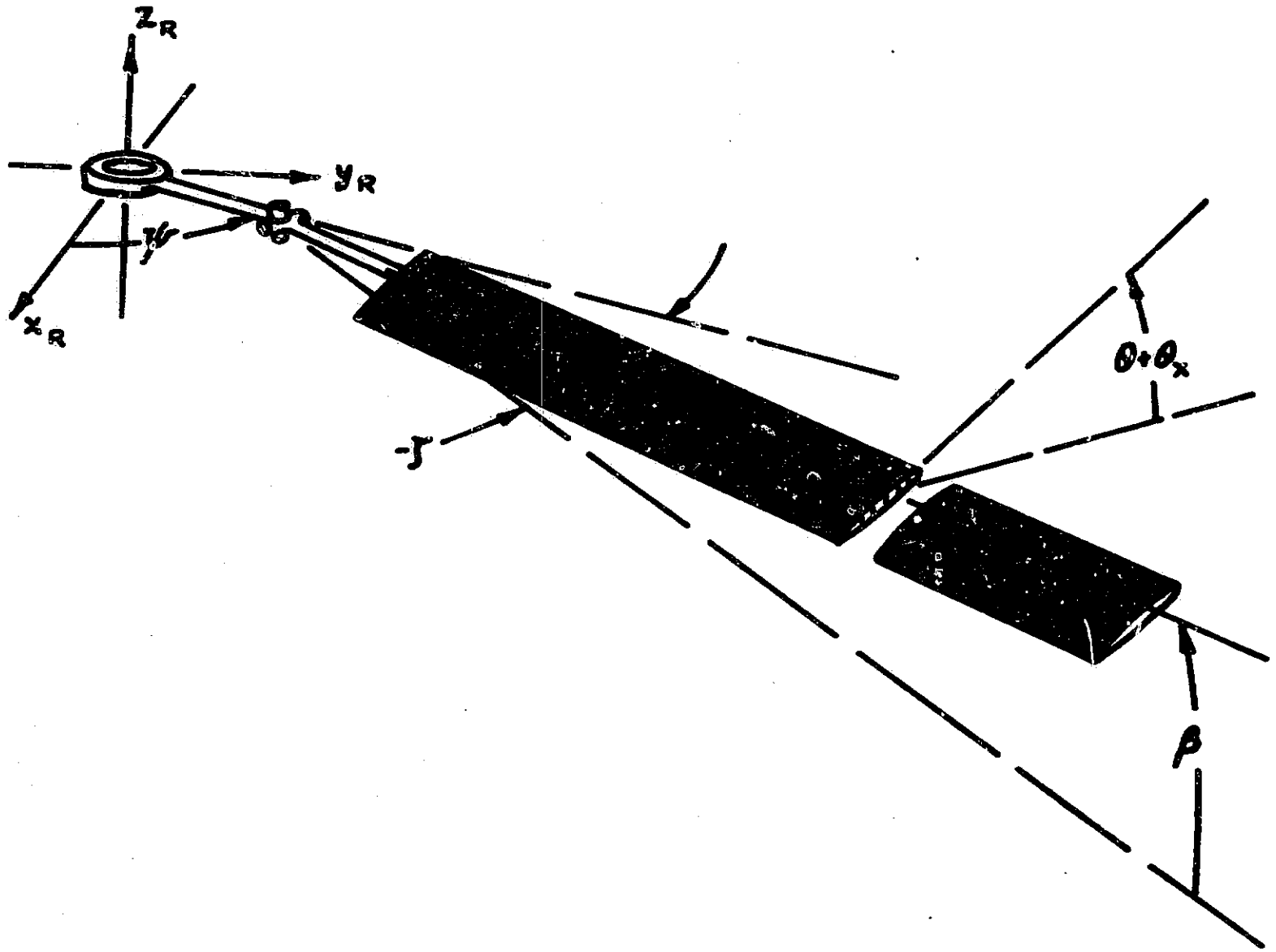

Figure 11. Geometry Of Deflected Blade

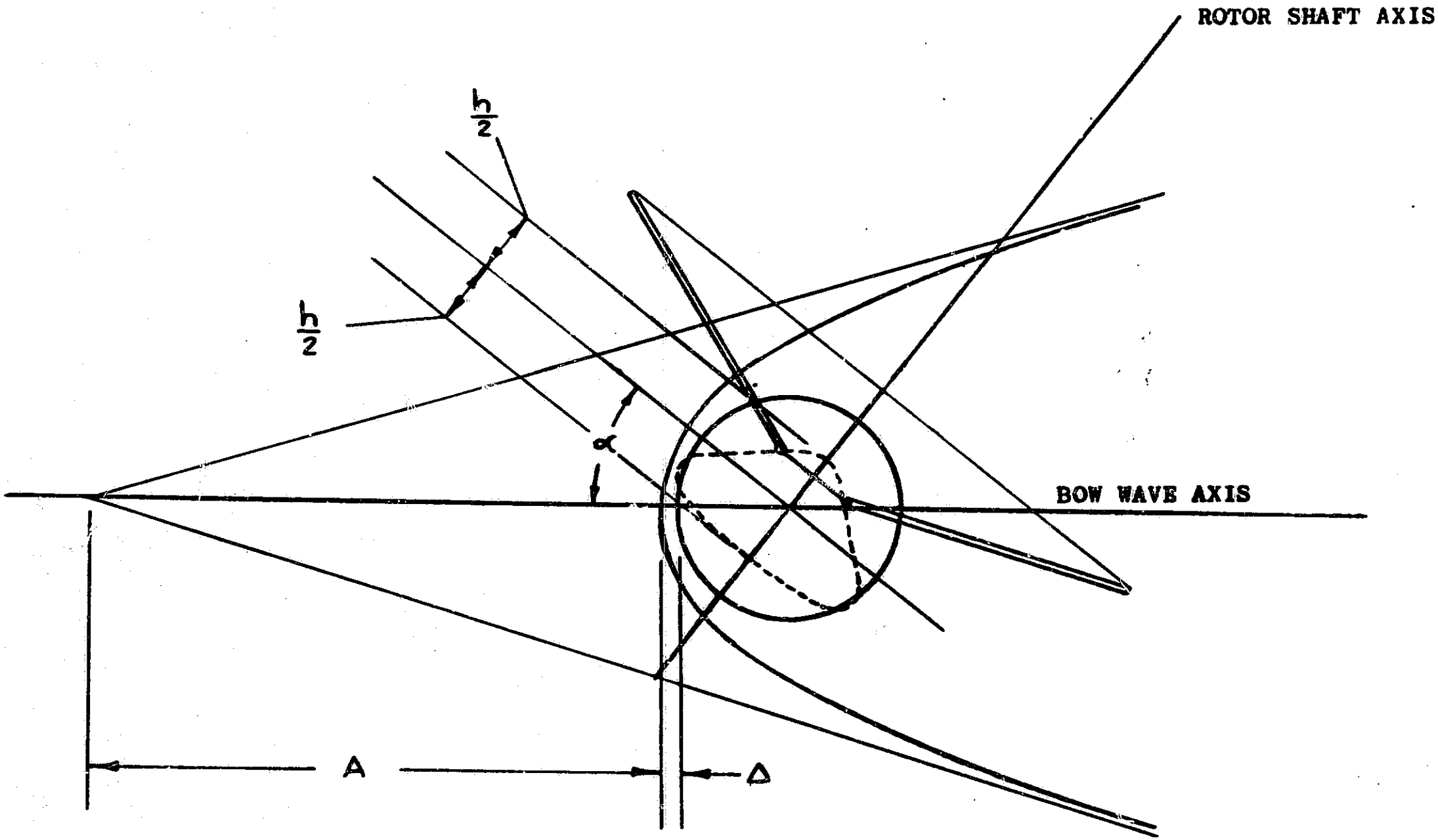

Figure 12. Configuration For Approximating Bow Shock Wave

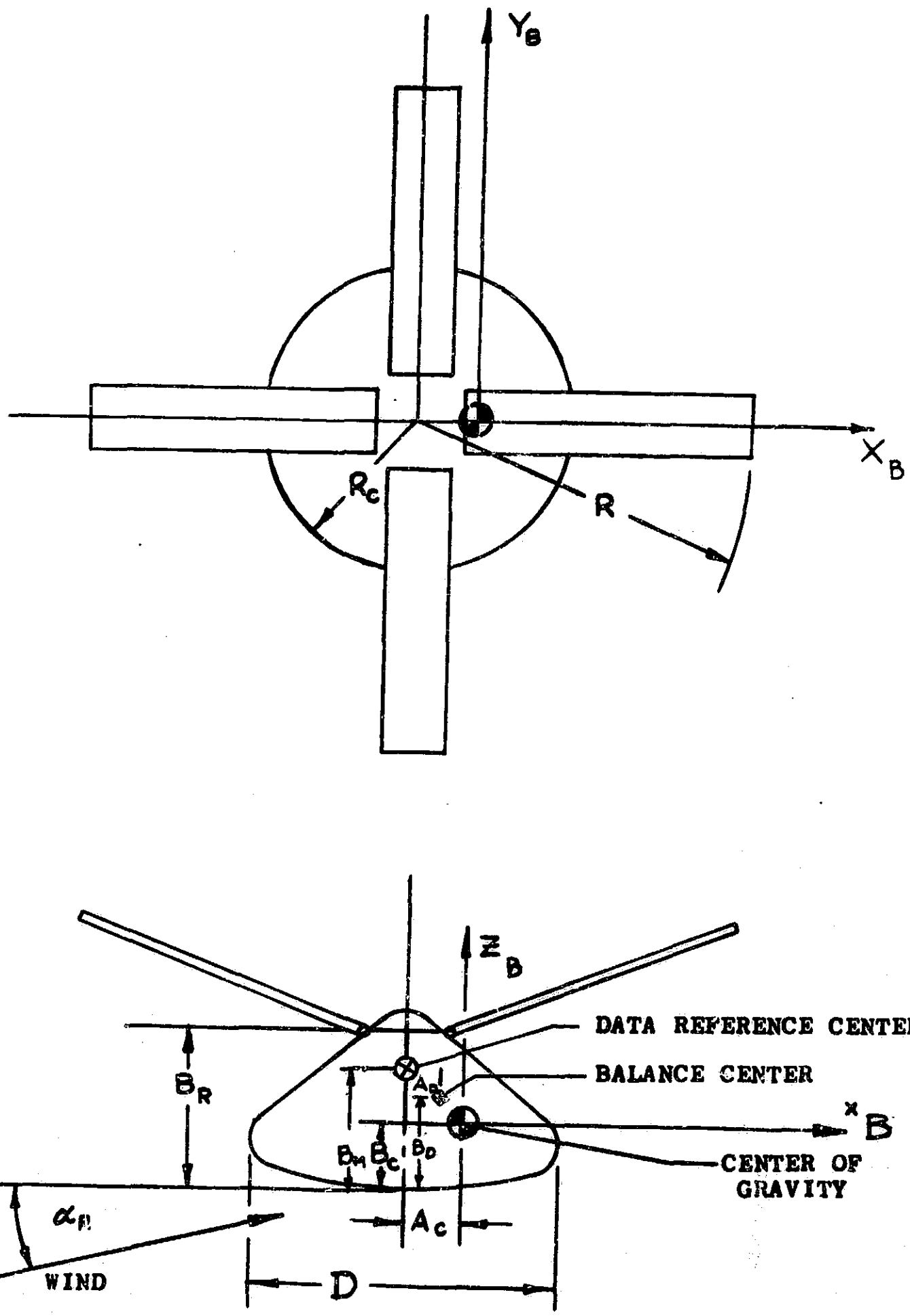

Figure 13. Vehicle Configuration For Dynamics Study

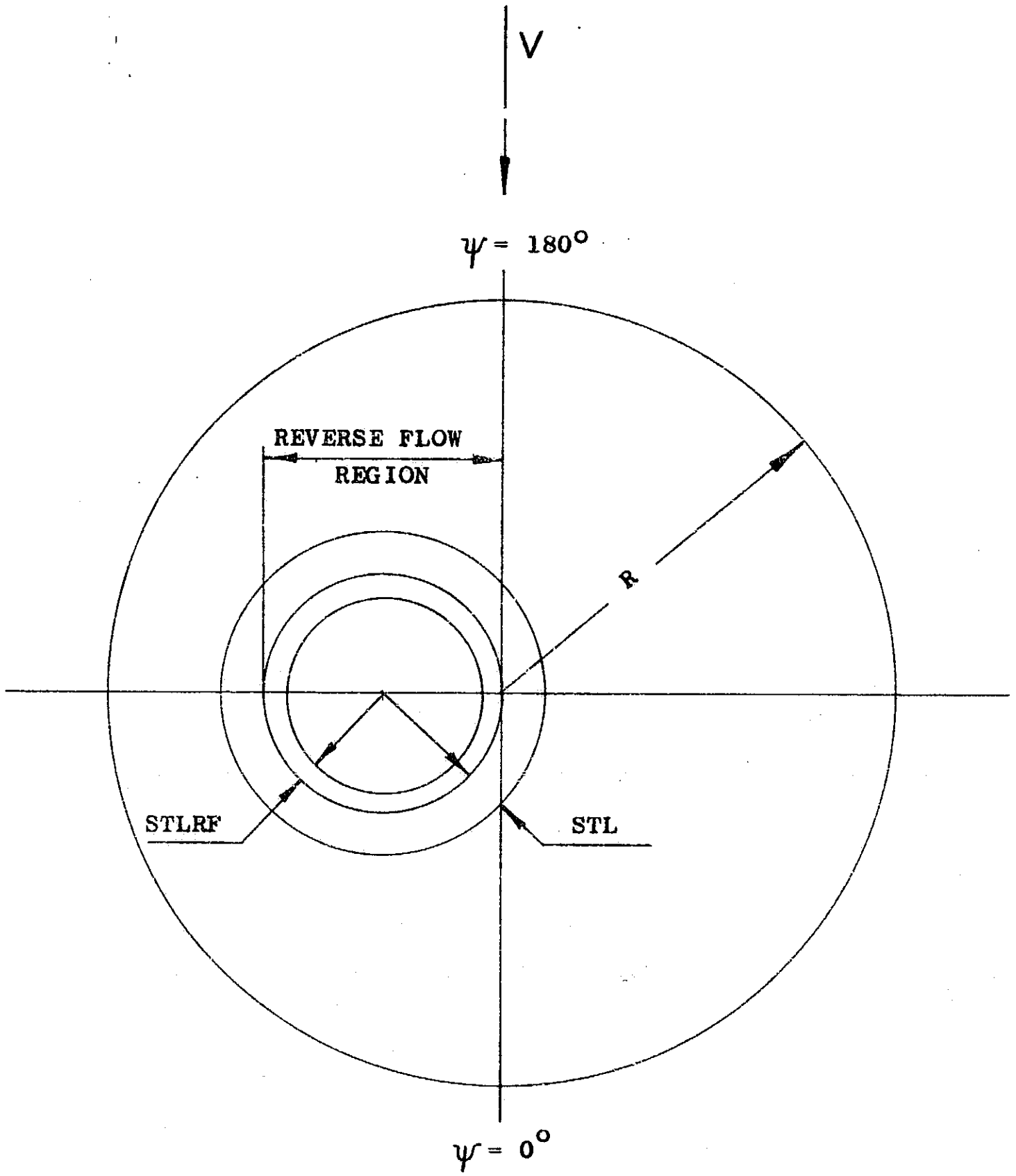

Figure 14. Stall And Reverse Flow Regions For Linear Analysis

REFERENCES

1. Lemnios, A. Z., and Giansante, N.: The Dynamic Behavior of Rotor Re-Entry Vehicle Configurations, Volume I.

2. Gessow, A., and Myers, G. C. Jr.: Aerodynamics of the Helicopter.

APPENDIX A

INPUT LISTING FOR

ROTOR RE-ENTRY VEHICLE (REV)

COMPUTER PROGRAMS

See Note 1 For Tape, Card Reader, Printer Assignments, And Definitions Of Program Controls NSTART, NSTAB, KNTRL, NCHK. Card format for REV01 control parameters is (4I10).

Card	1	Columns	1-5	NØPT	Program Option Control (See Note 2)
			6-10	NØCYCL	Number Of Cycles In Time History Calculation
			11-20	BCINIT(1)	θ_o Unit Step Initial Condition
			21-30	BCINIT(2)	θ'_o " " " "
			31-40	BCINIT(3)	ζ_o " " " "
			41-50	BCINIT(4)	ζ'_o " " " "
			51-60	BCINIT(5)	β_o " " " "
			61-70	BCINIT(6)	β'_o " " " "

Note: Prime On Variable Indicates Differentiation With Respect To Azimuth

$$\frac{d(\ )}{d\psi} = \frac{1}{\Omega}\frac{d(\ )}{dt} .$$

Card	2	Columns	1-5	NCASE	Case Identification Number
			6-80	HEAD	Case Description
Card	3	Columns	1-10	R	Rotor Radius (Ft)
			11-20	E1	Lag Hinge Offset (Ft)
			21-30	E2	Flapping Hinge Offset (Ft) (See Note 3)
			31-40	AMSI(1)	Blade Mass (Slugs)
			41-50	AMSI(2)	Blade Flapping Static Moment (Slug-Ft)
			51-60	AMSI(5)	Blade Flapping Moment Of Inertia (Slug-Ft^2)
			61-70	AMSI(8)	Blade Feathering Moment Of Inertia (Slug-Ft^2)
Card	4	Columns	1-10	NXF	Number Of Aerodynamic Blade Stations (≤ 10)
			11-20	FCNSP	Feathering Control Spring Rate (Ft-Lb/Rad)
			21-30	AKTZ	Feathering - Lag Feedback Ratio, $\partial\theta/\partial\zeta$
			31-40	ALAMO	Steady Inflow Ratio
			41-50	ALL	Minimum Angle Of Attack Used In Subroutine INTANG
			51-60	ALH	Maximum Angle Of Attack Used In Subroutine INTANG
			61-70	DELAL	Angle Of Attack Increment Used In Subroutine INTANG

Note: ALL, ALH, DELAL are used in conjunction with subroutine INTANG. This subroutine supplies angles of attack in integer form, as a function of radial station, for contour plots.

Card	5	Columns	1-10	NX	Total Number Of Blade Stations (≤ 16)
			11-20	NX1	Number Of First Aerodynamic Station
			21-30	NX2	Number Of Last Aerodynamic Station
			31-40	NREF	Reference Axis Control (See Note 4)
			41-50	NAERØ	Aerodynamic Coefficients Control (See Note 5)
			51-60	NMØCK	Control On Rotor Shaft Angle Calculation NMØCK = 0 Calculate Shaft Angle Using Thrust Coefficient NMØCK ≠ 0 Calculate Shaft Angle Without Thrust Coefficient
Card(s)	6	Columns	1-10	X	Blade Radial Station (Ft)
			11-20	C	Blade Chord (Ft)
			21-30	FA	Feathering Axis Aft Of Leading Edge (Ft)
			31-40	CG	CG Aft Of F.A. (NREF=1) Or L.E. (NREF=2) (Ft)
			41-50	THX	Blade Twist Referenced To .75R (Rad)
			51-60	EM	Radial Mass Distribution (Slug/Ft)
			61-70	AIC	Feathering Inertia Distribution (Slug-Ft^2/Ft)

Note: This card is to be repeated NX times in root to tip order. 16 cards maximum.

Card	7	Columns	1-10	AMU	Advance Ratio
			11-20	ØMEGA	Rotor Speed (Rad/Sec)
			21-30	ALT	Altitude (Ft)
			31-40	NP	Number Of Azimuth Stations (≤ 24)
			41-50	AKTB	Feathering-Flapping Feedback Ratio, $\partial\theta/\partial\beta$
			51-60	FSPRNG	Feathering Root Spring (Ft-Lb/Rad)
			61-70	BSPRNG	Flapping Root Spring (Ft-Lb/Rad)
			71-80	ZSPRNG	Lagging Root Spring (Ft-Lb/Rad)
Card	8	Columns	1-10	FDAMP	Feathering Damper (Ft-Lb/Rad/Sec)
			11-20	BDAMP	Flapping Damper (Ft-Lb/Rad/Sec)
			21-30	ZDAMP	Lagging Damper (Ft-Lb/Rad/Sec)

Card	9	Columns	1-10	NM	No. Of Mach Numbers Used In Linear Analysis And In Definition Of Shockwave Shape Factors (≤ 10)
			11-20	STL	See Note 6
			21-30	STLRF	See Note 6
Card(s)	10	Columns	1-10	AMCH	Mach Numbers Used In Linear Analysis
			11-20	AO	Normal Force Curve Slope (1/Deg)
			21-30	CDSLP	Chord Force Curve Slope (1/Deg)
			31-40	CMSLP	Pitching Moment Curve Slope (1/Deg)
			41-50	CLREF	Normal Force Coefficient (Reference For AO)
			51-60	CDO	Chord Force Coefficient (Reference For CDSLP)
			61-70	CMO	Pitching Moment Coefficient (Reference For CMSLP)

Note: This card is to be repeated NM times starting at the lowest Mach number and monotonically increasing. 10 cards maximum.

Card(s)	11	Columns	1-10	ALOL	Angle Of Attack At CLREF (Deg)
			11-20	ADOD	Angle Of Attack At CDO (Deg)
			21-30	AMOM	Angle Of Attack At CMO (Deg)
			31-40	CLAD	Non-Steady Lift Coefficient (1/Deg/Sec)
			41-50	CMTAD	Non-Steady Moment Coefficient (1/Deg/Sec)
			See note under card 10.		
Card(s)	12	Columns	1-10	SAO	These Variables Are Similar To Those
			11-20	SCDSLP	Defined On Card 10, Columns 11 Thru
			21-30	SCMSLP	70 Inclusive, Except They Define The
			31-40	SCLREF	Stalled Flow Region
			41-50	SCDO	
			51-60	SCMO	
			See note under card 10.		
Card(s)	13	Columns	1-10	SALOL	These Variables Are Similar To Those
			11-20	SADOD	Defined On Card 11, Except They Define
			21-30	SAMOM	The Stalled Flow Region
			31-40	SCLAD	
			41-50	SCMTAD	
			See note under card 10.		

Card(s)	14	Columns	1-10	RA0	These Variables Are Similar To Those
			11-20	RCDSLP	Defined On Card 10, Columns 11 Thru 70
			21-30	RCMSLP	Inclusive, Except They Define The
			31-40	RCLREF	Reversed Flow Region
			41-50	RCD0	
			51-60	RCM0	
			See note under card 10.		
Card(s)	15	Columns	1-10	RALOL	These Variables Are Similar To Those
			11-20	RAD0D	Defined On Card 11, Except They Define
			21-30	RAM0M	The Reversed Flow Region
			31-40	RCLAD	
			41-50	RCMTAD	
			See note under card 10.		
Card	16	Columns	1-10	NITB	Limiting Number Of Iterations On Flapping, Feathering And Lagging Equilibrium
					ILAM = 0 Uniform Inflow Distribution
					ILAM ≠ 0 Inflow Distribution Read From Cards
			11-20	ILAM	Control On Inflow
			21-30	NIØM	Limiting Number Of Iterations For Torque Equilibrium
			31-40	LFAR	Control On Shaft Angle Of Attack
					LFAR = 1 Shaft Angle Of Attack = 0^{o} (Defined Internally)
					LFAR = 2 Shaft Angle Of Attack = 90^{o} (Defined Internally)
					LFAR = 3 Program Calculates Shaft Angle Of Attack
			41-50	LSS2	Print Control
					LSS2 = 0 Print At Each Iteration: Distributions Of Flapping, Feathering, And Lagging Displacements And Velocities; Distributions Of Angles Of Attack And Mach Numbers
					LSS2 ≠ 0 No Print

		51-60	LCØN	Control Of Supersonic Inflow Subroutine And Data Input LCØN = 0 Read Input Parameters Defining Capsule Bow Wave Shape; Also Calculate Capsule Bow Wave-Rotor Cone Intersection And Corresponding Inflow Distribution Using INFLOW Subroutine LCØN ≠ 0 Aforementioned Data And Calculations Omitted
		61-70	IDYN	IDYN = 0 Omit Dynamic Stability Data IDYN ≠ 0 Include Dynamic Stability Data (See Note 15)
		71-80	ITEST	ITEST = 1 Calculate VFREE And W From Loads Initially ITEST = 2 Use VFREE And W From Previous Step Or Tape
Card	17 Columns	1-10	TOA	Static Blade Feathering Angle at .75R (Deg)
		11-20	BOA	Static Blade Coning Angle (Deg)
		21-30	ZOA	Static Lag Angle (Deg)
		31-40	APHASE	Input Phase Angle (Deg) (See Note 7)
		41-50	PIRA	Rotor Hub Pitch Rate (Rad/Sec)
		51-60	RØRA	Rotor Hub Roll Rate (Rad/Sec)
		61-70	SIDSLP	Initial Body Sideslip Angle (Deg)
Card	18 Columns	1-10	AOS	Collective Pilot Input (Deg)
		11-20	A1S	Longitudinal Cyclic Input (Deg) (See Note 14)
		21-30	B1S	Lateral Cyclic Input (Deg)
		31-40	BTØL	Percentage Tolerance (In Decimal Form) On β, β', θ, θ', ζ, ζ'
		41-50	ATØLB	Absolute Tolerance On Above Parameters
		51-60	CQTØL	Absolute Tolerance On Torque (Ft-Lbs)
Card(s)	19		$ALAM_{1,1}$ $ALAM_{2,1}$ . . . $ALAM_{NXF+2,1}$ $ALAM_{1,2}$ $ALAM_{2,2}$. $ALAM_{NXF+2,NP}$	Non-Dimensional Inflow Distribution Eight Values Per Card, 10 Columns Per Value (8F 10.4 Format). Maximum Of 36 Cards. First Subscript Denotes Aerodynamic Blade Station, Root To Tip Order. Second Subscript Denotes Azimuth Station, Monotonically Increasing

Note: These cards are omitted if ILAM = 0. See Note 8.

Card	20	Columns	1-68	HEAD1	Dynamic Stability Condition Description
Card	21	Columns	1-10	TØL(1)	Absolute Tolerance On Rotor Angle Of Attack (Radians)
			11-20	TØL(2)	Absolute Tolerance On Advance Ratio
			21-30	TØL(3)	Absolute Tolerance On Inflow Ratio
			31-40	TØL(4)	Absolute Tolerance On Rotor Angular Velocity (Rad/Sec)
			41-50	TØL(5)	Percent Tolerance On Rotor Angle Of Attack (In Decimal Form)
			51-60	TØL(6)	Percent Tolerance On Advance Ratio (In Decimal Form)
			61-70	TØL(7)	Percent Tolerance On Inflow Ratio (In Decimal Form)
			71-80	TØL(8)	Percent Tolerance On Angular Velocity (In Decimal Form)
Card	22	Columns	1-2	01	Card Count For Dynamic Stability Data
			11-20	INPUT(1,1)	Free Stream Mach Number
			31-40	INPUT(1,3)	Capsule Diameter (Ft) (See Figure 13)
			41-50	INPUT(1,4)	Gravitational Acceleration (Ft/Sec^2)
Card	23	Columns	1-2	02	Card Count For Dynamic Stability Data
			11-20	INPUT(2,1)	Body Dimension "A" In XZ-Plane From Rotor Axis To Body Center Of Gravity. Positive For Center Of Gravity Aft Of Rotor Z Azis (Ft) (See Figure 13)
			21-30	INPUT(2,2)	Body Dimension "BC" In XZ-Plane, Measured From Body Lower Surface To Body Center Of Gravity. Positive Up (Ft) (See Figure 13)
			31-40	INPUT(2,3)	M-Body Mass (Slugs)
			41-[illegible]	INPUT(2,4)	IX - Body Moment Of Inertia About Body Center Of Gravity ($Slug-Ft^2$)
			51-60	INPUT(2,5)	IY - Body Moment Of Inertia About Body Center Of Gravity ($Slug-Ft^2$)

	61-70	INPUT(2,6)	IZ - Body Moment Of Inertia About Body Center Of Gravity (Slug-Ft^2)
	71-80	INPUT(2,7)	JXZ - Body Product Of Inertia About Body Center Of Gravity (Slug-Ft^2)
Card 24 Columns	1-2	03	Card Count On Dynamic Stability Data
	3-10	IN(3)	Number Of Blades
	11-20	INPUT(3,1)	Blade Flapping Hinge Offset (Ft)
	21-30	INPUT(3,2)	Rotor Blade First Mass Moment About Center Line Of Rotation Slug (Ft)
	31-40	INPUT(3,3)	Rotor Polar Moment Of Inertia (Slug-Ft^2)
	41-50	INPUT(3,4)	Body Dimension "BR" Measured From Body Lower Surface To The Rotor Hub (See Figure 13)
Card 25 Columns	1-2	04	Card Count For Dynamic Stability Data
	41-50	INPUT(4,4)	Initial Body Roll Rate (Rad/Sec)
	51-60	INPUT(4,5)	Initial Body Pitch Rate (Rad/Sec)
	61-70	INPUT(4,6)	Initial Body Yaw Rate (Rad/Sec)
	71-80	INPUT(4,7)	Initial Rotor Angular Velocity (Rad/Sec)
Card 26 Columns	1-2	05	Card Count For Dynamic Stability Data
	11-20	INPUT(5,1)	Initial Rotation Of Body X Axis With Respect To Earth Axis (Radians)
	21-30	INPUT(5,2)	Initial Rotation Of Body Y Axis With Respect To Earth Axis (Radians)
	31-40	INPUT(5,3)	Initial Rotation About Body Z Axis With Respect To Earth Axis (Radians)
	41-50	INPUT(5,4)	Initial Displacement Of Body X Axis (Ft)
	51-60	INPUT(5,5)	Initial Displacement Of Body Y Axis (Ft)
	61-70	INPUT(5,6)	Initial Displacement Of Body Z Axis (Ft)

Note: If INPUT(5,2) $\neq$ 0, set INPUT(5,2) = α_R
If INPUT(5,3) $\neq$ 0, set INPUT(5,3) = SIDSLP
If INPUT(5,2) and/or INPUT(5,3) are set = 0, they are set to α_R and SIDSLP within the program.

Card	27	Columns	1-2	07	Card Count For Dynamic Stability Data
			11-20	INPUT(7,1)	Initial Time For Dynamic Stability Calculations (Seconds)
			21-30	INPUT(7,2)	Final Time For Dynamic Stability Calculations (Seconds)
			31-40	INPUT(7,3)	Time Increment For Dynamic Stability Calculations (Seconds)
Card	28	Column	1-2	10	Card Count For Dynamic Stability Data
Card	29	Columns	1-10	MACH1	Mach Number Below Free Stream Mach Number
			11-20	BM1	Vertical Offset Between Heat Shield Center And Data Reference Center (Ft)
			21-30	BD1	Vertical Offset Between Heat Shield Center And Vehicle Balance Center (Ft)
			31-40	AD1	Longitudinal Offset Between Rotor Shaft And Vehicle Balance Center (Ft)
Card	30	Columns	1-10	BØDYF(1,1,1)	Angle Of Attack Used To Define Body Aerodynamic Data (Degrees)
			11-20	BØDYF(1,2,1)	Body Lift Coefficient Corresponding To Angle Of Attack In Columns 1-10
			21-30	BØDYF(1,3,1)	Body Drag Coefficient Corresponding To Angle Of Attack In Columns 1-10
			31-40	BØDYF(1,4,1)	Body Pitching Moment Coefficient Corresponding To Angle Of Attack In Columns 1-10

Note: Reference area for body aerodynamic coefficients is the body cross-sectional area. ($A_{REF} = \pi/4$ INPUT$(1,3)^2$. Card 33 is repeated for each angle of attack at MACH1 up to a maximum of 20 cards, with angles of attack monotonically increasing. See Note 9.

Card	31				Blank Card
Card	32	Columns	1-10	MACH2	Mach Number Above Free Stream Mach Number

Card	33	Columns	1-10	BØDYF(1,1,2)	Angle Of Attack Used To Define Body Aerodynamic Data At Mach Number Above Free Stream Mach Number (Degrees)
			11-20	BØDYF(1,2,2)	Body Lift Coefficient Corresponding To Angle Of Attack In Columns 1-10
			21-30	BØDYF(1,3,2)	Body Drag Coefficient Corresponding To Angle Of Attack In Columns 1-10
			31-40	BØDYF(1,4,2)	Body Pitching Moment Coefficient Corresponding To Angle Of Attack In Columns 1-10

Note: Card 33 is repeated for each angle of attack at MACH2 up to a maximum of 20 cards, with angles of attack monotonically increasing and being identically equal to those for MACH1. See Note 9.

Card	34				Blank Card
Card	35	Column	1-2	11	Last Card For Dynamic Stability Data
Card	36	Columns	1-10	NØAL	Number Of Angles Of Attack For Airfoil Data (≤ 48)
			11-20	NØMN	Number Of Mach Numbers For Airfoil Data (≤ 8)
			21-30	NØSEC	Number Of Blade Stations For Airfoil Data (≤ 6)
Card(s)	37			$ALFA_1$	Angle Of Attack (Degrees) Used To Define Airfoil Data
				$ALFA_2$	Eight Values Per Card, 10 Columns Per Value (8F 10.4 Format), Maximum Of 6 Cards
				.	
				.	
				.	
				.	
				$ALFA_{NØAL}$	
Card	38			$AMACH_1$	Mach Numbers Used To Define Airfoil Data
				$AMACH_2$	Eight Values Per Card, 10 Columns Per Value (8F 10.4 Format), Maximum Of Eight Values, One Card
				.	
				.	
				.	
				$AMACH_{NØMN}$	

Card	39			$RADN_1$	Blade Stations (Ft) Used To Define Airfoil Data
				$RADN_2$	10 Columns Per Value (8F 10.4 Format)
				.	Maximum Of Six Values, One Card
				.	
				.	
				$RADN_{NØSEC}$	
Card	40			$ASTLP_1$	Positive Stall Angles (Degrees) At
				$ASTLP_2$	Each Mach Number; At Angles Of Attack
				.	Above ASTLP, Lowest Mach Number Data
				.	Are Used
				.	Eight Values Per Card, 10 Columns Per
				.	Value (8F 10.4 Format)
				$ASTLP_{NØMN}$	
Card	41			$ASTLN_1$	Negative Stall Angles (Degrees) At Each
				$ASTLN_2$	Mach Number; At Angles Of Attack Below
				.	ASTLN, Lowest Mach Number Data Are Used
				.	Eight Values Per Card, 10 Columns Per
				.	Value (8F 10.4 Format)
				$ASTLN_{NØMN}$	
Card	42	Columns	1-10	X0	Blade Root Cutout Station (Ft)
			11-20	FCP0	Blade Radial Flow Correction For Torque (Non-Dimensional)
			21-30	FCH0	Blade Radial Flow Correction For H-Force (Non-Dimensional)
			31-40	BL	Number Of Blades
			41-50	XC4	Airfoil Data Reference Axis (See Note 10)
			51-60	CD0R	Drag Coefficient Of Blade Retention Area
			61-70	CRET	Chord Of Blade Retention Area (Ft)
Card	43	Columns	1-10	INTAN	Control On Integer Angles Of Attack (See Note 11)
			11-20	NHARB	Control On Harmonic Analysis (See Note 12)
			21-30	NØHAR	Control On Harmonic Analysis (See Note 13)

Card	44	Columns 1-10	BEQ	Height Of Rotor Plane Above Center Of Equivalent Sphere (Ft)
		11-20	REQ	Equivalent Body Radius (Ft)
		21-30	AMINF	Free Stream Mach Number
		31-40	UR	Universal Gas Constant (Ft/^{o}R)
		41-50	GAMM	Ratio Of Specific Heats
Card(s)	45		$AMD\emptyset R_1$	Mach Numbers Defining Shock Wave Shape Factors
			$AMD\emptyset R_2$	Eight Values Per Card, 10 Columns Per Value (8F 10.4 Format). Maximum Of 2 Cards
			.	
			.	
			.	
			$AMD\emptyset R_{NM}$	

Note: These Mach numbers are not required to be identical to those (AMCH) used in the linear analysis.

Card(s)	46	$X\emptyset R_1$	Ratio Of The Distance Between The Mach Cone Vertex And the Hyperbolic Shock Vertex To The Equivalent Body Radius
		$X\emptyset R_2$	Eight Values Per Card, 10 Columns Per Value (8F 10.4 Format). Maximum Of 2 Cards (XØR = A/Rc. See Figure 12)
		.	
		.	
		.	
		$X\emptyset R_{NM}$	
Card(s)	47	$D\emptyset R_1$	Ratio Of The Distance Between Hyperbolic Shock Wave And The Equivalent Body Sphere To The Sphere Radius. Eight Values Per Card, 10 Columns Per Value (8F 10.4 Format). Maximum Of 2 Cards (DØR = Δ/Rc. See Figure 12)
		$D\emptyset R_2$	
		.	
		.	
		$D\emptyset R_{NM}$	

Note: See Page 15, Volume 1, for tabulated values of A/R_c and Δ/R_c versus M

Card(s)	48	$CL_{1,1,1}$ $CL_{2,1,1}$ . . . $CL_{NØAL,1,1}$ $CL_{1,2,1}$ . . $CL_{NØAL,NØMN,1}$ $CL_{1,1,2}$ . . . $CL_{NØAL,NØMN,NØSEC}$	Airfoil Section Lift Coefficient Tabulated Versus Angle Of Attack, Mach Number, Radius Eight Values Per Card, 10 Columns Per Value (8F 10.4 Format). Maximum Of 288 Cards First Subscript = Airfoil Angle Of Attack Second Subscript = Mach Number Third Subscript = Blade Radial Station For Aerodynamic Data
Card(s)	49	$CD_{1,1,1}$ $CD_{2,1,1}$ . . . $CD_{NØAL,1,1}$ $CD_{1,2,1}$ . . . $CD_{NØAL,NØMN,1}$ $CD_{1,1,2}$ . . . $CD_{NØAL,NØMN,NØSEC}$	Airfoil Section Drag Coefficient Tabulated Versus Angle Of Attack, Mach Number, Radius Eight Values Per Card, 10 Columns Per Value (8F 10.4 Format). Maximum Of 288 Cards First Subscript = Airfoil Angle Of Attack Second Subscript = Mach Number Third Subscript = Blade Radial Station For Aerodynamic Data

50	Card(s)	50	$CM_{1,1,1}$ $CM_{2,1,1}$ . . . $CM_{NØAL,1,1}$ $CM_{1,2,1}$ . . . $CM_{NØAL,NØMN,1}$ $CM_{1,1,2}$ . . . $CM_{NØAL,NØMN,NØSEC}$	Airfoil Section Pitching Moment Coefficient Referenced To An Axis At C(.25 + XC4) Eight Values Per Card, 10 Columns Per Value (8F 10.4 Format). Maximum Of 288 Cards First Subscript = Airfoil Angle Of Attack Third Subscript = Blade Radial Station For Aerodynamic Data

Note: Airfoil data omitted if NAERO ≠ 0

Notes:

1. All integer variables (i.e. variables beginning with letters I-N) must be right justified with no decimal point.

L1	FORTRAN Symbol For Card Reader	
L2	FORTRAN Symbol For Printer	
L3	FORTRAN Symbol For Tape 1 (Working Tape)	Binary Tape
L4	FORTRAN Symbol For Tape 2 (Working Tape)	"
L5	FORTRAN Symbol For Tape 3 (Working Tape)	"
L6	FORTRAN Symbol For Tape 4 (Working Tape)	"
L7	FORTRAN Symbol For Tape 5 (Working Tape)	"
L8	FORTRAN Symbol For Tape 6 (Working Tape)	"

Card 0 (Precedes Card 1)

Columns 1-10	NSTART	Control for user reentry into program. Anytime program is user terminated for future execution with NSTART, Tapes L3, L4, L5, L6, L7, L8 must be saved.
11-20	NCHK	NCHK ≠ 0 Torque Equilibrium Not Achieved, Program Returns to REV05. NCHK = 0 Torque Equilibrium Achieved, Program Continues
21-30	KNTRL	Program control for return to REV03 or REV07 after initial convergence on rotor torque equilibrium. KNTRL ≠ 0 Shock wave parameters are to be calculated KNTRL = 0 Shock wave parameters are not to be calculated. Program proceeds to REV07 (via NSTAB).
31-40	NSTAB	Program control for entry into dynamic stability portion of program. NSTAB = 0 Execution of dynamic stability and no torque iteration. NSTAB > 0 Execute dynamic stability and torque iteration. NSTAB < 0 Torque iteration and no dynamic stability.

2. NØPT controls the options for calculating time histories and/or loads.

NØPT = 1 Time History (Stability) Only
NØPT = 2 Load Calculation Only
NOPT = 3 Time History (Stability) And Load Calculation

3. Flapping hinge is coincident with or outboard of lagging hinge (E2 $\geq$ E1).

4. Control indicating reference axis for chordwise center of gravity location and feathering inertia distribution.

NREF = 1 Reference Is Feathering Axis
NREF = 2 Reference Is Blade Leading Edge

5. Control on method for calculation of aerodynamic coefficients.

NAERØ = 0 Use Tabular Data
NAERØ ≠ 0 Use Analytical Approach (Subroutine AERDAT)

Note: AERDAT is user supplied subroutine which would supply aerodynamic data using an analytical method.

6. STL and STLRF define a stall band for the linear analysis. The stall band uses the reverse flow region circle as the generating line and is described by adding STL and STLRF (negative quantity) to this line as shown in Figure 14.

7. Azimuth angle at which pilot rotor control is initiated; measured with respect to 90° azimuth position.

8. NXF stations are input, but the lagging hinge station and flapping hinge station are considered as additional stations by the program. Therefore NXF+2 input quantities are required.

9. For the Dynamic Stability Data, subscripts for BØDYF(I,J,K) are

First subscript = Body angle of attack
Second subscript = Body forces at specified angle of attack
Third subscript = Free stream Mach number

10. Airfoil data reference axis, percent chord (in decimal form), measured with respect to C/4 - positive aft.

11. Control on calculation of integer angles of attack versus blade radius; used to define contour plots.

INTAN = 0 No Calculation
INTAN ≠ 0 Angles Are Calculated

12. Contour on harmonic analysis of flapping and feathering angles.

NHARB = 0 No Harmonic Analysis
NHARB > 0 Angles Are Harmonically Analyzed

NHARB is the number of harmonics to be calculated.

13. Contour on harmonic analysis of all airloads distributions.

NØHAR = 0 No Harmonic Analysis
NØHAR > 0 Airloads Are Harmonically Analyzed

NØHAR is the number of harmonics to be calculated.

14. θ_{INPUT} = A0S-A1S(Cos(ψ + APHASE)) - B1S(Sin(ψ + APHASE).

15. If IDYN = 0, omit cards 20-35 inclusive.

APPENDIX B

OUTPUT SYMBOL DEFINITION SUPPLEMENT FOR ROTOR RE-ENTRY VEHICLE (REV) COMPUTER PROGRAMS

REV PROGRAM

OUTPUT SYMBOL DEFINITION

The major portion of the output symbols are defined in Appendix A wherein the input for the Rotor Re-Entry Vehicle Program is listed. The remaining output symbols are defined below.

T	Rotor blade feathering angle transient response.
TP	Rotor blade feathering angular velocity transient response.
Z	Rotor blade lag angle transient response.
ZP	Rotor blade lag angular velocity transient response.
B	Rotor blade flapping angle transient response.
BP	Rotor blade flapping velocity transient response.
Note:	T, TP, Z, ZP, B, BP are linear transient responses due to an initial unit step for any or all of these parameters.
PSI	Rotor blade azimuth station, degrees.
R	Rotor blade radius, Ft.
E	Rotor blade flapping hinge offset from center line of rotation, Ft.
I1	Rotor blade flapping moment of inertia about flapping hinge, slug-ft^2.
MU	Advance ratio.
LAMBDA	Inflow ratio.
THETA 0 (Steady)	Pilot collective pitch angle input, degrees.
THETA 1	Cosine component of pilot pitch angle input, degrees.
THETA 1 (Sin)	Sine component of pilot pitch angle input, degrees.

CP Factor	Blade radial flow correction factor which appears in rotor torque equation.
CH Factor	Blade radial flow correction factor which appears in rotor H force expression.
BETA	Rotor blade flapping angle response, rad.
THETA	Rotor blade feathering angle response, rad.
LAG ANGLE	Rotor blade lagging angle response, rad.

APPENDIX C

FORTRAN LISTINGS FOR

ROTOR RE-ENTRY VEHICLE (REV)

COMPUTER PROGRAMS

```
C     REV MAIN PROGRAM                                                    RV1    1
C     ******************************************************************* RV1    2
C                                                                         RV1    3
C                                                                         RV1    4
C                        MAIN PROGRAM FOR REV PROGRAM                     RV1    5
C                                                                         RV1    6
C                                                                         RV1    7
C     ******************************************************************* RV1    8
      COMMON L1, L2, L3, L4, L5, L6, L7, L8, NCHK                         RV1    9
      CALL TAPE                                                           RV1   10
      READ ( L1,100) NSTART,NCHK,KNTRL,NSTAB                              RV1   11
  100 FORMAT (4I10)                                                       RV1   12
      GO TO (110,110,120,130,140,150,210), NSTART                         RV1   13
  110 CALL REV02                                                          RV1   14
  120 CALL REV03                                                          RV1   15
  130 CALL REV04                                                          RV1   16
  140 CALL REV05                                                          RV1   17
  150 CALL REV06                                                          RV1   18
      IF (NSTAB) 160,210,160                                              RV1   19
  160 IF (NCHK) 140,170,140                                               RV1   20
  170 IF (KNTRL) 180,190,180                                              RV1   21
  180 KNTRL = 0                                                           RV1   22
      GO TO 120                                                           RV1   23
  190 IF (NSTAB) 220,210,200                                              RV1   24
  200 NSTAB = 0                                                           RV1   25
  210 CALL REV07                                                          RV1   26
      GO TO 120                                                           RV1   27
  220 STOP                                                                RV1   28
      END                                                                 RV1   29
```

```
      SUBROUTINE TAPE                                                    TPE    1
C                                                                        TPE    2
C       THIS SUBROUTINE ESTABLISHES ASSIGNMENTS FOR I/O DEVICES.         TPE    3
C     L1  FORTRAN SYMBOL FOR CARD READER                                 TPE    4
C     L2  FORTRAN SYMBOL FOR CARD PRINTER                                TPE    5
C     L3  FORTRAN SYMBOL FOR TAPE 1 (WORKING TAPE)  BINARY TAPE          TPE    6
C     L4  FORTRAN SYMBOL FOR TAPE 2 (WORKING TAPE)  BINARY TAPE          TPE    7
C     L5  FORTRAN SYMBOL FOR TAPE 3 (WORKING TAPE)  BINARY TAPE          TPE    8
C     L6  FORTRAN SYMBOL FOR TAPE 4 (WORKING TAPE)  BINARY TAPE          TPE    9
C     L7  FORTRAN SYMBOL FOR TAPE 5 (WORKING TAPE)  BINARY TAPE          TPE   10
C     L8  FORTRAN SYMBOL FOR TAPE 6 (WORKING TAPE)  BINARY TAPE          TPE   11
C                                                                        TPE   12
      COMMON L1, L2, L3, L4, L5, L6, L7, L8, NCHK                        TPE   13
      L1 =                                                               TPE   14
      L2 =                                                               TPE   15
      L3 =                                                               TPE   16
      L4 =                                                               TPE   17
      L5 =                                                               TPE   18
      L6 =                                                               TPE   19
      L7 =                                                               TPE   20
      L8 =                                                               TPE   21
      RETURN                                                             TPE   22
      END                                                                TPE   23
```

```
      SUBROUTINE REVC2                                                  RV2   1
C                                                                       RV2   2
C                                                                       RV2   3
C     NMOCK = 0  CALCULATE SHAFT ALPHA USING THRUST COEFFICIENT         RV2   4
C     NMOCK = 1  CALCULATE SHAFT ALPHA  W/O  THRUST COEFFICIENT         RV2   5
C     ITEST = 1  CALCULATE VFREE AND W FROM LOADS INITIALLY             RV2   6
C     ITEST = 2  USE VFREE AND W FROM PREVIOUS STEP OR TAPE             RV2   7
      COMMON L1, L2, L3, L4, L5, L6, L7, L8, NCHK                       RV2   8
      DIMENSION SCMO(10),SALOL(10),SCDO(10),SCLAD(10),SCMTAD(10),       RV2   9
     1SCLREF(10),SCDSLP(10),SCMSLP(10),SAO(10),SADOD(10),SAMOM(10)      RV2  10
      DIMENSION RCMO(10),RALCL(10),RCDO(10),RCLAD(10),RCMTAD(10),       RV2  11
     1RCLREF(10),RCDSLP(10),RCMSLP(10),RAO(10),RADOD(10),RAMOM(10)      RV2  12
      DIMENSION  ALFAC(12,24),AMACH( 8),ASTLN( 8),ASTLP( 8),HEAD1(17),  RV2  13
     1  ALFA(48),C(16),BCINIT(6),AMSI(10),X(16),FA(16),CG(16),          RV2  14
     2  THX(16),EM(16),AIC(16),CM(4),CQ(4),COSAL(24),SINAL(24),         RV2  15
     3    CL(48, 8,6),CD(48, 8,6),CM(48, 8,6),HEAD(17),CLAD(10),       RV2  16
     4  CLREF(10),AMCH(10),AO(10),ALOL(10),CDO(10),CMO(10),CMTAD(10),   RV2  17
     5  AMDOR(10),DOR(10),XOR(10),CDSLP(10),CMSLP(10),ADOD(10),         RV2  18
     6  AMOM(10),RADN(6),AMUC(12,25),RHOC(12,25),ANS(4),ALAM(12,25)     RV2  19
      INTEGER IN(11)                                                    RV2  20
      DIMENSION AA(9,13),STHX(16),CTHX(16),AS2(16),AS3(16),AS4(16),     RV2  21
     1AS5(16),AS6(16),XA(16),AX(16),BX(16),CX(16),DX(16),FX(16),XX1(16), RV2  22
     2CC(16),PSI(25),CPSI(25),SPSI(25),XX(16)                           RV2  23
      REAL M,IX,IY,IZ,JXZ,I1,I2,I3,I4,I5,I6,I7,I8,IR,PRMT(5),Y(13),     RV2  24
     2  INPUT(11,7),BODYF(21,4,2),MACH,MACH1,MACH2,COEF(20,4),TOL(8)    RV2  25
C                                                                       RV2  26
C                                                                       RV2  27
C                                                                       RV2  28
C                                                                       RV2  29
C                                                                       RV2  30
      REWIND L3                                                         RV2  31
      REWIND L5                                                         RV2  32
      REWIND L6                                                         RV2  33
      REWIND L8                                                         RV2  34
      READ (L1,150)  NOPT,NOCYCL, (BCINIT(I), I=1,6)                    RV2  35
      READ (L1,180)  NCASE, HEAD                                        RV2  36
      WRITE  (L2,160) NCASE,HEAD,NOPT,NOCYCL, (BCINIT(I), I=1,6)        RV2  37
C                                                                       RV2  38
C     READ  BLADE  PARAMETERS  AND  CALCULATE  INERTIAS .               RV2  39
C                                                                       RV2  40
      READ (L1,1000) R, E1, E2, AMSI(1),AMSI(2), AMSI(5), AMSI(8)       RV2  41
      READ (L1,200) NXF,FCNSP,AKTZ,ALAMO,ALL,ALH,DELAL                 RV2  42
      READ (L1,990) NX,NX1,NX2,NREF,NAERO,NMOCK                         RV2  43
      WRITE (L2,220) FCNSP,AKTZ,NX,NX1,NX2,NREF                         RV2  44
      WRITE (L2,100) R,E1,E2,AMSI(1),AMSI(5),AMSI(8)                    RV2  45
  100 FORMAT(/42X,30H      BLADE PARAMETERS        ///14H BLADE RADIUS=  RV2  46
     1  F10.5,25H FT    LAG HINGE OFFSET = F10.5,31H FT     FLAPPING HIN RV2  47
     2GE OFFSET = F10.5,3H FT//13H BLADE MASS = F10.5,56H SLUGS    BLADE RV2  48
     3 MOMENT OF INERTIA ABOUT FLAPPING HINGE = F10.3,10H SL FT SQ //48H RV2  49
     4 BLADE MOMENT OF INERTIA ABOUT FEATHERING AXIS =F10.5, 9H SL FT SQ RV2  50
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     5//)                                                                    RV2   51
      READ (L1,190) (X(I),C(I),FA(I),CG(I),THX(I),FM(I),AIC(I),I=1,NX)       RV2   52
      WRITE (L2,210) (X(I),C(I),FA(I),CG(I),THX(I),FM(I),AIC(I),I=1,NX)      RV2   53
      E21 = E2-E1                                                            RV2   54
      X1=E1/R                                                                RV2   55
      X2=E2/R                                                                RV2   56
      DO 110 J=1,NX                                                         1RV2   57
      X(J) = X(J)*12.0                                                      1RV2   58
      C(J) = C(J)*12.0                                                      1RV2   59
      FA(J) = FA(J)*12.0                                                    1RV2   60
      CG(J) = CG(J)*12.0                                                    1RV2   61
      FM(J) = FM(J)/12.0                                                    1RV2   62
  110 AIC(J) = AIC(J)*12.0                                                  1RV2   63
C                                                                           RV2   64
C     READ  AERODYNAMIC  DATA  AND  CALCULATE  C  COLUMNS .                 RV2   65
C                                                                           RV2   66
  120 READ (L1,230) AMU,OMEGA,ALT,NP,AKTB,FSPRNG,BSPRNG,ZSPRNG,             RV2   67
     1  FDAMP,BDAMP,ZDAMP                                                    RV2   68
      READ(L1,260)NM,STL,STLRF,(AMCH(I),AO(I),CDSLP(I),CMSLP(I),            RV2   69
     1CLREF(I),CD0(I),CM0(I),I=1,NP)                                        RV2   70
      READ(L1,130)(ALOL(I),ADCD(I),AMOM(I),CLAD(I),CMTAD(I),I=1,NM)         RV2   71
      READ (L1,140) (SAO(I),SCDSLP(I),SCMSLP(I),SCLREF(I),SCD0(I),          RV2   72
     1SCM0(I),I=1,NM)                                                       RV2   73
      READ(L1,130)(SALOL(I),SADCD(I),SAMOM(I),SCLAD(I),SCMTAD(I),I=1,NM)    RV2   74
      READ (L1,140) (RAO(I),RCDSLP(I),RCMSLP(I),RCLREF(I),RCD0(I),          RV2   75
     1RCM0(I),I=1,NM)                                                       RV2   76
      READ(L1,130)(RALOL(I),RADCD(I),RAMOM(I),RCLAD(I),RCMTAD(I),I=1,NM)    RV2   77
  130 FORMAT(5F10.6)                                                        RV2   78
  140 FORMAT(6F10.6)                                                        RV2   79
      WRITE (L2,240) AMU,OMEGA,ALT,AKTB,FSPRNG,BSPRNG,ZSPRNG,FDAMP,         RV2   80
     1  BDAMP,ZDAMP                                                        RV2   81
      WRITE (L2,250) STL,STLRF,                                             RV2   82
     1  (AMCH(I),CM0(I),AO(I),ALOL(I),CD0(I),CLAD(I),CMTAD(I),I=1,NM)      RV2   83
  150 FORMAT(2I5,6F10.5 )                                                   RV2   84
  160 FORMAT(1H1,28X,33HTHREE DEGREES OF FREEDOM          ///15X,57H        RV2   85
     1  CALCULATION OF INERTIAS                            ///11X,9HCASE   RV2   86
     2NO.=I5,17A4///40X,36HINPUT DATA FOR OPTIONAL TIME HISTORY//25X,12H    RV2   87
     3  FEATHERING,12X,3HLAG,15X,8HFLAPPING//6X,4HNOPT,4X,6HNOCYCL,5X,      RV2   88
     4  2H T,8X,2HTP,9X,1HZ,8X,2HZP,9X,1HB,8X,2HBP/2I10,6F10.5//120H        RV2   89
     5  TIME HISTORY (STABILITY) IS TO BE CALCULATED IN   REV03   FOR       RV2   90
     6  NUMBER OF CYCLES=NOCYCL,ONLY IF NOPT=1 OR NOPT=3///)                RV2   91
  170 FORMAT(    17A4)                                                      RV2   92
  180 FORMAT(I5,17A4)                                                       RV2   93
  190 FORMAT(7F10.4)                                                        RV2   94
C                                                                           RV2   95
  200 FORMAT(I10,7F10.4)                                                    RV2   96
  210 FORMAT (1H1,25H BLADE SECTION PROPERTIES,//10X,          RADIUS,FT    RV2   97
     1,      CHORD,FT.        E.A.,FT.        C.G.,FT.      TWIST,DEG.     M RV2   98
     2ASS,SL/FT.      IC,SL.FT.//(F17.4,6F15.4))                            RV2   99
  220 FORMAT(29H  FEATHERING CONTROL SPRING =F10.2,11HFT.-LB/RAD.//8H  A    RV2  100
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     1KTZ =F10.6                                                                RV2 101
     2    //36H TOTAL(INERTIA INC. AERO.)STATIONS =I10,58H    FIRST AERO RV2 102
     3DYNAMIC STATION NUMBER (ROOT-TO-TIP ORDER) =I10//27H  LAST AERODYN RV2 103
     4AMIC NUMBER =I10//8H  NREF =I2 ,95H    =1 (FEATHERING AXIS) OR =2  RV2 104
     5(LEADING EDGE), AS REFERENCE FROM WHICH CG AND IC ARE MEASURED .)  RV2 105
  230 FORMAT(3F10.5,I10,4F10.3)                                             RV2 106
  240 FORMAT(1H1,46X,23HAERODYNAMIC  PARAMETERS//5H MU =F10.6,5X,7HOMEGA RV2 107
     1 =F10.5,7HRAD/SEC,5X,12H  ALTITUDE =F10.0                             RV2 108
     2         //5X,5HAKTB=F10.6,5X,7HFSPRNG=F10.3,4X,7HBSPRNG=F10.3,4X, RV2 109
     37HZSPRNG=F10.3//5X,6HFDAMP=F10.5,5X,6HBDAMP=F10.5,5X,6HZDAMP=F10.3 RV2 110
     4///)                                                                  RV2 111
  250 FORMAT(30X,17HSTALL  FROM  UT =F10.6,5X,8HTO  UT =F10.6               RV2 112
     1                    ///42X,36HPARAMETERS  FOR  NORMAL-FLOW  REGI RV2 113
     2ON//15H       MACH  NO.,10X,3HCMO,13X,2HA0,11X,4HALOL,12X,3HCDO,11X RV2 114
     3,4HCLAD,12X,5HCMTAD//(7F15.6))                                        RV2 115
  260 FORMAT(I10,2F10.5/(7F10.6))                                           RV2 116
      READ (L1,990)NITB,ILAM,NICM,LFAR,LSS2,LCON,IDYN,ITEST                 RV2 117
      READ(L1,1000) TOA,BOA,ZOA,APHASE,PIRA,RORA,SIDSLP                     RV2 118
      SIDSLP = SIDSLP / 57.2958                                             RV2 119
      TOA = TOA/57.2958                                                     RV2 120
      BOA = BOA/57.2958                                                     RV2 121
      ZOA = ZOA/57.2958                                                     RV2 122
      Q2=2.0*PIRA/OMEGA                                                     RV2 123
      P2=2.0*RORA/OMEGA                                                     RV2 124
      CALL AT62(ALT,ANS)                                                    RV2 125
      REFM=ANS(4)                                                           RV2 126
      RHO=ANS(1)/.002378                                                    RV2 127
      TIN=ANS(3)*1.8                                                        RV2 128
      READ (L1,1000) AOS,AIS,PIS,BTOL,ATOL8,CQTOL                           RV2 129
      NXF2 = NXF&2                                                          RV2 130
      IF(ILAM) 290,270,290                                                  RV2 131
  270  DO 280 I=1,NP                                                        1RV2 132
      DO 280 J=1,NXF2                                                       2RV2 133
  280 ALAM(J,I)=ALAMO                                                       2RV2 134
      GO TO 300                                                             RV2 135
  290 READ(L1,1000)((ALAM(J,I),J=1,NXF2),I=1,NP)                            RV2 136
  300 DO 310 J=1,NXF2                                                       1RV2 137
      DO 310 I=1,NP                                                         2RV2 138
      AMUC(J,I)=AMU                                                         2RV2 139
  310 RHOC(J,I)=RHO                                                         2RV2 140
C                    ROTOCHUTE NON LINEAR STABILITY      (RCSTAB)          RV2 141
C                                                                           RV2 142
      ALAMFS=ALAMO                                                          RV2 143
      AMUFS=AMU                                                             RV2 144
      IF (IDYN) 320,640,320                                                 RV2 145
  320 NDIM=13                                                               RV2 146
      DO 330 I=1,11                                                         1RV2 147
  330 IN(I)=-1                                                              1RV2 148
      IN(6)=0                                                               RV2 149
      IN(8) = 0                                                             RV2 150
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      IN(9) = 0                                                          RV2 151
C                              INPUT                                     RV2 152
      READ(L1,170)   HEAD1                                               RV2 153
      READ (L1,1000) (TOL(J),J=1,8)                                      RV2 154
  340 READ(L1,350)I,IN(I),(INPUT(I,J),J=1,7)                             RV2 155
  350 FORMAT(I2,I8,7F10.5)                                               RV2 156
      IF(I-10) 340,360,420                                               RV2 157
C                              READ BODY FORCE DATA                      RV2 158
  360 K=1                                                                RV2 159
      READ(L1,1000) MACH1,BM1,BD1,AD1                                    RV2 160
  370 DO 380 I=1,21                                                     1RV2 161
      READ(L1,1000) (BODYF(I,J,K),J=1,4)                                1RV2 162
      IF(BODYF(I,1,K)&BODYF(I,2,K)&BODYF(I,3,K)) 380,400,380            1RV2 163
  380 CONTINUE                                                          1RV2 164
      WRITE(L2,390)                                                      RV2 165
  390 FORMAT(//20X,24HBODY FORCE TABLE TOO BIG)                          RV2 166
      CALL EXIT                                                          RV2 167
  400 IF(K-1) 410,410,340                                                RV2 168
  410 NALPHA=I-1                                                         RV2 169
      READ(L1,1000) MACH2                                                RV2 170
      K=2                                                                RV2 171
      GO TO 370                                                          RV2 172
C                              TEST COMPLETENESS OF DATA                 RV2 173
  420 DO 430 I=1,11                                                     1RV2 174
      IF(IN(I)) 440,430,430                                             1RV2 175
  430 CONTINUE                                                          1RV2 176
      GO TO 460                                                          RV2 177
  440 WRITE(L2,450)                                                      RV2 178
  450 FORMAT(//20X,15HDATA INCOMPLETE)                                   RV2 179
      CALL EXIT                                                          RV2 180
C                              INTERPOLATE BODY FORCES                   RV2 181
  460 MACH=INPUT(1,1)                                                    RV2 182
      IF(MACH-AMIN1(MACH1,MACH2)) 480,470,470                            RV2 183
  470 IF(MACH-AMAX1(MACH1,MACH2)) 500,500,480                            RV2 184
  480 WRITE(L2,490)                                                      RV2 185
  490 FORMAT(//20X,14HWRONG MACH NOS)                                    RV2 186
      CALL EXIT                                                          RV2 187
  500 S2=(MACH-MACH1)/(MACH2-MACH1)                                      RV2 188
      S1=(MACH2-MACH)/(MACH2-MACH1)                                      RV2 189
      DO 520 I=1,NALPHA                                                 1RV2 190
      IF(BODYF(I,1,1)-BODYF(I,1,2)) 530,510,530                         1RV2 191
  510 COEF(I,1)=BODYF(I,1,1)                                            1RV2 192
      DO 520 J=2,4                                                      2RV2 193
  520 COEF(I,J)=S1*BODYF(I,J,1)&S2*BODYF(I,J,2)                         2RV2 194
      GO TO 550                                                          RV2 195
  530 WRITE(L2,540)                                                      RV2 196
  540 FORMAT(//20X,26HAERO ALPHAS NOT CONSISTANT )                       RV2 197
      CALL EXIT                                                          RV2 198
C                              CONVERT INPUT DATA TO USEFUL FORM AND OUTPUT RV2 199
  550 FACTL=ANS(1) *3.14159*INPUT(1,3)*INPUT(1,3)/8.0                    RV2 200
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      FACTM=FACTL*INPUT(1,3)                                                  RV2 201
      CON=BM1-BD1                                                             RV2 202
      DO 560 J=1,NALPHA                                                      1RV2 203
      SOA=SIN(COEF(J,1)/57.2958)                                             1RV2 204
      COA=COS(COEF(J,1)/57.2958)                                             1RV2 205
  560 COEF(J,4)=COEF(J,4)-COEF(J,2)*(AD1*COA-CON*SOA)-COEF(J,3)*(CON*        1RV2 206
     1COA&AD1*SOA)                                                            RV2 207
      G=INPUT(1,4)                                                            RV2 208
      A=INPUT(2,1)                                                            RV2 209
      BMC=BM1-INPUT(2,2)                                                      RV2 210
      M=INPUT(2,3)                                                            RV2 211
      IX=INPUT(2,4)                                                           RV2 212
      IY=INPUT(2,5)                                                           RV2 213
      IZ=INPUT(2,6)                                                           RV2 214
      JXZ=INPUT(2,7)                                                          RV2 215
      DD=IX*IZ-JXZ*JXZ                                                        RV2 216
      I1=JXZ*(IX-IY&IZ)/DD                                                    RV2 217
      I2=IIZ*(IY-IZ)-JXZ*JXZ)/DD                                              RV2 218
      I3=IX*IZ/DD                                                             RV2 219
      I4=IZ*JXZ/DD                                                            RV2 220
      I5=(IZ-IX)/IY                                                           RV2 221
      I6=JXZ/IY                                                               RV2 222
      I7=JXZ/IZ                                                               RV2 223
      I8=(IX-IY)/IZ                                                           RV2 224
      B=INPUT(3,4)-INPUT(2,2)                                                 RV2 225
      IR=INPUT(3,3)                                                           RV2 226
      DO 570 I = 1,9                                                         1RV2 227
      DO 570 J = 1,13                                                        2RV2 228
  570 AA(I,J) = 0.0                                                          2RV2 229
      DO 580 I=1,7                                                           1RV2 230
  580 AA(1,I) = INPUT(4,I)                                                   1RV2 231
      DO 590 I=1,6                                                           1RV2 232
  590 AA(1,I&7) = INPUT(5,I)                                                 1RV2 233
      DO 600 I=1,4                                                           1RV2 234
  600 PRMT(I)=INPUT(7,I)                                                     1RV2 235
      ROTD = P * 2.0                                                          RV2 236
      WRITE (L2,610) HEAD,INPUT(1,1),ANS(1),INPUT(1,4),INPUT(1,3),            RV2 237
     1 INPUT(2,3),ROTD,INPUT(3,2),INPUT(2,1),INPUT(2,2),INPUT(3,3),           RV2 238
     2 INPUT(3,4),(INPUT(2,I),I= 4,7),(PRMT(I),I = 1,3)                       RV2 239
  610 FORMAT (1H1,50X,32HROTOCHUTE STABILITY TIME HISTORY ,//,                RV2 240
     1 17X,17A4,//,9X,13HMACH NUMBER = ,F7.2,17X,9HDENSITY = ,                RV2 241
     2 E9.7,9H SL/FT CU ,17X,16HACC OF GRAVITY = ,F7.4,11H FT/SEC/SEC ,       RV2 242
     3 //,29X,9HBODY DATA ,55X,10HROTOR DATA ,//,9X,10HBODY DIA = ,F7.2       RV2 243
     4 ,12X,11HBODY MASS = ,F7.2,3H SL ,16X,11HROTOR DIA = ,F7.2,3H FT ,      RV2 244
     5 11X,6HSB    = ,F7.2,6H SL FT ,//,13X,6HA     = ,F7.2,3H FT ,13X,      RV2 245
     6 7HBC     = ,F7.2,3H FT ,21X,6HIR    = ,F7.2,9H SL FT SQ ,5X,          RV2 246
     7 6HBR     = ,F7.2,3H FT ,//,12X,7HIX     = ,F7.2,9H SL FT SQ ,7X,      RV2 247
     8 7HIY     = ,F7.2,9H SL FT SQ ,//,12X,7HIZ     = ,F7.2,9H SL FT SQ ,    RV2 249
     9 6X,9HJXZ     = ,F7.2,9H SL FT SQ,///,9X,12HSTART TIME = ,F7.3,        RV2 249
     A 4H SEC,15X,11HSTOP TIME = ,F7.3,4H SEC,22X,11HINCREMENT = ,F7.3,      RV2 250
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     8 4H SEC ,///)                                                          RV2 251
       WRITE(L2,620)MACH1,BM1,MACH2,BM1,MACH,BM,((BODYF(I,J,1),J=1,4)        RV2 252
     1   ,(BODYF(I,J,2),J=2,4),(COEF(I,J),J=2,4),I=1,NALPHA)                 RV2 253
   620 FORMAT(//50X,16HAERODYNAMIC DATA 30X,27HINTERPOLATED DATA //          RV2 254
     1   10X,3(12H     MACH NO F6.3, 6H    BM F6.3,5X)//                    RV2 255
     2   9X,5HALPHA  3(35H          CL        CD        CM    )/           RV2 256
     3  /(5X,F5.3,5X,3F10.5,5X,3F10.5,5X,3F10.5))                            RV2 257
C                          CONVERT AERO DATA                                 RV2 258
       DO 630 I=1,NALPHA                                                    1RV2 259
       COEF(I,1)=COEF(I,1)/57.2958                                          1RV2 260
       COEF(I,2)=COEF(I,2)*FACTL                                            1RV2 261
       COEF(I,3)=COEF(I,3)*FACTL                                            1RV2 262
   630 COEF(I,4)=COEF(I,4)*FACTM                                            1RV2 263
       WRITE (L8) G,A,BMC,M,IX,IY,IZ,JXZ,DD,I1,I2,I3,I4,I5,I6,NDIM          RV2 264
     1,I7,I8,B,IR,MACH,MACH1,MACH2                                          RV2 265
     2,BM1,NALPHA,((COEF(I,J),I=1,NALPHA),J=1,4),SIDSLP                     RV2 266
     3,R,(TOL(I),I=1,8)                                                     RV2 267
       I3F=0                                                                RV2 268
       ZZMX=0.                                                              RV2 269
       ZZMY=0.                                                              RV2 270
       ZZMZ=0.                                                              RV2 271
       VDUM=OMEGA*R                                                         RV2 272
       ODUM=OMEGA                                                           RV2 273
       RDUM=R                                                               RV2 274
       WRITE (L8) AMUFS,ALAMFS,NMOCK,ITEST                                  RV2 275
       WRITE (L8) AA,(PRMT(I),I=1,4),I3F                                    RV2 276
       WRITE (L8)  RDUM,VDUM,ODUM,ZZMX,ZZMY,ZZMZ                            RV2 277
   640 WRITE (L3) LCON,NXF2,NP,((ALAM(J,I),AMUC(J,I),RHOC(J,I),J=1,NXF2),   RV2 278
     1     I=1,NP)                                                          RV2 279
       IF(IDYN) 660,650,660                                                 RV2 280
   650 WRITE (L8) AMUFS,ALAMFS,NMOCK,ITEST                                  RV2 281
   660 DO 670 I=1,NM                                                        1RV2 282
       AMOM(I)=AMOM(I)/57.2958                                              1RV2 283
       ADOD(I)=ADOD(I)/57.2958                                              1RV2 284
       CLREF(I)=CLREF(I)/5.73                                               1RV2 285
       CDSLP(I)=CDSLP(I)*10.0                                               1RV2 286
       CMSLP(I)=CMSLP(I)*10.0                                               1RV2 287
       CMO(I) = CMO(I) / 5.73                                               1RV2 288
       ALOL(I) = ALOL(I) / 57.29578                                         1RV2 289
       CDO(I) = CDO(I) / 5.73                                               1RV2 290
       AO(I) = AO(I) * 10.0                                                 1RV2 291
       CLAD(I) = CLAD(I) * 10.0                                             1RV2 292
       CMTAD(I) = CMTAD(I) * 10.0                                           1RV2 293
       SAMOM(I)=SAMOM(I)/57.2958                                            1RV2 294
       SADOD(I)=SADOD(I)/57.2958                                            1RV2 295
       SCLREF(I)=SCLREF(I)/5.73                                             1RV2 296
       SCDSLP(I)=SCDSLP(I)*10.0                                             1RV2 297
       SCMSLP(I)=SCMSLP(I)*10.0                                             1RV2 298
       SCMO(I)=SCMO(I)/5.73                                                 1RV2 299
       SALOL(I)=SALOL(I)/57.2958                                            1RV2 300
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      SCDO(I)=SCDO(I)/5.73                                              IRV2 301
      SAO(I)=SAO(I)*10.0                                                IRV2 302
      SCLAD(I)=SCLAD(I)*10.0                                            IRV2 303
      SCMTAD(I)=SCMTAD(I)*10.C                                          IRV2 304
      RAMOM(I)=RAMOM(I)/57.2958                                         IRV2 305
      RADOD(I)=RADOD(I)/57.2958                                         IRV2 306
      RCLREF(I)=RCLREF(I)/5.73                                          IRV2 307
      RCDSLP(I)=RCDSLP(I)*10.C                                          IRV2 308
      RCMSLP(I)=RCMSLP(I)*10.C                                          IRV2 309
      RCMO(I)=RCMO(I)/5.73                                              IRV2 310
      RALOL(I)=RALOL(I)/57.2958                                         IRV2 311
      RCDO(I)=RCDO(I)/5.73                                              IRV2 312
      RAO(I)=RAO(I)*10.0                                                IRV2 313
      RCLAD(I)=RCLAD(I)*10.0                                            IRV2 314
  670 RCMTAD(I)=RCMTAD(I)*10.C                                          IRV2 315
      TORQSV = 0.                                                        RV2 316
      ALFAR = 0.0                                                        RV2 317
      NTOR = C                                                           RV2 318
      DO 680  I=1,NX                                                    IRV2 319
      THX(I) = THX(I)/57.2957E                                          IRV2 320
      STHX(I) = SIN(THX(I))                                             IRV2 321
      CTHX(I) = COS(THX(I))                                             IRV2 322
  680 XX(I) = X(I) - E2 * 12.C                                          IRV2 323
      GO TO (690,720), NREF                                              RV2 324
  690 DO 700  I=1,NX                                                    IRV2 325
      AS5(I) =   CG(I)  *                                               IRV2 326
      AS3(I) = STHX(I) *                                                IRV2 327
      AS4(I) = CTHX(I) *                                                IRV2 328
  700 AS6(I)=AIC(I)*CTHX(I)*CTHX(I)                                     IRV2 329
      AMSI(3) = DINT1(AS3,X,1,NX) /12.0                                  RV2 330
      AMSI(4) = DINT1(AS4,X,1,NX) /12.0                                  RV2 331
      DO 710 I=1,NX                                                     IRV2 332
      AS3(I) = AS3(I) * XX(I)                                           IRV2 333
  710 AS4(I) = AS4(I) * XX(I)                                           IRV2 334
      GO TO 740                                                          RV2 335
  720 DO 730  I=1,NX                                                    IRV2 336
      AIC(I) = AIC(I) & FA(I) * (FA(I) - CG(I) - CG(I)) * EM(I)         IRV2 337
  730 CG(I) = CG(I) - FA(I)                                             IRV2 338
      GO TO 65C                                                          RV2 339
  740 AMSI(6) = DINT1(AS3,X,1,NX) /144.0                                 RV2 340
      AMSI(7) = DINT1(AS4,X,1,NX) /144.0                                 RV2 341
      AMSI(9)=DINT1(AS6,X,1,NX)/144.                                     RV2 342
      FLOATN = NP                                                        RV2 343
      NP1 = NP & 1                                                       RV2 344
      DPSI = 6.283185 / FLOATN                                           RV2 345
      DPSI2 = DPSI /2.0                                                  RV2 346
      NV = (NP1 * (NP1 & 1))/2                                           RV2 347
      NV0 = (NP * (NP & 1)) /2                                           RV2 348
      DPSI0 = 360.0 / FLOATN                                             RV2 349
      PSIR = C.0                                                         RV2 350
```

```
      DO 750  I=1,NP1                                                    1RV2 351
      CPSI(I) = COS(PSIR)                                                1RV2 352
      SPSI(I) = SIN(PSIR)                                                1RV2 353
  750 PSIR = PSIR & DPSI                                                 1RV2 354
      PSI(1) = 0.0                                                        RV2 355
      DO 760  I=2,NP1                                                    1RV2 356
  760 PSI(I) =  PSI(I-1) & DPSID                                         1RV2 357
      RINS = R * 12.0                                                     RV2 358
      CO = DINT1(C,X,NX1,NX2) / (X(NX2)-X(NX1))                           RV2 359
      DO 770  I=NX1,NX2                                                  1RV2 360
      CC(I) = C(I) / CO                                                  1RV2 361
      X(I) = X(I) / RINS                                                 1RV2 362
      XX(I) = XX(I) / RINS                                               1RV2 363
      XX1(I) = X(I) - X1                                                 1RV2 364
      AX(I) = XX(I) * CC(I)                                              1RV2 365
      BX(I) = C(I) / RINS                                                1RV2 366
      CX(I) = BX(I) * CC(I)                                              1RV2 367
      XA(I) = (FA(I) - C(I)/4.) / C(I)                                   1RV2 368
      DX(I) = CX(I) * XA(I)                                              1RV2 369
  770 FX(I) = CC(I) * XX1(I)                                             1RV2 370
      WRITE (L3) NTOR,Q2,P2,OMEGA,ALAMO,AMU,TORQSV,ALFAR                  RV2 371
      WRITE (L5) NOPT,NOCYCL,(BCINIT(I),I=1,6),NCASE,HEAD,REFM,           RV2 372
     1  R,E1,E2,(AMSI(I),I=1,9),X1,FLOATN,NP1,NV,NVO,DPSI,DPSI2,NX1,NX2,  RV2 373
     C(PSI(I),CPSI(I),SPSI(I),I=1,NP1),CO,(CC(I),XX(I),XX1(I),AX(I),     RV2 374
     DBX(I),CX(I),XA(I),DX(I),FX(I),I= NX1,NX2),                         RV2 375
     2  FCNSP,AKTZ,F21,NX,NREF,                                          RV2 376
     3  (X(I),C(I),FA(I),CG(I),THX(I),EM(I),AIC(I),I=1,NX),              RV2 377
     4  ALT,AKTB,FSPRNG,BSPRNG,ZSPRNG,                                   RV2 378
     5  FDAMP,BDAMP,ZDAMP,NM,STL,STLRF,(AMCH(I),CMO(I),                  RV2 379
     6  AO(I),ALOL(I),CDO(I),CLAD(I),CMTAD(I),CLREF(I),CDSLP(I),         RV2 380
     7  ADDO(I),CMSLP(I),AMOM(I),                                        RV2 381
     8  SCMO(I),SAO(I),SALOL(I),SCDO(I),SCLAD(I),SCMTAD(I),SCLREF(I),    RV2 382
     9  SCDSLP(I),SADDO(I),SCMSLP(I),SAMOM(I),                           RV2 383
     A  RCMO(I),RAO(I),RALOL(I),RCDO(I),RCLAD(I),RCMTAD(I),RCLREF(I),    RV2 384
     B  RCDSLP(I),RADDO(I),RCMSLP(I),RAMOM(I),  I=1,NM),RHO              RV2 385
  780 READ (L1,990) NOAL,NOMA,NOSEC                                      RV2 386
      READ (L1,1000) (ALFA(I),I=1,NOAL)                                  RV2 387
      READ (L1,1000) (AMACH(I),I=1,NOMN)                                 RV2 388
      READ(L1,1000) (RADN(I),I=1,NOSEC)                                  RV2 389
      DO 790 I=1,NOSEC                                                  1RV2 390
  790 RADN(I) = RADN(I)/R                                               1RV2 391
      READ (L1,1000) (ASTLP(I),I=1,NOMA)                                 RV2 392
      READ (L1,1000) (ASTLN(I),I=1,NOMN)                                 RV2 393
      READ (L1,1000)    XO,FCPO,FCHO,BL,XC4,CDOR,GRET                    RV2 394
      CDOR = CDOR/5.73                                                   RV2 395
      XO = XO/R                                                          RV2 396
      DO 800 I=1,NOMA                                                   1RV2 397
      ASTLP(I) = ASTLP(I)/57.2958                                       1RV2 398
  800 ASTLN(I) = ASTLN(I)/57.2958                                       1RV2 399
      READ (L1,990) INTAN,NHARM,NCHAR                                    RV2 400
```

```
      IF (LCON) 840,810,840                                                  RV2 401
  810 READ (L1,1000) BEQ,REQ,AMINF,UR,GAMM                                   RV2 402
      READ (L1,1000) (AMDOR(I),I=1,NM)                                       RV2 403
      READ (L1,1000) (XOR(I),I=1,NM)                                         RV2 404
      READ (L1,1000) (DOR(I),I=1,NM)                                         RV2 405
      DO 820 I=2,NM                                                         1RV2 406
      IF(AMINF-AMDOR(I)) 830,830,820                                        1RV2 407
  820 CONTINUE                                                              1RV2 408
      I=NM                                                                   RV2 409
  830 AMD=(AMINF-AMDOR(I-1))/(AMDOR(I)-AMDOR(I-1))                           RV2 410
      XREF=(XOR(I-1)&AMD*(XOR(I)-XOR(I-1)))*REQ                              RV2 411
      DREF=(DOR(I-1)&AMD*(DOR(I)-DOR(I-1)))*REQ                              RV2 412
  840 IKOM = 1                                                               RV2 413
      KCM = 1                                                                RV2 414
      DO 850  L=1,3                                                         1RV2 415
      DM(L)=0.                                                              1RV2 416
  850 CQ(L)=0.                                                              1RV2 417
      WRITE (L6) AOS,NC1,NICM,IKOM,KCM,CQTOL,NCHK,(CQ(I),DM(I),I=1,3)        RV2 418
     1,ALAMO,IDYN.                                                           RV2 419
      DO 860 I=1,NOAL                                                       1RV2 420
  860 ALFA(I)=ALFA(I) / 57.2958                                             1RV2 421
      WRITE (L5)IC,NITB,             TOA,BOA,ZOA,APHASE,ALFAR,LSS2,HEAD,    RV2 422
     1AOS,ALS,BIS,BTOL,ATOLB,NCASE,NAERO,LFAR,                               RV2 423
     2NOAL,NOMN,NCSEC,ALL,ALH,DELAL,(ALFA(I),I=1,NOAL),X1,X2,                RV2 424
     3(AMACH(I),ASTLF(I),ASTLN(I),I=1,NOMN),(RADN(I),I=1,NOSEC),             RV2 425
     4   XO,FCPO,FCHO,BL,   INTAN,NHARB,          NOHAR,CDOR,CRET,           RV2 426
     5BEQ,REQ,AMINF,TIN,UR,GAMM,NM,XREF,DREF                                 RV2 427
      IF(NAERC) 1020,870,1020                                                RV2 428
  870 DO 880 JJ=1,NOSEC                                                     1RV2 429
      DO 880 MM=1,NOMN                                                      2RV2 430
  880 READ (L1,1000) (CL(II,MM,JJ),II=1,NOAL)                               2RV2 431
      DO 890 JJ=1,NOSEC                                                     1RV2 432
      DO 890 MM=1,NOMN                                                      2RV2 433
  890 READ (L1,1000) (CD(II,MM,JJ),II=1,NOAL)                               2RV2 434
      DO 900 JJ=1,NOSEC                                                     1RV2 435
      DO 900 MM=1,NOMN                                                      2RV2 436
  900 READ (L1,1000) (CM(II,MM,JJ),II=1,NOAL)                               2RV2 437
      DO 910 JJ=1,NOSEC                                                     1RV2 438
      DO 910 MM=1,NOMN                                                      2RV2 439
      DO 910 II=1,NOAL                                                      3RV2 440
      CL(II,MM,JJ)=CL(II,MM,JJ)*0.17452                                     3RV2 441
      CD(II,MM,JJ)=CD(II,MM,JJ)*0.17452                                     3RV2 442
  910 CM(II,MM,JJ)=CM(II,MM,JJ)*0.17452                                     3RV2 443
      IF(XC4) 920,950,920                                                    RV2 444
  920 DO 930 I=1,NOAL                                                       1RV2 445
      COSAL(I)=COS(ALFA(I)/57.2958)                                         1RV2 446
  930 SINAL(I)=SIN(ALFA(I)/57.2958)                                         1RV2 447
      DO 940 I=1,NOAL                                                       1RV2 448
      DO 940 J=1,NCMN                                                       2RV2 449
      DO 940 K=1,NOSEC                                                      3RV2 450
```

```
  940 CM(I,J,K)=CM(I,J,K)-(CL(I,J,K)*COSAL(I)&CD(I,J,K)*SINAL(I))*XC4    3RV2 451
  950 DO 960 JJ=1,NOSEC                                                 1RV2 452
      DO 960 MM=1,NCMN                                                  2RV2 453
  960 WRITE(L5)     (CL(II,MM,JJ),II=1,NOAL)                            2RV2 454
      DO 970 JJ=1,NOSEC                                                 1RV2 455
      DO 970 MM=1,NCMN                                                  2RV2 456
  970 WRITE(L5)     (CD(II,MM,JJ),II=1,NOAL)                            2RV2 457
      DO 980 JJ=1,NOSEC                                                 1RV2 458
      DO 980 MM=1,NCMN                                                  2RV2 459
  980 WRITE(L5)     (CM(II,MM,JJ),II=1,NOAL)                            2RV2 460
  990 FORMAT(8I10)                                                       RV2 461
 1000 FORMAT(8F10.4)                                                     RV2 462
 1010 FORMAT(3F10.4,I10)                                                 RV2 463
 1020 RETURN                                                             RV2 464
      END                                                                RV2 465
```

```
      SUBROUTINE AT62(ALT,ANS)                                          AT6    1
C                                                                       AT6    2
C     CAUTION- IF USING WIND TUNNEL DATA MAKE SURE THIS SUBROUTINE      AT6    3
C     IS COMPATABLE WITH DATA.                                          AT6    4
C                                                                       AT6    5
      DIMENSION ANS(4)                                                  AT6    6
C                                                                       AT6    7
      ANS(1)=.0000399                                                   AT6    8
      ANS(2)=0.0                                                        AT6    9
      ANS(3)=85.0                                                       AT6   10
      ANS(4)=607.91                                                     AT6   11
      RETURN                                                            AT6   12
      END                                                               AT6   13
```

```
      SUBROUTINE AT62(ZFT,ANS)                                          AT6    1
      REAL PH,HZ,A,B,WA,WB,D1,D2,D3,PZ                                  AT6    2
      DIMENSION ANS(4)                                                  AT6    3
      DIMENSION HT(8),TH(8),THD(8),PH(8)                                AT6    4
      DATA HT/0.,11.,20.,32.,47.,52.,61.,79./                           AT6    5
      DATA TH/288.15,216.65,216.65,228.65,270.65,270.65,252.65,180.65/  AT6    6
      DATA THD/-6.5,0.,1.,2.8,0.,-2.,-4.,0./                            AT6    7
      DATA PH/101325.,22632.0638,5474.88855,868.018647,110.906298,      AT6    8
     P59.0009367,18.2100724,1.03771164/                                 AT6    9
      DIMENSION ZT(13),TZ(13),TZD(13),HZ(13),A(13),B(13)                AT6   10
      DATA ZT/90.,100.,110.,120.,150.,160.,170.,190.,230.,300.,400.,    AT6   11
     Z500.,600./                                                        AT6   12
      DATA TZ/180.65, 210.65, 260.65, 360.65, 960.65, 1110.65, 1210.65, AT6   13
     T 1350.65, 1550.65, 1830.65, 2160.65, 2420.65, 2590.65/            AT6   14
      DATA TZD/3.,5.,10.,20.,15.,10.,7.,5.,4.,3.3,2.6,1.7,1.1/          AT6   15
      DATA HZ/88.7433565,98.4509829,108.128578,117.776280,146.541401,   AT6   16
     H156.070901,165.571187,184.484657,221.966870,286.476269,376.312415,AT6   17
     K463.526097,548.230014/                                            AT6   18
      DATA A/.99999916,.99999857,.99999877,.99999832,.99999776,.99995746AT6   19
     A,.99999698,.99999592,.99999355,.99998878,.99998131,.99997196,     AT6   20
     C.99996075/                                                        AT6   21
      DATA B/.00015734766,.00015734953,.00015735140,.00015735513,       AT6   22
     B.00015735887,.00015736074,.00015736355,.00015736915,.00015737943,AT6   23
     D.00015739532,.00015741401,.00015743271,.00015745140/              AT6   24
      DIMENSION WA(13),WB(13),WC(13)                                    AT6   25
      DATA WA/21.998808, 15.798995, 31.044527, 40.387675, 29.538575,    AT6   26
     W32.268571, 27.789444, 32.168670, 30.241635, 34.561172,            AT6   27
     W36.099504, 38.195672, 18.258073/                                  AT6   28
      DATA WB/.15479092, .27878720, .0015957013, -.15412343,-.0094687678 AT6   29
     W, -.043598715, .0091016009, -.036974463, -.020235026,             AT6   30
     W-.049031942, -.056723605, -.065108273, .00135039O1/               AT6   31
      DATA WC/-.85994958E-3, -.14799309E-2, -.21996960E-3, .42886012E-3,AT6   32
     W-.53322091E-4, .53333994E-4, -.10166693E-3, .19585867E-4,         AT6   33
     W-.16804213E-4, .31190648E-4, .40805227E-4, .49189895E-4,          AT6   34
     W-.61923241E-5/                                                    AT6   35
      DIMENSION D1(13),D2(13),D3(13)                                    AT6   36
      DATA D1/.0017834765,.0010654322,.00053055610,.00026454351,        AT6   37
     D.00035360997,.0005334878Z,.0007603649 ,.0010889831,.0013783559,   AT6   38
     D.0016975137,.0022189663,.0037023997,.0067578185/                  AT6   39
      DATA D2/-11.281753,-6.7098914,-3.3278396,-1.6546388,-2.2171667,   AT6   40
     D-3.3643151,-4.6850055,-7.0083025,-8.9810162,-11.235530,-15.122423,AT6   41
     D-27.520411,-59.311259/                                            AT6   42
      DATA D3/.01692C782,.024325051,.039545102,.057409044,.016199137,   AT6   43
     D.0093014845,.0059339235,.0037645169,.0026065966,.0018120459,      AT6   44
     D.0011923023,.0006473605S,.00033627561/                            AT6   45
      DIMENSION PZ(13)                                                  AT6   46
      DATA PZ/.16438012,.030075034,.0073545270,.0025216927,             AT6   47
     P.00050617890,.00036943532,.00027926462,.00016852498,.69605367E-4, AT6   48
     P.18838777E-4,.40304321E-5,.10956964E-5,.34502614E-6/              AT6   49
      ALT=ZFT*0.3048                                                    AT6   50
      Z=ALT/1000.                                                       AT6   51
      IF(Z.LT.-5.)Z=-5.                                                 AT6   52
      IF(Z.GT.700.)Z=700.                                               AT6   53
      IF(Z.GT.90.)GO TO 90                                              AT6   54
      DEN=1.0&0.00015733831E0*Z                                         AT6   55
      H=Z/DEN                                                           AT6   56
      GMW=28.9644                                                       AT6   57
      IF(H.GE.47.)GO TO 47                                              AT6   58
      IF(H.GT.20.)GO TO 20                                              AT6   59
```

```
      J=1                                                              AT6  60
      IF(H.GE.11.)J=2                                                  AT6  61
      GO TO 21                                                         AT6  62
   20 J=3                                                              AT6  63
      IF(H.GE.32.)J=4                                                  AT6  64
      GO TO 21                                                         AT6  65
   47 IF(H.GE.61.)GO TO 61                                             AT6  66
      J=5                                                              AT6  67
      IF(H.GE.52.)J=6                                                  AT6  68
      GO TO 21                                                         AT6  69
   61 J=7                                                              AT6  70
      IF(H.GE.79.)J=8                                                  AT6  71
   21 TM=TH(J)&THD(J)*(H-HT(J))                                        AT6  72
      IF(THD(J).EQ.0.)GO TO 5                                          AT6  73
      PLOG=-34.163195E0*ALOG(TM/TH(J))/THD(J)                          AT6  74
      GO TO 2                                                          AT6  75
    5 PLOG=-34.163195E0*(H-HT(J))/TM                                   AT6  76
    2 PB=PH(J)                                                         AT6  77
      GO TO 100                                                        AT6  78
   90 IF(Z.LT.170.)GO TO 11                                            AT6  79
      IF(Z.LT.300.)GO TO 12                                            AT6  80
      IF(Z.LT.500.)GO TO 13                                            AT6  81
      J=13                                                             AT6  82
      IF(Z.LT.600.)J=12                                                AT6  83
      GO TO 10                                                         AT6  84
   13 J=11                                                             AT6  85
      IF(Z.LT.400.)J=10                                                AT6  86
      GO TO 10                                                         AT6  87
   12 J=9                                                              AT6  88
      IF(Z.LT.230.)J=8                                                 AT6  89
      IF(Z.LT.190.)J=7                                                 AT6  90
      GO TO 10                                                         AT6  91
   11 IF(Z.LT.120.)GO TO 14                                            AT6  92
      J=6                                                             AAT6  92
      IF(Z.LT.160.)J=5                                                 AT6  93
      IF(Z.LT.150.)J=4                                                 AT6  94
      GO TO 10                                                         AT6  95
   14 J=3                                                              AT6  96
      IF(Z.LT.110.)J=2                                                 AT6  97
      IF(Z.LT.100.)J=1                                                 AT6  98
   10 GMW=WA(J)&Z*(WB(J)&Z*WC(J))                                      AT6  99
      TM=TZ(J)&TZD(J)*(Z-ZT(J))                                        AT6 100
      DEN=A(J)&Z*B(J)                                                  AT6 101
      H=Z/DEN                                                          AT6 102
      DELTAH=H-HZ(J)                                                   AT6 103
      PLOG=D1(J)*DELTAH&D2(J)*ALOG(1.0&D3(J)*DELTAH)                   AT6 104
      PB=PZ(J)                                                         AT6 105
  100 P=PB*EXP(PLOG)                                                   AT6 106
      ANS(1)=6.75944794E-6*P/TM                                        AT6 107
      ANS(2)=P*0.020885434E0                                           AT6 108
      ANS(3)=GMW*TM/28.9644                                            AT6 109
      ANS(4)=894.50046E0                                               AT6 110
      ARG1=4325.73899E0*TM                                             AT6 111
      IF(ZFT.LT.300000.)ANS(4)=SQRT(ARG1)                              AT6 112
      RETURN                                                           AT6 113
      END                                                              AT6 114
```

```
      FUNCTION DINT1 (A,X,N1,N2)                                        DN1    1
C                                                                       DN1    2
C           DINT = TRAP. INT. OF A  WRT  X                              DN1    3
C           A(I),X(I)  I=N1,N2     N2 MAX = 16                          DN1    4
C                                                                       DN1    5
      DIMENSION A(16),X(16)                                             DN1    6
      DINT1= (A(N1)*(X(N1+1)-X(N1))+A(N2)*(X(N2)-X(N2-1)))/2.           DN1    7
      M1=N1+1                                                           DN1    8
      M2=N2-1                                                           DN1    9
      DO 100 I=M1,M2                                                   1DN1   10
  100 DINT1=DINT1+A(I)*(X(I+1)-X(I-1))/2.0                             1DN1   11
      RETURN                                                            DN1   12
      END                                                               DN1   13
```

```
      SUBROUTINE  REV03                                                  RV3   1
C                                                                        RV3   2
C                                                                        RV3   3
      COMMON L1, L2, L3, L4, L5, L6, L7, L8, NCHK                        RV3   4
C                                                                        RV3   5
      COMMON X(16),NX1,NX2,CCMO,CALOL,CCDO,CAO,CCLAD,CCMTAD,CCLREF,      RV3   6
     1CCDSLP,CCMSLP,CADOD,CAMOM,CLCON,CDCON,CMCON,THX(16),FACTOR         RV3   7
      DIMENSION  HEAD(17),BCINIT(6),AMSI(10),C(16),FA(16),               RV3   8
     1  CG(16),EM(16),AIC(16),STHX(16),CTHX(16),AS2(16),                 RV3   9
     2  XX(16),AS3(16),AS4(16),AS5(16),AS6(16),AMCH(10) ,CO(3),DM(3),    RV3  10
     3  AO(10),ALOL(10),CDO(10),CMO(10),CMTAD(10),CLAD(10),CPSI(25),     RV3  11
     4  SPSI(25),PSI(25),CC(16),XX1(16),AX(16),BX(16),CX(16),XA(16),     RV3  12
     5  DX(16),EX(16),FX(16),T1FX(16),T2FX(16),T3FX(16),T4FX(16),        RV3  13
     6  T5FX(16),T6FX(16),T1ZX(16),T2ZX(16),T3ZX(16),T4ZX(16),T5ZX(16),  RV3  14
     7  T6ZX(16),T1BX(16),T2BX(16),T3BX(16),T4BX(16),T5BX(16),T6BX(16)   RV3  15
C                                                                        RV3  16
      DIMENSION  CT1(25),CT2(25),CT3(25),CT7(25),CT8(25),CT9(25),        RV3  17
     1  CT10(25),CT11(25),CT12(25),TOT(25),CZ1(25),CZ2(25),              RV3  18
     2  CZ3(25),CZ7(25),CZ8(25),CZ9(25),CZ10(25),CZ11(25),CZ12(25),      RV3  19
     3  TOZ(25),CB1(25),CB2(25),CB3(25),CB7(25),CB8(25),                 RV3  20
     4  CB9(25),CB10(25),CB11(25),CB12(25),TOB(25),T8FX(16),             RV3  21
     5 T8BX(16),T8ZX(16),T9ZX(16),T10ZX(16),T11ZX(16),T12ZX(16),A1(325),  RV3  22
     6 A2(325),A3(325),A4(325),A5(325),A6(325),A7(325),                  RV3  23
     7  A8(325),A9(325),A10(325),A11(325),A12(325),CLREF(10),            RV3  24
     8 CDSLP(10),CMSLP(10),ADOD(10),AMOM(10)                            RV3  25
C                                                                        RV3  26
      DIMENSION SCMO(10),SALOL(10),SCDO(10),SCLAD(10),SCMTAD(10),        RV3  27
     1SCLREF(10),SCDSLP(10),SCMSLP(10),SAO(10),SADOD(10),SAMOM(10)      RV3  28
      DIMENSION RCMO(10),RALOL(10),RCDO(10),RCLAD(10),RCMTAD(10)         RV3  29
     1,RCLREF(10),RCDSLP(10),RCMSLP(10),RAO(10),RADOD(10),RAMOM(10)     RV3  30
      DIMENSION ALAM(12,25),AMUC(12,25),RHOC(12,25),ALRO(12,25),         RV3  31
     1     AMRO(12,25),ALMRO(12,25),T7FXD(16),T7ZXD(16),T7BXD(16),      RV3  32
     2     AX1(16),CX1(16),DX1(16),FX1(16)                              RV3  33
C                                                                        RV3  34
C                                                                        RV3  35
      REWIND L3                                                          RV3  36
      REWIND L5                                                          RV3  37
      REWIND L6                                                          RV3  38
      READ(L3) LCCN,NXF2,NP,((ALAM(J,I),AMUC(J,I),RHOC(J,I),J=1,NXF2),   RV3  39
     1     I=1,NP)                                                       RV3  40
      READ (L3) NTOR,Q2,P2,OMEGA,ALAMO,AMU,TORQSV                        RV3  41
      READ  (L5) NOPT,NOCYCL,(BCINIT(I),I=1,6),NCASE,HEAD,REFM,          RV3  42
     1  R,F1,E2,(AMSI(I),I=1,9),X1,FLCATN,NP1,NV,NVO,DPSI,DPSI2,NX1,NX2, RV3  43
     C(PSI(I),CPSI(I),SPSI(I),I=1,NP1),CO,(CC(I),XX(I),XX1(I),AX(I),     RV3  44
     DBX(I),CX(I),XA(I),DX(I),FX(I),I= NX1,NX2),                         RV3  45
     2  FCNSP,AKTZ,F21,NX,NREF,                                          RV3  46
     3  (X(I),C(I),FA(I),CG(I),THX(I),EM(I),AIC(I),I=1,NX),              RV3  47
     4  ALT,AKTB,FSPRNG,BSPRNG,ZSPRNG,                                   RV3  48
     5  FDAMP,BDAMP,ZDAMP,NM,STL,STLRF,(AMCH(I),CMO(I),                  RV3  49
     6  AO(I),ALOL(I),CDO(I),CLAD(I),CMTAD(I),CLREF(I),CDSLP(I),         RV3  50
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     7  ADOD(I),CMSLP(I),AMOM(I),                                          RV3   51
     8  SCMO(I),SA (I),SALOL(I),SCDO(I),SCLAD(I),SCMTAD(I),SCLREF(I),      RV3   52
     9  SCDSLP(I),SADOD(I),SCMSLP(I),SAMOM(I),                             RV3   53
     A  RCMO(I),RAO(I),RALOL(I),RCDO(I),RCLAD(I),RCMTAD(I),RCLREF(I),      RV3   54
     B  RCDSLP(I),RADOD(I),RCMSLP(I),RAMOM(I),   I=1,NM),RHO               RV3   55
      P2 = -P2                                                            RV3   56
      READ (L6)                                                           RV3   57
  100 OMEGI = OMEGA * AMSI(5)                                             RV3   58
C                                                                         RV3   59
      GAMMA2 = CO * R**4 *       0.001 *0.56775 / AMSI(5)                 RV3   60
      FDAMP = FDAMP / OMEGI                                               RV3   61
      ZDAMP = ZDAMP / OMEGI                                               RV3   62
      BDAMP = BDAMP / OMEGI                                               RV3   63
      FSPRNG = FSPRNG / OMEGI / OMEGA                                     RV3   64
      ZSPRNG = ZSPRNG / OMEGI / OMEGA                                     RV3   65
      BSPRNG = BSPRNG / OMEGI / OMEGA                                     RV3   66
      REFM=REFM/OMEGA/R                                                   RV3   67
      FCNSP = FCNSP / OMEGI / OMEGA                                       RV3   68
      CT1C =AMSI(8)/AMSI(5)                                               RV3   69
      CT9C = AMSI(3)*E1/AMSI(5)                                           RV3   70
      CT7C = (E21*AMSI(3)&AMSI(6))/AMSI(5)                                RV3   71
      CT10C= -AMSI(7)/AMSI(5)                                             RV3   72
      CT3C = AMSI(9)/AMSI(5)&FSPRNG&FCNSP                                 RV3   73
      CT12C = (-AMSI(7)-E2*AMSI(4))/AMSI(5)--AKTB*FCNSP                   RV3   74
      CZ7C = (E21*F21*AMSI(1)&2.0*E21*AMSI(2)&AMSI(9))/AMSI(5)&1.0        RV3   75
      CZ9C =(E21* AMSI(1)&AMSI(2))*E1/AMSI(5)&ZSPRNG                      RV3   76
      CZ11C= CT7C*2.C                                                     RV3   77
      CZ16C = E1*AMSI(4)/AMSI(5)                                          RV3   78
      CB10C = 1.0                                                         RV3   79
      CB12C = E2*AMSI(2)/AMSI(5)&1.0&BSPRNG&FCNSP*AKTB*AKTB               RV3   80
      CB16C = -(AMSI(3)*E2-AMSI(6))/AMSI(5)                               RV3   81
      DO 110 J = NX1,NX2                                                 1RV3   82
      RHOC(J,NP1) = RHOC(J,1)                                            1RV3   83
      AMUC(J,NP1) = AMUC(J,1)                                            1RV3   84
  110 ALAM(J,NP1) = ALAM(J,1)                                            1RV3   85
C                                                                         RV3   86
      DO 230  I=1,NP1                                                    1RV3   87
      P2S=P2*SPSI(I)                                                     1RV3   88
      P2C=P2*CPSI(I)                                                     1RV3   89
      Q2S=Q2*SPSI(I)                                                     1RV3   90
      Q2C=Q2*CPSI(I)                                                     1RV3   91
      ARATE=(Q2C&P2S)*.5                                                 1RV3   92
      DO 220  J=NX1,NX2                                                  2RV3   93
      UTO = X(J) & AMUC(J,I) * SPSI(I)                                   2RV3   94
      UTO2 = UTO * UTO                                                   2RV3   95
      U2 = ALAM(J,I) & X(J) * ARATE                                      2RV3   96
      U2SQ = U2 * U2                                                     2RV3   97
      U1 = UTO2 & U2SQ                                                   2RV3   98
      U = SQRT(U1)                                                       2RV3   99
      U4 = UTO**3/U2                                                     2RV3  100
```

```
      UCHK = U2SQ / LT02                                                2RV3 101
      IF (UCHK - 1.0) 120,120,130                                       2RV3 102
  120 ASIGN =  1.0                                                      2RV3 103
      AZN = 0.0                                                         2RV3 104
      AZM = 1.0                                                         2RV3 105
      GO TO 140                                                         2RV3 106
  130 ASIGN =-1.0                                                       2RV3 107
      AZN = 1.0                                                         2RV3 108
      AZM = 0.0                                                         2RV3 109
  140 AMNO = ABS(U/REFM)                                                2RV3 110
      DO 150  K=2,NM                                                    3RV3 111
      IF(AMNO-AMCH(K)) 160,160,150                                      3RV3 112
  150 CONTINUE                                                          3RV3 113
      K=NM                                                              2RV3 114
  160 FACTOR = (AMNO-AMCH(K-1)) / (AMCH(K)-AMCH(K-1))                   2RV3 115
      IF(UTO-STL) 180,170,170                                           2RV3 116
  170 CALL  CALC( CMC,ALOL,CDO,AO,CLAD,CMTAD,CLREF,CDSLP,               2RV3 117
     1CMSLP,ADOD,AMOM,K,J)                                              2RV3 118
      GO TO 210                                                         2RV3 119
  180 IF(UTO-STLRF) 200,200,190                                         2RV3 120
  190 CALL  CALC(SCMC,SALOL,SCDO,SAO,SCLAD,SCMTAD,SCLREF,               2RV3 121
     1SCDSLP,SCMSLP,SADOD,SAMOM,K,J)                                    2RV3 122
      GO TO 210                                                         2RV3 123
  200 CALL  CALC(RCMO,RALOL,RCDO,RAO,RCLAD,RCMTAD,RCLREF,               2RV3 124
     1RCDSLP,RCMSLP,RADOD,RAMOM,K,J)                                    2RV3 125
  210 AX1(J) = AX(J) * RHOC(J,I)                                        2RV3 126
      CX1(J) = CX(J) * RHOC(J,I)                                        2RV3 127
      DX1(J) =  DX(J) * RHOC(J,I)                                       2RV3 128
      FX1(J) = FX(J) * RHOC(J,I)                                        2RV3 129
      F1 = CAO * UTO * ASIGN                                            2RV3 130
      F2 = CCDSLP * UTO * ASIGN                                         2RV3 131
      F3 = AMLC(J,I)                                                    2RV3 132
      F6 = (1.57C8 * U1 - U4) * AZN                                     2RV3 133
      F7 = 2.0 * CLCON * U2 & F1                                        2RV3 134
      F11 = U4 * AZN                                                    2RV3 135
      F12 = U2 ** 3 / UTO * AZM * .66667                                2RV3 136
      F13 = 2.0 * CLCON * UTO & ASIGN * CAO * U2                        2RV3 137
      F17 = F6 & F12                                                    2RV3 138
      T1BX(J) = AX1(J) * (U1 * CLCON & U2 * F1 & CAO * F17)             2RV3 139
      T2BX(J) = -AX1(J) * (U1 * (CDCON - CA0) & F2 * U2 & CCDSLP * F17) 2RV3 140
      T3BX(J) = -AX1(J) * F3 * F7                                       2RV3 141
      T4BX(J) = AX1(J) * F3 * F13                                       2RV3 142
      T5BX(J) = -AX1(J) *XX(J) * F7                                     2RV3 143
      T6BX(J) = AX1(J) * XX1(J) * F13                                   2RV3 144
      T7BXD(J) = AX1(J) * BX(J) * CCLAD * UTO                           2RV3 145
      F4 = DX1(J) * CLCON & CX1(J) * CMCON                              2RV3 146
      F5 = DX1(J) * CAO & CX1(J) * CCMSLP                               2RV3 147
      F8 = UTO * F5                                                     2RV3 148
      F9 = UTC * F4                                                     2RV3 149
      F14 = 2.0 * U2 * F4 & ASIGN * F8                                  2RV3 150
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```
      F15 = 2.0 * F9 & F5 * ASIGN * U2                                          2RV3 151
      T1FX(J) = U1 * F4 & F5 * (ASIGN * U2 * UTO & F17)                         2RV3 152
      T2FX(J) = U1 * F5                                                         2RV3 153
      T3FX(J) = -F3 * F14                                                       2RV3 154
      T4FX(J) = F3 * F15                                                        2RV3 155
      T5FX(J) = -XX(J) * F14                                                    2RV3 156
      T6FX(J) = XX1(J) * F15                                                    2RV3 157
      T7FXD(J) = BX(J) * CX1(J) * CCMTAD * U                                    2RV3 158
      F16 = 2.0 * CDCON * UTO & CCDSLP * U2 * ASIGN                             2RV3 159
      F18 = 2.0 * U2 * CDCON & CCDSLP * UTO * ASIGN                             2RV3 160
      T1ZX(J) = -FX1(J) * ( CDCON * U1 & U2 * F2 & CCDSLP * F17)                2RV3 161
      T2ZX(J) = -FX1(J) * (U1 * (CLCON & CCDSLP) & U2 * F1 & CAO * F17)         2RV3 162
      T3ZX(J) = FX1(J) * F3 * F18                                               2RV3 163
      T4ZX(J) = - FX1(J) * F3 * F16                                             2RV3 164
      T5ZX(J) = FX1(J) * XX(J) * F18                                            2RV3 165
      T6ZX(J) = -FX1(J) * XX1(J) * F16                                          2RV3 166
      T7ZXD(J) = BX(J) * FX1(J) * CCLAD * U2                                    2RV3 167
  220 CONTINUE                                                                  2RV3 168
      CB1(I)=CT10C                                                              1RV3 169
      CB2 (I) = -GAMMA2 * DINT(T7BXD)                                           1RV3 170
      CB3 (I) = CT12C - GAMMA2 *DINT(T2BX)                                      1RV3 171
      CB7(I)=0.                                                                 1RV3 172
      CB8 (I) = -CZ11C - GAMMA2*DINT(T6BX)                                      1RV3 173
      CB9 (I) = - GAMMA2 * DINT(T4BX) * CPSI(I)                                 1RV3 174
      CB10(I) = CB10C                                                           1RV3 175
      CB11(I) = BDAMP - GAMMA2 * DINT(T5BX)                                     1RV3 176
      CB12(I) = CB12C - GAMMA2 * DINT(T3BX) * CPSI(I)                           1RV3 177
      TOB(I) = CB16C & GAMMA2 * DINT(T1BX) & (1.0 & AMSI   . * E2 /             1RV3 178
     1          AMSI(5)) * (P2C - C2S)                                         1RV3 179
      CT1(I) = CT1C                                                             1RV3 180
      CT2 (I) = FDAMP - GAMMA2 * DINT(T7FXD)                                    1RV3 181
      CT3 (I) = CT3C - GAMMA2 * DINT(T2FX)                                      1RV3 182
      CT7(I) = CT7C                                                             1RV3 183
      CT8 (I) = - GAMMA2 * DINT(T6FX)                                           1RV3 184
      CT9 (I) = CT9C - GAMMA2 * CPSI(I) * DINT(T4FX)                            1RV3 185
      CT10(I) = CT10C                                                           1RV3 186
      CT11(I) =  -GAMMA2 * DINT(T5FX)                                           1RV3 187
      CT12(I) =  -GAMMA2 * CPSI(I) * DINT(T3FX) & CT12C                         1RV3 188
      TOT(I) = GAMMA2 * DINT(T1FX) - (AMSI(7) & E2 * AMSI(4)) / AMSI(5)         1RV3 189
     1          * (Q2S - P2C) - AMSI(9) / AMSI(5) * (Q2C & P2S)                 1RV3 190
      CZ1(I)=CT7(I)                                                             1RV3 191
      CZ2 (I) = -GAMMA2 * DINT(T7ZXD)                                           1RV3 192
      CZ3 (I) = CT9C - FCNSP * AKTZ - GAMMA2 * DINT(T2ZX)                       1RV3 193
      CZ7(I) = CZ7C                                                             1RV3 194
      CZ8 (I) = ZDAMP - GAMMA2 * DINT(T6ZX)                                     1RV3 195
      CZ9 (I) = CZ9C - GAMMA2 * DINT(T4ZX) * CPSI(I) & FCNSP * AKTZ             1RV3 196
      CZ10(I)=0.                                                                1RV3 197
      CZ11(I) = C711C - GAMMA2 * DINT(T5ZX)                                     1RV3 198
      CZ12(I) = - GAMMA2 * DINT(T3ZX) * CPSI(I) & FCNSP * AKTZ * AKTB           1RV3 199
      TOZ(I) = CZ16C & GAMMA2 * DINT(T1ZX)                                      1RV3 200
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```
  230 CONTINUE                                                          1RV3 201
C                                                                        RV3 202
C     CALCULATE  RESPONSE  MATRICES .                                    RV3 203
C                                                                        RV3 204
      CALL SIGCOM(A1,CT1,CT2,CT3,DPSI2,NP1)                              RV3 205
      CALL SIGCOM(A2,CT7,CT8,CT9,DPSI2,NP1)                              RV3 206
      CALL SIGCOM(A3,CZ1,CZ2,CZ3,DPSI2,NP1)                              RV3 207
      CALL SIGCOM(A4,CZ7,CZ8,CZ9,DPSI2,NP1)                              RV3 208
      CALL SIGCOM(A6,CT10,CT11,CT12,DPSI2,NP1)                           RV3 209
      CALL SIGCOM(A7,CZ10,CZ11,CZ12,DPSI2,NP1)                           RV3 210
      CALL SIGCOM(A8,CB10,CB11,CB12,DPSI2,NP1)                           RV3 211
      CALL SIGCOM(A9,CB1,CB2,CB3,DPSI2,NP1)                              RV3 212
      CALL SIGCOM(A10,CB7,CB8,CB9,DPSI2,NP1)                             RV3 213
      AMSX=AMSI(5)                                                       RV3 214
      DO 240  I=1,9                                                     1RV3 215
  240 AMSI(I) = AMSI(I)/AMSX                                            1RV3 216
      AMSI(5)=AMSX                                                       RV3 217
      DO 250  I=NX1,NX2                                                 1RV3 218
      FA(I) = FA(I)/CO                                                  1RV3 219
  250 EM(I) = EM(I) * 32.2                                              1RV3 220
      CO = CO /12.                                                       RV3 221
      WRITE (L6) NP,NX,NX1,NX2,FLOATN,DPSI2,NCASE,HEAD,(PSI(I),I=1,NP),  RV3 222
     1 AKTB,FCNSP,(TOB(I),TOT(I),TOZ(I),                                 RV3 223
     2SPSI(I),CPSI(I),I=1,NP),FSPRNG,AKTZ,ZSPRNG,BSPRNG,                 RV3 224
     3 E1,E2,R,FDAMP,BDAMP,ZDAMP,CO,RHO,GAMMA2,REFM,(X(I),               RV3 225
     4XX1(I),XX(I),CC(I),THX(I),EM(I),XA(I),FA(I),          I=NX1,NX2),  RV3 226
     1(AMSI(I),I=1,9)                                                    RV3 227
      WRITE (L6) (CT1(I),CT2(I),CT3(I),CT7(I),CT8(I),CT9(I),CT10(I),     RV3 228
     1  CT11(I),CT12(I),CZ1(I),CZ2(I),CZ3(I),CZ7(I),CZ8(I),CZ9(I),       RV3 229
     2  CZ10(I),CZ11(I),CZ12(I),CB1(I),CB2(I),CB3(I),CB7(I),CB8(I),      RV3 230
     3  CB9(I),CB10(I),CB11(I),CB12(I),I=1,NP),NOPT,NOCYCL,              RV3 231
     4(BCINIT(I),I=1,6)                                                  RV3 232
      END FILE L6                                                        RV3 233
      REWIND L6                                                          RV3 234
      CALL TINV(A5,A1,NP1)                                               RV3 235
      CALL TXT(A1,A5,A2,0,1,NP1)                                         RV3 236
      CALL TXT(A4,A3,A1,1,0,NP1)                                         RV3 237
      CALL TINV(A2,A4,NP1)                                               RV3 238
      CALL TXT(A4,A3,A5,0,1,NP1)                                         RV3 239
       CALL TXT(A3,A2,A4,0,0,NP1)                                        RV3 240
      CALL TXT(A4,A1,A2,0,0,NP1)                                         RV3 241
      CALL TXT(A5,A1,A3,1,0,NP1)                                         RV3 242
C                                                                        RV3 243
C            2 X 2  COMPLETED                                            RV3 244
C                                                                        RV3 245
      CALL TXT(A11,A5,A6,0,1,NP1)                                        RV3 246
      CALL TXT(A11,A4,A7,1,1,NP1)                                        RV3 247
      CALL TXT(A12,A3,A6,0,1,NP1)                                        RV3 248
      CALL TXT(A12,A2,A7,1,1,NP1)                                        RV3 249
      CALL TXT(A8,A5,A11,1,0,NP1)                                        RV3 250
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      CALL TXT(A8,A1C,A12,1,0,NP1)                                      RV3 251
      CALL TINV(A1,A8,NP1)                                              RV3 252
      CALL TXT(A6,A9,A4,0,0,NP1)                                        RV3 253
      CALL TXT(A6,A10,A2,1,0,NP1)                                       RV3 254
      CALL TXT(A7,A9,A5,0,0,NP1)                                        RV3 255
      CALL TXT(A7,A1C,A3,1,0,NP1)                                       RV3 256
      CALL TXT(A8,A1,A6,0,1,NP1)                                        RV3 257
      CALL TXT(A9,A1,A7,0,1,NP1)                                        RV3 258
      CALL TXT(A6,A12,A1,0,0,NP1)                                       RV3 259
      CALL TXT(A7,A11,A1,0,0,NP1)                                       RV3 260
      CALL TXT(A2,A12,A8,1,0,NP1)                                       RV3 261
      CALL TXT(A3,A12,A9,1,0,NP1)                                       RV3 262
      CALL TXT(A4,A11,A8,1,0,NP1)                                       RV3 263
      CALL TXT(A5,A11,A9,1,0,NP1)                                       RV3 264
C                                                                       RV3 265
C           3 X 3  COMPLETED                                            RV3 266
C                                                                       RV3 267
C                                                                       RV3 268
C                       SORT  RESULTS  TO  TAPE  L3                     RV3 269
      REWIND L3                                                         RV3 270
      READ (L3)                                                         RV3 271
      READ (L3)                                                         RV3 272
      WRITE (L3) A5                                                     RV3 273
      WRITE (L3) A4                                                     RV3 274
      WRITE (L3) A3                                                     RV3 275
      WRITE (L3) A2                                                     RV3 276
      WRITE (L3) A7                                                     RV3 277
      WRITE (L3) A6                                                     RV3 278
      WRITE (L3) A1                                                     RV3 279
      WRITE (L3) A9                                                     RV3 280
      WRITE (L3) A8                                                     RV3 281
C                                                                       RV3 282
C                                                                       RV3 283
      RETURN                                                            RV3 284
      END                                                               RV3 285
```

```
      SUBROUTINE SIGCCM(A,B,C,D,H2,N)                                    SIG    1
C                                                                        SIG    2
C           CALCULATES  TRIANGULAR MATRIX A (STORED ONE DIMENSIONALLY)   SIG    3
C                 B,C,D ARE DIAGONALS (STORED ONE DIMENSIONALLY)         SIG    4
C                 H2 IS CONSTANT HALF INTERVAL      N IS NOM. ORDER      SIG    5
C                                                   N = 4 TO 25          SIG    6
C                 A=B&C*SIGMA&D*SIGMA SQUARED                            SIG    7
C                                                                        SIG    8
      DIMENSION A(325),B(25),C(25),D(25)                                 SIG    9
      A(1)=B(1)                                                          SIG   10
      A(2)=(C(2)&D(2) *H2)*H2                                            SIG   11
      A(3)=A(2)&B(2)                                                     SIG   12
      DH1=H2&H2                                                          SIG   13
      AH1=DH1&H2                                                         SIG   14
      DH2=DH1&DH1                                                        SIG   15
      AH2=DH2                                                            SIG   16
      A(4)=(D(3)*AH1&C(3))*H2                                            SIG   17
      A(5)=D(3)*AH2*H2&C(3)*DH1                                          SIG   18
      A(6)=(C(3)&D(3) *H2)*H2&B(3)                                       SIG   19
      IA=6                                                               SIG   20
      DO 110 I=4,N                                                      1SIG   21
      DI=D(I)*H2                                                        1SIG   22
      AH1=AH1&DH1                                                       1SIG   23
      AH2=AH2&DH2                                                       1SIG   24
      DD=DI*DH2                                                         1SIG   25
      IA=IA&2                                                           1SIG   26
      A(IA-1)=C(I)*H2&DI*AH1                                            1SIG   27
      A(IA)  =C(I)*DH1&DI*AH2                                           1SIG   28
      J1=I-1                                                            1SIG   29
      DO 100 J=3,J1                                                     2SIG   30
      IA=IA&1                                                           2SIG   31
  100 A(IA)=A(IA-1)-DD                                                  2SIG   32
      IA=IA&1                                                           1SIG   33
  110 A(IA)=B(I)&(C(I)&DI)*H2                                           1SIG   34
      RETURN                                                             SIG   35
      END                                                                SIG   36
```

```
      FUNCTION DINT (A)                                                  DNT    1
C                                                                        DNT    2
C           DINT = TRAP. INT. OF A  WRT  X                               DNT    3
C           A(I),X(I)  I=N1,N2     N2 MAX = 16                           DNT    4
C                                                                        DNT    5
      DIMENSION A(16),X(16)                                              DNT    6
      COMMON L1, L2, L3, L4, L5, L6, L7, L8, NCHK                        DNT    7
      COMMON X,N1,N2                                                     DNT    8
      DINT = (A(N1)*          (X(N1+1)-X(N1))+A(N2)          *(X(N2)-    DNT    9
     1    X(N2-1)))/2.                                                   DNT   10
      M1=N1+1                                                            DNT   11
      M2=N2-1                                                            DNT   12
      DO 100 I=M1,M2                                                     1DNT   13
  100 DINT = DINT+A(I)*(X(I+1)-X(I-1))/2.0                               1DNT   14
      RETURN                                                             DNT   15
      END                                                                DNT   16
```

```
      SUBROUTINE TINV(A,B,N)                                              TIN    1
C               CALCULATES  THE INVERSE OF B AND STORES IN A              TIN    2
C               N IS ORDER    N MAX = 25      N  IN  COMMON               TIN    3
C               A,B  ARE LOWER TRIANGLES STORED ONE DIMENSIONALLY         TIN    4
C                                                                         TIN    5
      DIMENSION A(325),B(325)                                             TIN    6
      IA=1                                                                TIN    7
      A(1)=1.0/B(1)                                                       TIN    8
      DO 120 I=2,N                                                       1TIN    9
      IKO=1                                                              1TIN   10
      I1=I-1                                                             1TIN   11
           DO 110 J=1,I1                                                 2TIN   12
           IB=IA                                                         2TIN   13
           IA=IA+1                                                       2TIN   14
           IKC=IKO+J-1                                                   2TIN   15
           IK=IKO                                                        2TIN   16
           A(IA)=0.0                                                     2TIN   17
                DO 100 K=J,I1                                            3TIN   18
                IB=IB+1                                                  3TIN   19
                IK=IK+K-1                                                3TIN   20
  100           A(IA)=A(IA)+B(IB)*A(IK)                                  3TIN   21
  110      A(IA)=-A(IA)/B(IB+1)                                          2TIN   22
      IA=IA+1                                                           1TIN   23
  120 A(IA)=1.0/B(IB+1)                                                 1TIN   24
      RETURN                                                             TIN   25
      END                                                                TIN   26
```

```
      SUBROUTINE TXT(A,B,C,N1,N2,N)                                      TXT   1
C                        TXT(A,B,C,N1,N2)                                 TXT   2
C               A=(-)B*C(A)      (-) IF N2 .NE. 0                        TXT   3
C                                (&A) IF N1 .NE.0                        TXT   4
C               A,B,C ARE LOWER TRIANGULAR MATRICES STORES AS VECTORS    TXT   5
C               N IS NOMINAL ORDER ,  N MAX = 25 ,N STORED IN COMMON     TXT   6
C                                                                        TXT   7
      DIMENSION A(325),B(325),C(325)                                     TXT   8
      IA=0                                                               TXT   9
      DO 140 I=1,N                                                      1TXT  10
      ICO=0                                                             1TXT  11
           DO 140 J=1,I                                                 2TXT  12
           IB=IA                                                        2TXT  13
           IA=IA&1                                                      2TXT  14
           IF (N1) 110,100,110                                          2TXT  15
  100      A(IA)=0.0                                                    2TXT  16
  110      ICC=ICC&J                                                    2TXT  17
           IC=ICC                                                       2TXT  18
                DO 140 K=J,I                                            3TXT  19
                IB=IB&1                                                 3TXT  20
                IF (N2) 130,120,130                                     3TXT  21
  120           A(IA)=A(IA)&B(IB)*C(IC)                                 3TXT  22
                GO TO 140                                               3TXT  23
  130           A(IA)=A(IA)-B(IB)*C(IC)                                 3TXT  24
  140 IC=IC&K                                                           3TXT  25
      RETURN                                                             TXT  26
      END                                                                TXT  27
```

```
      SUBROUTINE CALC (ACMO,AALOL,ACDO,AAO,ACLAD,ACMTAD,ACLREF,ACDSLP,    CAL    1
     1ACMSLP,AADOD,AAMOM,K,J)                                             CAL    2
      DIMENSION ACMO(10),AALOL(10),ACDO(10),AAO(10),ACLAD(10),ACMTAD(10)  CAL    3
     1,ACLREF(10),ACDSLP(10),ACMSLP(10),AADOD(10),AAMOM(10)               CAL    4
      COMMON L1, L2, L3, L4, L5, L6, L7, L8, NCHK                         CAL    5
      COMMON X(16),N1,N2,CCMO,CALOL,CCDO,CAO,CCLAD,CCMTAD,CCLREF,CCDSLP,  CAL    6
     1CCMSLP,CADOD,CAMOM,CLCON,CDCON,CMCON,THX(16),FACTOR                 CAL    7
C                                                                         CAL    8
C                                                                         CAL    9
      CCMO =ACMO(K-1) & FACTOR * (ACMO(K) - ACMO(K-1))                    CAL   10
      CALOL =AALOL(K-1) & FACTOR * (AALOL(K)-AALOL(K-1))                  CAL   11
      CCDO =ACDO(K-1) & FACTOR * (ACDO(K)-ACDO(K-1))                      CAL   12
      CAO =AAO(K-1) & FACTOR * (AAO(K)-AAO(K-1))                          CAL   13
      CCLAD =ACLAD(K-1) & FACTOR * (ACLAD(K) - ACLAD(K-1))                CAL   14
      CCMTAD =ACMTAD(K-1) & FACTOR * (ACMTAD(K) - ACMTAD(K-1))            CAL   15
      CCLREF =ACLREF(K-1) & FACTOR * (ACLREF(K)-ACLREF(K-1))              CAL   16
      CCDSLP=ACDSLP(K-1)&FACTOR*(ACDSLP(K)-ACDSLP(K-1))                   CAL   17
      CCMSLP=ACMSLP(K-1)&FACTOR*(ACMSLP(K)-ACMSLP(K-1))                   CAL   18
      CADOD=AADOD(K-1)&FACTOR*(AADOD(K)-AADOD(K-1))                       CAL   19
      CAMOM=AAMOM(K-1)&FACTOR*(AAMOM(K)-AAMOM(K-1))                       CAL   20
      CLCON=CCLREF&CAO*(THX(J)-CALOL)                                     CAL   21
      CDCON=CCDO&CCDSLP*(THX(J)-CADOD)                                    CAL   22
      CMCON=CCMO&CCMSLP*(THX(J)-CAMOM)                                    CAL   23
      RETURN                                                              CAL   24
      END                                                                 CAL   25
```

```
      SUBROUTINE  REV04                                                      RV4    1
C                                                                            RV4    2
C     THREE    DEGREES OF FREEDOM - CALCULATION OF  D  MATRICES            RV4    3
C                                                                            RV4    4
C                                                                            RV4    5
C                                                                            RV4    6
C                                                                            RV4    7
      COMMON L1, L2, L3, L4, L5, L6, L7, L8, NCHK                            RV4    8
      DIMENSION CT1(25),CT2(25),CT3(25),CT7(25),CT8(25),CT9(25),CT10(25)     RV4    9
     1  ,CT11(25),CT12(25),TOT(25),CZ1(25),CZ2(25),CZ3(25),                  RV4   10
     2  CZ7(25),CZ8(25),CZ9(25),CZ10(25),CZ11(25),CZ12(25),TOZ(25),          RV4   11
     3  CB1(25),CB2(25),CB3(25),CB7(25),CB8(25),CB9(25),                     RV4   12
     4  CB10(25),CB11(25),CB12(25),TOP(25),                                 RV4   13
     5  CT(25,6),CZ(25,6),CB(25,6),DT(25,6),DZ(25,6),                       RV4   14
     6  DB(25,6),DT2INT(25,6),DZ2INT(25,6),DB2INT(25,6),A1(325),            RV4   15
     7  A2(325),A3(325),A4(325),A5(325),PSI(25),BCM(6,81),BCINIT(6),        RV4   16
     8  BCNTHC(6),AMSI(10),X(16),C(16),FA(16),CG(16),THX(16),EM(16),        RV4   17
     9  AIC(16),SPSI(25),CPSI(25),XX1(16),XX(16),CC(16),XA(16),HEAD(17),    RV4   18
     1 BCINIC(6),ET(24),EB(24),EZ(24),TH(24),B(24),Z(24),THO(24),BD(24),    RV4   19
     2  DTSP(25,6),DZSP(25,6),DBSP(25,6),SMAX(10,6)                         RV4   20
C                                                                            RV4   21
C                                                                            RV4   22
C                                                                            RV4   23
      DIMENSION ET(6,24),EZ(6,24),EB(6,24),ZD(24)                            RV4   24
C                                                                            RV4   25
C                                                                            RV4   26
      REWIND L6                                                              RV4   27
      READ  (L6)                                                             RV4   28
      READ  (L6) NP,NX,NX1,NX2,FLOATN,DPSI2,NCASE,HEAD,(PSI(I),I=1,NP),      RV4   29
     1 AKTB,ECNSP,(TOB(I),TOT(I),TOZ(I),                                     RV4   30
     2           SPSI(I),CPSI(I),I=1,NP),ESPRNG,AKTZ,ZSPRNG,BSPRNG,          RV4   31
     3 E1,E2,P,ECAMP,BDAMP,ZCAMP,CO,PHC,GAMMA2,REFM,(X(I),                   RV4   32
     4XX1(I),XX(I),CC(I),THX(I),EM(I),XA(I),FA(I),I=NX1,NX2),                RV4   33
     5(AMSI(I),I=1,9)                                                        RV4   34
      READ  (L6) (CT1(I),CT2(I),CT3(I),CT7(I),CT8(I),CT9(I),CT10(I),         RV4   35
     1  CT11(I),CT12(I),CZ1(I),CZ2(I),CZ3(I),CZ7(I),CZ8(I),CZ9(I),           RV4   36
     2  CZ10(I),CZ11(I),CZ12(I),CB1(I),CB2(I),CB3(I),CB7(I),CB8(I),          RV4   37
     3  CB9(I),CB10(I),CB11(I),CB12(I),I=1,NP),NOPT,NOCYCL,                  RV4   38
     4(BCINIT(I),I=1,6)                                                      RV4   39
      NP1 = NP + 1                                                           RV4   40
      DPSI = 6.283185/FLOATN                                                 RV4   41
      PSI(NP1) = PSI(NP) +360.0/FLOATN                                       RV4   42
      CT2(NP1) = CT2(1)                                                      RV4   43
      CT3(NP1) = CT3(1)                                                      RV4   44
      CT8(NP1) = CT8(1)                                                      RV4   45
      CT9(NP1) = CT9(1)                                                      RV4   46
      CT11(NP1) = CT11(1)                                                    RV4   47
      CT12(NP1) = CT12(1)                                                    RV4   48
      CZ2(NP1) = CZ2(1)                                                      RV4   49
      CZ3(NP1) = CZ3(1)                                                      RV4   50
      CZ8(NP1) = CZ8(1)
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      CZ9(NP1) = CZ9(1)                                                  RV4   51
      CZ11(NP1) = CZ11(1)                                                RV4   52
      CZ12(NP1) = CZ12(1)                                                RV4   53
      CB2(NP1) = CB2(1)                                                  RV4   54
      CB3(NP1) = CB3(1)                                                  RV4   55
      CB8(NP1) = CB8(1)                                                  RV4   56
      CB9(NP1) = CB9(1)                                                  RV4   57
      CB11(NP1) = CB11(1)                                                RV4   58
      CB12(NP1) = CB12(1)                                                RV4   59
      PSIR = C.                                                          RV4   60
      DO 100  I=1,NP1                                                   1RV4   61
      CT(I,1) = -CT3(I)                                                 1RV4   62
      CT(I,2) = -CT2(I) - CT3(I) * PSIR                                 1RV4   63
      CT(I,3) = -CT9(I)                                                 1RV4   64
      CT(I,4) = -CT8(I) - CT9(I) * PSIR                                 1RV4   65
      CT(I,5) = -CT12(I)                                                1RV4   66
      CT(I,6) = -CT11(I) - CT12(I) * PSIR                               1RV4   67
      CZ(I,1) = -CZ3(I)                                                 1RV4   68
      CZ(I,2) = -CZ2(I) - CZ3(I) * PSIR                                 1RV4   69
      CZ(I,3) = -CZ9(I)                                                 1RV4   70
      CZ(I,4) = -CZ8(I) - CZ9(I) * PSIR                                 1RV4   71
      CZ(I,5) = -CZ12(I)                                                1RV4   72
      CZ(I,6) = -CZ11(I) - CZ12(I) * PSIR                               1RV4   73
      CB(I,1) = -CB3(I)                                                 1RV4   74
      CB(I,2) = -CB2(I) - CB3(I) * PSIR                                 1RV4   75
      CB(I,3) = -CB9(I)                                                 1RV4   76
      CB(I,4) = -CB8(I) - CB9(I) * PSIR                                 1RV4   77
      CB(I,5) = -CB12(I)                                                1RV4   78
      CB(I,6) = -CB11(I) - CB12(I) * PSIR                               1RV4   79
  100 PSIR = PSIR + DPSI                                                1RV4   80
C                                                                        RV4   81
C     CT, CZ, CB,  MATRICES  ARE  COMPLETED .                            RV4   82
C                                                                        RV4   83
C     CALCULATE  DT, DZ, DB, MATRICES .                                  RV4   84
C                                                                        RV4   85
      REWIND L3                                                          RV4   86
      READ (L3)                                                          RV4   87
      READ (L3)                                                          RV4   88
      CALL TPREAD (L3,4,A1,A2,A3,A4,A4)                                  RV4   89
      CALL TRMULT(DT,A1,CT,NP1,6,1)                                      RV4   90
      CALL TRMULT(DT,A2,CZ,NP1,6,2)                                      RV4   91
      CALL TRMULT(DZ,A3,CT,NP1,6,1)                                      RV4   92
      CALL TRMULT(DZ,A4,CZ,NP1,6,2)                                      RV4   93
      CALL TPREAD(L3,5,A1,A2,A3,A4,A5)                                   RV4   94
      CALL TRMULT(DT,A1,CB,NP1,6,2)                                      RV4   95
      CALL TRMULT(DZ,A2,CB,NP1,6,2)                                      RV4   96
      CALL TRMULT(DB,A4,CT,NP1,6,1)                                      RV4   97
      CALL TRMULT(DB,A5,CZ,NP1,6,2)                                      RV4   98
      CALL TRMULT(DB,A3,CB,NP1,6,2)                                      RV4   99
      DO 110 I=1,NP1                                                    1RV4  100
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      DO 110 J=1,6                                                          2RV4 101
      DTSP(I,J)=DT(I,J)                                                     2RV4 102
      DZSP(I,J)=DZ(I,J)                                                     2RV4 103
  110 DBSP(I,J)=DB(I,J)                                                     2RV4 104
  120 CALL INTR(DT,DT2INT,DT,NP1,6,DPSI2)                                    RV4 105
      CALL INTR(DZ, DZ2INT, DZ, NP1, 6, DPSI2)                               RV4 106
      CALL INTR(DB, DB2INT, DB, NP1, 6, DPSI2)                               RV4 107
      DO 130  I=1,NP1                                                       1RV4 108
      DT(I,2) = DT(I,2) & 1.0                                               1RV4 109
      DZ(I,4) = DZ(I,4) & 1.0                                               1RV4 110
  130 DB(I,6) = DB(I,6) & 1.0                                               1RV4 111
C                                                                             RV4 112
  140 DO 150  I=1,NP1                                                       1RV4 113
      PSIR = PSI(I)/57.29578                                                1RV4 114
      DT2INT(I,1) = DT2INT(I,1) & 1.0                                       1RV4 115
      DT2INT(I,2) = DT2INT(I,2) & PSIR                                      1RV4 116
      DZ2INT(I,3) = DZ2INT(I,3) & 1.0                                       1RV4 117
      DZ2INT(I,4) = DZ2INT(I,4) & PSIR                                      1RV4 118
      DB2INT(I,5) = DB2INT(I,5) & 1.0                                       1RV4 119
  150 DB2INT(I,6) = DB2INT(I,6) & PSIR                                      1RV4 120
C                                                                             RV4 121
C                                                                             RV4 122
C     CALCULATE TIME HISTORY (STABILITY) IF SPECIFIED BY NOPT = 1 OR 3 .      RV4 123
C                                                                             RV4 124
  160 DO 170  I=1,6                                                         1RV4 125
      BCM(1,I) = -DT2INT(NP1,I)                                             1RV4 126
      BCM(2,I) = -DT(NP1,I)                                                 1RV4 127
      BCM(3,I) = -DZ2INT(NP1,I)                                             1RV4 128
      BCM(4,I) = -DZ(NP1,I)                                                 1RV4 129
      BCM(5,I) = -DB2INT(NP1,I)                                             1RV4 130
  170 BCM(6,I) = -DB(NP1,I)                                                 1RV4 131
      NV = (NP1*(NP1&1))/2                                                   RV4 132
      NVO = (NP*(NP&1))/2                                                    RV4 133
      GO TO (180,440,180), NOPT                                              RV4 134
  180 DO 400  L=1,NOCYCL                                                    1RV4 135
      WRITE (L2,720) L                                                      1RV4 136
      IF(L-1) 190,190,210                                                   1RV4 137
  190 DO 200  NIC=1,6                                                       2RV4 138
  200 BCINIC(NIC) = BCINIT(NIC)                                             2RV4 139
      GO TO 230                                                             1RV4 140
  210 DO 220  NTHC=1,6                                                      2RV4 141
  220 BCINIC(NTHC) = BCNTHC(NTHC)                                           2RV4 142
C                                                                           1RV4 143
  230 DO 390  J=1,NP1                                                       2RV4 144
      DO 240  M=1,6                                                         3RV4 145
  240 BCNTHC(M) = 0.0                                                       3RV4 146
      DO 250  K=1,6                                                         3RV4 147
      BCNTHC(1) = BCNTHC(1) & DT2INT(J,K) * BCINIC(K)                       3RV4 148
      BCNTHC(2) = BCNTHC(2) & DT(J,K) * BCINIC(K)                           3RV4 149
      BCNTHC(3) = BCNTHC(3) & DZ2INT(J,K) * BCINIC(K)                       3RV4 150
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      BCNTHC(4) = BCNTHC(4) & DZ(J,K) * BCINIC(K)                        3RV4  151
      BCNTHC(5) = BCNTHC(5) & DBZINT(J,K) * BCINIC(K)                    3RV4  152
  250 BCNTHC(6) = BCNTHC(6) & DB(J,K) * BCINIC(K)                        3RV4  153
      WRITE (L2,730) PSI(J),(BCNTHC(I),I=1,6)                            2RV4  154
      IF(J-1) 270,260,270                                                2RV4  155
  260 AMAX1=ABS(BCNTHC(1))                                               2RV4  156
      AMAX2=ABS(BCNTHC(2))                                               2RV4  157
      AMAX3=ABS(BCNTHC(3))                                               2RV4  158
      AMAX4=ABS(BCNTHC(4))                                               2RV4  159
      AMAX5=ABS(BCNTHC(5))                                               2RV4  160
      AMAX6=ABS(BCNTHC(6))                                               2RV4  161
      PMAX1 = 0.0                                                        2RV4  162
      PMAX2 = 0.0                                                        2RV4  163
      PMAX3 = 0.0                                                        2RV4  164
      PMAX4 = 0.0                                                        2RV4  165
      PMAX5 = 0.0                                                        2RV4  166
      PMAX6 = 0.0                                                        2RV4  167
      GO TO 390                                                          2RV4  168
  270 ABBC=ABS(BCNTHC(1))                                                2RV4  169
      IF(AMAX1-ABBC) 280,280,290                                         2RV4  170
  280 AMAX1=ABBC                                                         2RV4  171
      PMAX1=PSI(J)                                                       2RV4  172
  290 ABBC=ABS(BCNTHC(2))                                                2RV4  173
      IF(AMAX2-ABBC) 300,300,310                                         2RV4  174
  300 AMAX2=ABBC                                                         2RV4  175
      PMAX2=PSI(J)                                                       2RV4  176
  310 ABBC=ABS(BCNTHC(3))                                                2RV4  177
      IF(AMAX3-ABBC) 320,320,330                                         2RV4  178
  320 AMAX3=ABBC                                                         2RV4  179
      PMAX3=PSI(J)                                                       2RV4  180
  330 ABBC=ABS(BCNTHC(4))                                                2RV4  181
      IF(AMAX4-ABBC) 340,340,350                                         2RV4  182
  340 AMAX4=ABBC                                                         2RV4  183
      PMAX4=PSI(J)                                                       2RV4  184
  350 ABBC=ABS(BCNTHC(5))                                                2RV4  185
      IF(AMAX5-ABBC) 360,360,370                                         2RV4  186
  360 AMAX5=ABBC                                                         2RV4  187
      PMAX5=PSI(J)                                                       2RV4  188
  370 ABBC=ABS(BCNTHC(6))                                                2RV4  189
      IF(AMAX6-ABBC) 380,380,390                                         2RV4  190
  380 AMAX6=ABBC                                                         2RV4  191
      PMAX6=PSI(J)                                                       2RV4  192
  390 CONTINUE                                                           2RV4  193
      WRITE (L2,670)                                                     1RV4  194
      WRITE (L2,680)                                                     1RV4  195
      WRITE (L2,690) PMAX1,AMAX1,PMAX2,AMAX2,PMAX3,AMAX3,PMAX4,AMAX4,    1PV4  196
     1PMAX5,AMAX5,PMAX6,AMAX6                                            1RV4  197
      SMAX(L,1)=AMAX1                                                    1RV4  198
      SMAX(L,2)=AMAX2                                                    1RV4  199
      SMAX(L,3)=AMAX3                                                    1RV4  200
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      SMAX(L,4)=AMAX4                                                    1RV4 201
      SMAX(L,5)=AMAX5                                                    1RV4 202
      SMAX(L,6)=AMAX6                                                    1RV4 203
  400 CONTINUE                                                           1RV4 204
C                                                                         RV4 205
      NOM = NOCYCL - 1                                                    RV4 206
      DO 410 I = 1,6,2                                                   1RV4 207
      IF(ABS(SMAX(NOCYCL,I)/SMAX(NOM,I))-1.05) 410,410,420               1RV4 208
  410 CONTINUE                                                           1RV4 209
      GO TO (430,440,440), NOPT                                           RV4 210
  420 WRITE (L2,700)                                                      RV4 211
      CALL EXIT                                                           RV4 212
  430 WRITE (L2,710)                                                      RV4 213
      CALL EXIT                                                           RV4 214
C                                                                         RV4 215
C     THREE    DEGREES OF FREEDOM - CALCULATION OF RESPONSE (E) MATRICES RV4 216
C                                                                         RV4 217
C                                                                         RV4 218
C                                                                         RV4 219
  440 REWIND L3                                                           RV4 220
      READ (L3)                                                           RV4 221
      READ (L3)                                                           RV4 222
      REWIND L6                                                           RV4 223
      DO 450  I=1,6                                                      1RV4 224
  450 BCM(I,I) = BCM(I,I) & 1.0                                          1RV4 225
      NTL = NV - NP1                                                      RV4 226
      NBC1 = 6 & NP1                                                      RV4 227
      NBC2 = NBC1 & 1                                                     RV4 228
      NBC3 = NBC1 & NP1                                                   RV4 229
      NBC4 = NBC3 & 1                                                     RV4 230
      NBC5 = NBC3 & NP1                                                   RV4 231
      CALL TPREAD(L3,3,A1,A2,A3,A3,A3)                                    RV4 232
      CALL INTT(A5,A4,A2,NP1,EPSI2)                                       RV4 233
      J = NTL                                                             RV4 234
      DO 460  I=NBC2,NBC3                                                1RV4 235
      J = J & 1                                                          1RV4 236
      BCM(1,I) = A4(J)                                                   1RV4 237
  460 BCM(2,I) = A5(J)                                                   1RV4 238
      CALL INTT(A5,A4,A1,NP1,EPSI2)                                       RV4 239
      CALL INTT(A2,A1,A3,NP1,EPSI2)                                       RV4 240
      J = NTL                                                             RV4 241
      DO 470  I=7,NBC1                                                   1RV4 242
      J = J & 1                                                          1RV4 243
      BCM(1,I) = A4(J)                                                   1RV4 244
      BCM(2,I) = A5(J)                                                   1RV4 245
      BCM(3,I) = A1(J)                                                   1RV4 246
  470 BCM(4,I) = A2(J)                                                   1RV4 247
      CALL TPREAD(L3,3,A1,A2,A3,A3,A3)                                    RV4 248
      CALL INTT(A5,A4,A1,NP1,EPSI2)                                       RV4 249
      J = NTL                                                             RV4 250
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      DO 480  I=NBC2,NBC3                                              1RV4 251
      J = J & 1                                                        1RV4 252
      BCM(3,I) = A4(J)                                                 1RV4 253
  480 BCM(4,I) = A5(J)                                                 1RV4 254
      CALL INTT(A5,A4,A2,NP1,EPSI2)                                     RV4 255
      CALL INTT(A2,A1,A3,NP1,EPSI2)                                     RV4 256
      J = NTL                                                           RV4 257
      DO 490  I=NBC4,NBC5                                              1RV4 258
      J = J & 1                                                        1RV4 259
      BCM(1,I) = A4(J)                                                 1RV4 260
      BCM(2,I) = A5(J)                                                 1RV4 261
      BCM(3,I) = A1(J)                                                 1RV4 262
  490 BCM(4,I) = A2(J)                                                 1RV4 263
      CALL TPREAD(L3,3,A1,A2,A3,A3,A3)                                  RV4 264
      CALL INTT(A5,A4,A1,NP1,EPSI2)                                     RV4 265
      J = NTL                                                           RV4 266
      DO 500  I=NBC4,NBC5                                              1RV4 267
      J = J & 1                                                        1RV4 268
      BCM(5,I) = A4(J)                                                 1RV4 269
  500 BCM(6,I) = A5(J)                                                 1RV4 270
      CALL INTT(A5,A4,A2,NP1,EPSI2)                                     RV4 271
      J = NTL                                                           RV4 272
      DO 510  I=7,NBC1                                                 1RV4 273
      J = J & 1                                                        1RV4 274
      BCM(5,I) = A4(J)                                                 1RV4 275
  510 BCM(6,I) = A5(J)                                                 1RV4 276
      CALL INTT(A5,A4,A3,NP1,EPSI2)                                     RV4 277
      J = NTL                                                           RV4 278
      DO 520  I=NBC2,NBC3                                              1RV4 279
      J = J & 1                                                        1RV4 280
      BCM(5,I) = A4(J)                                                 1RV4 281
  520 BCM(6,I) = A5(J)                                                 1RV4 282
C                                                                       RV4 283
  530 DO 570  K=1,6                                                    1RV4 284
      PVT = BCM(K,K)                                                   1RV4 285
      DO 540  J=K,NBC5                                                 2RV4 286
  540 BCM(K,J) = BCM(K,J) / PVT                                        2RV4 287
C                                                                      1RV4 288
      DO 570  I=1,6                                                    2RV4 289
      TRM = BCM(I,K)                                                   2RV4 290
      IF(I-K) 550,570,550                                              2RV4 291
  550 DO 560  J=K,NBC5                                                 3RV4 292
  560 BCM(I,J) = BCM(I,J) - BCM(K,J) * TRM                             3RV4 293
  570 CONTINUE                                                         2RV4 294
      DO 580  I=1,6                                                    1RV4 295
C                                                                      1RV4 296
      BCM(I,7)=BCM(I,7)&BCM(I,NBC1)                                    1RV4 297
      BCM(I,NBC2)= BCM(I,NBC2) & BCM(I,NBC3)                           1RV4 298
  580 BCM(I,NBC4)= BCM(I,NBC4) & BCM(I,NBC5)                           1RV4 299
C                                                                       RV4 300
```

```
C                                                                       RV4 301
CC                                                                      RV4 302
C                                                                       RV4 303
      NBC1 = NBC1 - 1                                                   RV4 304
      NBC3 = NBC3 - 1                                                   RV4 305
      NBC5 = NBC5 - 1                                                   RV4 306
      REWIND L7                                                         RV4 307
      DO 610 I = 1,6                                                   1RV4 308
      J = 0                                                            1RV4 309
      DO 590 J1 = 7,NBC1                                               2RV4 310
      J = J + 1                                                        2RV4 311
  590 ET(I,J) = BCM(I,J1)                                              2RV4 312
      J = 0                                                            1RV4 313
      DO 600 J2 = NBC2,NBC3                                            2RV4 314
      J = J + 1                                                        2RV4 315
  600 EZ(I,J) = BCM(I,J2)                                              2RV4 316
      J = 0                                                            1RV4 317
      DO 610 J3 = NBC4,NBC5                                            2RV4 318
      J = J + 1                                                        2RV4 319
  610 EB(I,J) = BCM(I,J3)                                              2RV4 320
      DO 620  I=1,6                                                    1RV4 321
  620 WRITE (L7)(ET(I,J),J=1,NP),(EZ(I,J),J=1,NP),(EB(I,J),J=1,NP),    1RV4 322
     1  (DTSP(L,I),DZSP(L,I),DBSP(L,I),L=1,NP)                         RV4 323
  630 REWIND L4                                                        RV4 324
      REWIND L3                                                        RV4 325
      READ (L3)                                                        RV4 326
      READ (L3)                                                        RV4 327
      CALL TPREAD (L3,5,A1,A2,A3,A4,A5)                                RV4 328
      WRITE (L4) A1                                                    RV4 329
      WRITE (L4) A2                                                    RV4 330
      WRITE (L4) A5                                                    RV4 331
      WRITE (L4) A3                                                    RV4 332
      WRITE (L4) A4                                                    RV4 333
      CALL TPREAD(L3,4,A1,A2,A3,A4,A4)                                 RV4 334
      WRITE (L4) A1                                                    RV4 335
      WRITE (L4) A3                                                    RV4 336
      WRITE (L4) A4                                                    RV4 337
      WRITE (L4) A2                                                    RV4 338
  640 REWIND L4                                                        RV4 339
      NX = NX2 - NX1 + 1                                               RV4 340
      WRITE  (L7) NP,NX,E1,E2,R,EDAMP,BDAMP,ZDAMP,DPSI2,CO,RHO,        RV4 341
     1  GAMMA2,REFM,(X(I),XX1(I),XX(I),CC(I),THX(I),EM(I),XA(I),       RV4 342
     2  FA(I), I=NX1,NX2),(AMSI(I),I=1,9),ZSPRNG,BSPRNG,                RV4 343
     3 AKTB,FCNSP,(TOB(I),TOT(I),TOZ(I),                               RV4 344
     4           PSI(I),SPSI(I),CPSI(I),I=1,NP),FSPRNG,AKTZ,DPSI       RV4 345
      DO 650  K=1,3                                                   1RV4 346
      CALL TPREAD(L4,3,A1,A2,A3,A4,A5)                                1RV4 347
  650 WRITE (L7)    NVO, (A1(I), A2(I), A3(I), I=1,NVO)               1RV4 348
      CCON=-AKTB*FCNSP                                                 RV4 349
      BCON=-FCNSP*AKTZ                                                 RV4 350
```

```
      ACON=FCNSP*AKTZ*AKTB                                                  RV4 351
      DO 660 I=1,NP                                                        1RV4 352
       CB3(I)=CB3(I)-CCON                                                  1RV4 353
       CB9(I)=CB9(I)-ACON                                                  1RV4 354
       CB11(I)=CB11(I)-BDAMP                                               1RV4 355
      CT2(I)=CT2(I)-FDAMP                                                  1RV4 356
      CT3(I)=CT3(I)-FSPRNG-FCNSP                                           1RV4 357
      CT9(I)=CT9(I)-BCON                                                   1RV4 358
      CT12(I)=CT12(I)-CCCN                                                 1RV4 359
      CZ3(I)=CZ3(I)-BCON                                                   1RV4 360
      CZ8(I)=CZ8(I)-ZDAMP                                                  1RV4 361
      CZ9(I)=CZ9(I)-ZSPRNG-FCNSP*AKTZ                                      1RV4 362
      CZ12(I)=CZ12(I)-ACCN                                                 1RV4 363
  660 CB12(I)=CB12(I)-BSPRNG-FCNSP*AKTB*AKTB                               1RV4 364
        WRITE (L7) (CT1(I),CT2(I),CT3(I),CT7(I),CT8(I),CT9(I),CT10(I),      RV4 365
     1  CT11(I),CT12(I),CZ1(I),CZ2(I),CZ3(I),CZ7(I),CZ8(I),CZ9(I),         RV4 366
     2  CZ10(I),CZ11(I),CZ12(I),CB1(I),CB2(I),CB3(I),CB7(I),CB8(I),        RV4 367
     3  CB9(I),CB10(I),CB11(I),CB12(I),I=1,NP)                             RV4 368
      REWIND L3                                                            RV4 369
      REWIND L7                                                            RV4 370
      REWIND L6                                                            RV4 371
C                                                                          RV4 372
C                                                                          RV4 373
C     END  OF  RESPONSE  MATRIX  CALCULATIONS .                            RV4 374
C                                                                          RV4 375
      RETURN                                                               RV4 376
C                                                                          RV4 377
C        FORMAT  STATEMENTS                                                RV4 378
C                                                                          RV4 379
  670 FORMAT(26H MAXIMUM ABSOLUTE RESPONSE//)                              RV4 380
  680 FORMAT(4X,3HPSI,12X,1HT,13X,2HTP,12X,1HZ,13X,2HZP,12X,1HB,13X,2HBP   RV4 381
     1//)                                                                  RV4 382
  690 FORMAT(F8.1,1PE17.3/0PF8.1,1PE31.3/0PF8.1,1PE45.3/0PF8.1,1PE59.3/    RV4 383
     1 0PF8.1,1PE73.3/0PF8.1,1PE87.3)                                      RV4 384
  700 FORMAT(34H DIVERGENCE CONDITION DISCONTINUED)                        RV4 385
  710 FORMAT (27H END OF JOB--STABILITY ONLY//)                            RV4 386
  720 FORMAT(1H1,53X,13HTIME  HISTORY//                                    RV4 387
     153X,11HCYCLE NO. =I3 //4X,3HPSI,12X,1HT,13X,2HTP,12X,1HZ,           RV4 388
     213X,2HZP,12X,1HB,13X,2HBP)                                           RV4 389
  730 FORMAT(F7.1,3X,(1P6E14.3 ))                                          RV4 390
      END                                                                  RV4 391
```

```
      SUBROUTINE TRMLLT (A,B,C,N,NR,IC)                                  TRM   1
C                                                                        TRM   2
C               A=B*C       WHERE B IS LOWER TRIANGLE OF NOMINAL ORDER N TRM   3
C                           STORED AS VECTOR                             TRM   4
C                           A,C ARE RECTANGULAR OF ORDER  N X NR         TRM   5
C                           N MAX = 25     NR MAX =  6                   TRM   6
C       IC=1 A=B*C      IC=2 A=A&B*C       IC=3  A=-A&B*C                TRM   7
      DIMENSION A(25,6),B(325),C(25,6)                                   TRM   8
      DO 130 J=1,NR                                                     1TRM   9
      IB=0                                                              1TRM  10
      DO 130 I=1,N                                                      2TRM  11
      GO TO (100,120,110), IC                                           2TRM  12
  100 A(I,J)=0.0                                                        2TRM  13
      GO TO 120                                                         2TRM  14
  110 A(I,J)=-A(I,J)                                                    2TRM  15
  120 DO 130 K=1,I                                                      3TRM  16
      IB=IB&1                                                           3TRM  17
  130 A(I,J)=A(I,J)&DBLE(B(IB))*DBLE(C(K,J))                            3TRM  18
      RETURN                                                             TRM  19
      END                                                                TRM  20
```

```
      SUBROUTINE INTR(A,B,C,M,N,H2)                                          INR    1
C                                                                            INR    2
C             A=INT OF C      B=2ND INT OF C      BY TRAPEZOIDAL RULE        INR    3
C             A,B,C ARE RECTANGULAR MATRICES   M X N    MAX 25 X 6          INR    4
C             H2 IS CONSTANT HALF INTERVAL                                   INR    5
C             A OR B MAY BE EQUAL TO C                                       INR    6
C             IF A AND B ARE EQUAL       RESULT WILL BE 1ST INTEGRAL         INR    7
C                                                                            INR    8
      DIMENSION A(25,6),B(25,6),C(25,6)                                      INR    9
      DO 100 J=1,N                                                          1INR   10
      TC=C(1,J)                                                             1INR   11
      B(1,J)=0.0                                                            1INR   12
      A(1,J)=0.0                                                            1INR   13
      TA=0.0                                                                1INR   14
      TB=0.0                                                                1INR   15
      DO 100 I=2,M                                                          2INR   16
      TT=TA+H2*(C(I,J)+TC)                                                  2INR   17
      TB=TB+H2*(TA+TT)                                                      2INR   18
      TA=TT                                                                 2INR   19
      TC=C(I,J)                                                             2INR   20
      B(I,J)=TB                                                             2INR   21
  100 A(I,J)=TA                                                             2INR   22
      RETURN                                                                 INR   23
      END                                                                    INR   24
```

```
      SUBROUTINE TPREAD(NT,NM,A,B,C,D,E)                                TPR    1
C                       TPREAD(NT,NM,A,B,C,D,E)                         TPR    2
C                 READS TAPE NT , NM VECTORS OF 325 WORDS               TPR    3
C                                                                       TPR    4
      DIMENSION A(325),B(325),C(325),D(325),E(325)                      TPR    5
      READ (NT) A                                                       TPR    6
      IF (NM-1) 100,140,100                                             TPR    7
  100 READ (NT) B                                                       TPR    8
      IF (NM-2) 110,140,110                                             TPR    9
  110 READ (NT) C                                                       TPR   10
      IF (NM-3) 120,140,120                                             TPR   11
  120 READ (NT) D                                                       TPR   12
      IF (NM-4) 130,140,130                                             TPR   13
  130 READ (NT) E                                                       TPR   14
  140 RETURN                                                            TPR   15
      END                                                               TPR   16
```

```
      SUBROUTINE  INTT(A,B,C,N,H2)                                          INT    1
C           A=INT OF C       B=2ND INT OF C     BY TRAPEZOIDAL RULE         INT    2
C           A,B,C ARE TRIANGULAR MATRICES STORED AS VECTORS                 INT    3
C           H2 IS CONSTANT HALF INTERVAL     N IS NOMINAL ORDER , MAX=25    INT    4
C           A OR B MAY EQUAL C                                              INT    5
C           IF A AND B ARE EQUAL   RESULT WILL BE 1ST INTEGRAL              INT    6
C           SENSE LIGHT 4 IS OFF ON EXIT                                    INT    7
C                                                                           INT    8
      DIMENSION A(325),B(325),C(325)                                        INT    9
      CALL SLITE(4)                                                         INT   10
      II0=0                                                                 INT   11
      DO 120 J=1,N                                                         1INT   12
      II0=II0+J                                                            1INT   13
      TA=0.0                                                               1INT   14
      TB=0.0                                                               1INT   15
      TC=0.0                                                               1INT   16
      II=II0                                                               1INT   17
      DO 120 I=J,N                                                         2INT   18
      CALL SLITET(4,K)                                                     2INT   19
      GO TO (110,100), K                                                   2INT   20
  100 TT=TA+H2*(C(II)+TC)                                                  2INT   21
      TB=TB+H2*(TA+TT)                                                     2INT   22
      TA=TT                                                                2INT   23
  110 TC=C(II)                                                             2INT   24
      B(II)=TB                                                             2INT   25
      A(II)=TA                                                             2INT   26
  120 II=II+I                                                              2INT   27
      RETURN                                                                INT   28
      END                                                                   INT   29
```

```
      SUBROUTINE RFVC5                                                  RV5   1
C                                                                       RV5   2
C                                                                       RV5   3
C                                                                       RV5   4
      COMMON L1, L2, L3, L4, L5, L6, L7, L8, NCHK                       RV5   5
      DIMENSION TBB(24),TBPB(24),TBPPB(24),TZPPT(24),TZZ(24),TZPZ(24),  RV5   6
     1  TZPPZ(24),TBZ(24),TBPZ(24),TBPPZ(24),TTZ(24),TTPZ(24),TTPPZ(24), RV5   7
     2  TTB(24),TTPB(24),TTPPB(24),TZB(24),TZPB(24),TZPPB(24),TBT(24),   RV5   8
     3  TBPT(24),TBPPT(24),TTT(24),TTPT(24),TTPPT(24),TZT(24),TZPT(24),  RV5   9
     4  ALAM(12,24),B(24),BD(24),BDD(24),TH(24),THD(24),                 RV5  10
     5  THDD(24),Z(24),ZD(24),ZDD(24),                                   RV5  11
     6  TOB(24),TOT(24),TOZ(24),THIN(24),DTDX(12,24),DMDX(12,24),        RV5  12
     7  DZDX(12,24),PSI(24),SPSI(24),CPSI(24),XA(12),X(12),XXI(12),      RV5  13
     8  C(12),TWIST(12),AI(5),S(3),XH(12),XXL(12),XR(12),                RV5  14
     9  ALFAC(12,24),AMACH(10),ASTLN(10),ASTLP(10),ALFA(36),             RV5  15
     1  DPDXI(12,24),DPDXP(12,24),DPDSII(24),DPDSIP(24),DQDSII(24),      RV5  16
     2  DQDSIP(24),DTDPSI(24),DYMPSI(24),DQDPSI(24),DPDPSI(24),          RV5  17
     3  OM(4),CQ(4),CCEF(3,3),ABC(3),                                    RV5  18
     4  DOUTDR(12,24),DINDR(12,24),OMB(12),FB(24),FT(24),FZ(24)          RV5  19
C                                                                       RV5  20
      DIMENSION   FT1(24),FB1(24),FZ1(24),RADN(10),                     RV5  21
     1  AMUC(12,24),RHOC(12,24),XYZ(8,12),VLL(12,24)                     RV5  22
C                                                                       RV5  23
C                                                                       RV5  24
C                                                                       RV5  25
      DIMENSION                                                         RV5  26
     1  CL(48, 8, 6),CD(48, 8, 6),CM(48, 8, 6),CB(24),                   RV5  27
     2  STH(24),CTH(24),UP(12,24),HEAD(17),SB(24),AMACHC(12,24),XJ2(12), RV5  28
     3  BC(6),THDD(24),BDO(24),ZDO(24),FB(6,24),FT(6,24),                RV5  29
     4  FZ(6,24),DB(24,6),DT(24,6),DZ(24,6),PT1(300),                    RV5  30
     5  PT3(300),PT4(300),SZ(24),CZ(24)                                  RV5  31
C                                                                       RV5  32
C                                                                       RV5  33
C                                                                       RV5  34
C                                                                       RV5  35
      REWIND L3                                                         RV5  36
      REWIND L5                                                         RV5  37
      REWIND L6                                                         RV5  38
      REWIND L7                                                         RV5  39
      READ  (L3) LCCN,NXF2,NP,((ALAM(J,I),AMUC(J,I),RHOC(J,I),J=1,NXF2), RV5  40
     1     I=1,NP)                                                      RV5  41
      READ (L3) NTOR,Q2,P2,OMEGA,ALAMO,AMU                              RV5  42
      READ (L5)                                                         RV5  43
      READ (L5)IC,NITR,TOA,BCA,ZOA,APHASE,ALFAR,LSS2,HEAD,              RV5  44
     1  AOS,A1S,B1S,BTOL,ATOLP,                    NCASE,NAERO,LFAR,    RV5  45
     2  NOAL,NOMN,NOSEC,ALL,ALH,DELAL,(ALFA(I),I=1,NOAL),X1,X2,          RV5  46
     3  (AMACH(I),ASTLP(I),ASTLN(I),I=1,NOMN),(RADN(I),I=1,NOSEC),       RV5  47
     4  XO,ECPO,ECHO,RL,INTAN,AHARB,NCHAR,CDOR,CRET,                     RV5  48
     5  BSO,RSO,AMINF,TIN,UR,GAMM,NM,XREF,DREF                           RV5  49
      WRITE(L2,100)HEAD                                                 RV5  50
```

```
100 FORMAT(1H ,17A4)                                                    RV5   51
110 DO 120 I=1,NP                                                      1RV5   52
    FT(I)=0.0                                                          1RV5   53
    FB(I)=0.0                                                          1RV5   54
    FZ(I)=0.0                                                          1RV5   55
    TH(I)=0.0                                                          1RV5   56
    THD(I)=0.0                                                         1RV5   57
    B(I)=0.0                                                           1RV5   58
    BD(I)=0.0                                                          1RV5   59
    Z(I)=0.0                                                           1RV5   60
120 ZD(I)=0.0                                                          1RV5   61
    DO 130 I=1,6                                                       1RV5   62
130 READ (L7) (FT(I,J),J=1,NP),(FZ(I,J),J=1,NP),(FB(I,J),J=1,NP),      1RV5   63
   1  (DT(J,I),DZ(J,I),DB(J,I),J=1,NP)                                 RV5   64
    IF(NAERC) 180,140,180                                              RV5   65
140 DO 150 JJ=1,NOSEC                                                  1RV5   66
    DO 150 MM=1,NCMN                                                   2RV5   67
150 READ (L5)     (CL(II,MM,JJ),II=1,NOAL)                             2RV5   68
    DO 160 JJ=1,NOSEC                                                  1RV5   69
    DO 160 MM=1,NCMN                                                   2RV5   70
160 READ (L5)     (CD(II,MM,JJ),II=1,NOAL)                             2RV5   71
    DO 170 JJ=1,NOSEC                                                  1RV5   72
    DO 170 MM=1,NCMN                                                   2RV5   73
170 READ (L5)     (CM(II,MM,JJ),II=1,NOAL)                             2RV5   74
180  READ  (L7) NP,NX,E1,E2,R,FDAMP,BDAMP,ZDAMP,DPSI2,CO,RHO,          RV5   75
   1  GAMMA2,REFM,(X(I),XXL(I),XXI(I),C(I),TWIST(I),DMB(I),XA(I),       RV5   76
   2  XH(I),I=1,NX),AM,(S(I),I=1,3),(AI(I),I=1,5),ZSPRNG,               RV5   77
   3  BSPRNG,AKTB,FCNSP,(TOB(I),TOT(I),TOZ(I),                         RV5   78
   4          PSI(I),SPSI(I),CPSI(I),I=1,NP),FSPRNG,AKTZ,DPSI          RV5   79
     REWIND L6                                                         RV5   80
    E21=E2-E1                                                          RV5   81
    READ (L6) AOS,NCL,NIOM,IKCM,KOM,CQTOL,NCHK,(CQ(I),OM(I),I=1,3)     RV5   82
190 OMEGAR=OMEGA*R                                                     RV5   83
    ITERB=0                                                            RV5   84
    IF(IKOM-1) 220,200,220                                             RV5   85
200 CORR = AI(1)     * OMEGA * OMEGA                                   RV5   86
    FSPRNG = FSPRNG * CORR                                             RV5   87
    ZSPRNG=ZSPRNG*CORR                                                 RV5   88
    BSPRNG=BSPRNG*CORR                                                 RV5   89
    FCNSP=FCNSP*CORR                                                   RV5   90
    OCORR=CORR/OMEGA                                                   RV5   91
    FDAMP  = FDAMP  *OCORR                                             RV5   92
    ZDAMP=ZDAMP*OCORR                                                  RV5   93
    BDAMP=BDAMP*OCORR                                                  RV5   94
    WRITE (L2,1260) R,E1,AI(1),PL                                      RV5   95
    WRITE (L2,1270) AMU,ALAMO,AOS,AIS,BIS                              RV5   96
    WRITE (L2,1250) FCPO,FCFO                                          RV5   97
    WRITE(L2,210) OMEGAR,RHO,FSPRNG,ZSPRNG,BSPRNG,FDAMP,ZDAMP,BDAMP,   RV5   98
   1  FCNSP                                                            RV5   99
210 FORMAT(5X,22HAERODYNAMIC PARAMETERS/11H TIP SPEED=F8.2,6HFT/SEC,5X RV5  100
```

```
     114HDENSITY RATIO=F6.3//26H SPRING RATES (FT LBS/RAD)/5X,11HFEATHER  RV5 101
     2ING=F9.1/12X,4HLAG=F9.1/7X,9HFLAPPING=F9.1//                       RV5 102
     331H DAMPING RATES (FT LBS/RAD/SEC)/5X,11HFEATHERING=F9.1/          RV5 103
     412X,4HLAG=F9.1/7X,9HFLAPPING=F9.1//                                RV5 104
     534H CONTROL SPRING RATES (FT LBS/RAD)/5X,11HFEATHERING=F9.1///)    RV5 105
      FSPRNG=FSPRNG/CORR                                                 RV5 106
      ZSPRNG=ZSPRNG/CORR                                                 RV5 107
      BSPRNG=BSPRNG/CORR                                                 RV5 108
      FCNSP=FCNSP/CORR                                                   RV5 109
      BDAMP=BDAMP/OCORR                                                  RV5 110
      ZDAMP=ZDAMP/OCORR                                                  RV5 111
      FDAMP=FDAMP/OCORR                                                  RV5 112
  220 CRET=CRET/CO                                                       RV5 113
      OMSQ=OMEGA*OMEGA                                                   RV5 114
      OMSQ2=2.0*OMSQ                                                     RV5 115
      OMRSQ=OMSQ*R*R                                                     RV5 116
      CONST=3.1416*OMRSQ*R*R*.002378                                     RV5 117
      ACONST=OMRSQ*5.73*CO*.001189                                       RV5 118
      ANP=NP                                                             PV5 119
      BFLN=BL/ANP                                                        RV5 120
      CCONST=ACONST*R*BFLN                                               RV5 121
      DO 230 J=1,NX                                                     1RV5 122
      XYZ(1,J)=X(J)                                                     1RV5 123
      XYZ(2,J)=C(J)                                                     1RV5 124
      XYZ(3,J)=XH(J)                                                    1RV5 125
      XYZ(4,J)=XA(J)                                                    1RV5 126
      XYZ(5,J)=XXI(J)                                                   1RV5 127
      XYZ(6,J)=XXL(J)                                                   1RV5 128
      XYZ(7,J)=TWIST(J)                                                 1RV5 129
  230 XYZ(8,J)=DMR(J)                                                   1RV5 130
      DO 240 J=1,NX                                                     1RV5 131
      J2=J&2                                                            1RV5 132
      X(J2)=XYZ(1,J)                                                    1RV5 133
      XR(J2)=X(J2)*R                                                    1RV5 134
      C(J2)=XYZ(2,J)                                                    1RV5 135
      XH(J2)=XYZ(3,J)                                                   1RV5 136
      XA(J2)=XYZ(4,J)                                                   1RV5 137
      XXI(J2)=XYZ(5,J)                                                  1RV5 138
      XXL(J2)=XYZ(6,J)                                                  1RV5 139
      TWIST(J2)=XYZ(7,J)                                                1RV5 140
  240 DMR(J2)=XYZ(8,J)                                                  1RV5 141
      X(1)=X1                                                            RV5 142
      X(2)=X2                                                            RV5 143
      C(1)=CRET                                                          RV5 144
      C(2)=CRET                                                          RV5 145
      XXI(1)=0.0                                                         RV5 146
      XXI(2)=0.0                                                         RV5 147
      XE21=X2-X1                                                         RV5 148
      DO 250 I=1,NP                                                     1RV5 149
      PS    =(PSI(I)&APHASE)/57.2958                                    1RV5 150
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  250 THIN(I)=(AOS-A1S*COS(PS)-B1S*SIN(PS))/57.2958                    1RV5 151
  260 IF(ITERB-1) 270,290,290                                           RV5 152
  270 DO 280 I=1,NP                                                    1RV5 153
      FZ(I)=TCZ(I)          -AKTZ*FCNSP*THIN(I)&ZSPRNG*ZOA             1RV5 154
      FB(I)=TCB(I)          -AKTB*FCNSP*THIN(I)&BSPRNG*BOA             1RV5 155
      FT(I)=TOT(I)          &FCNSP*THIN(I)&FSPRNG*TOA                  1RV5 156
  280 CONTINUE                                                         1RV5 157
  290 ITERB=ITERB&1                                                     RV5 158
C     CALCULATE  BETA,BETAD,TH,THD,ZETA,ZETAD  TEST  FOR CONVERGENCE.   RV5 159
C     ICHK=0 IF ALL NON ZERO VALUES ARE WITHIN SPECIFIED TOLERANCE,OTHER RV5 160
C     WISE ICHK=1                                                       RV5 161
C     INTEGRATIONS PERFORMED BY TRAPEZOIDAL RULE                        RV5 162
C                                                                       RV5 163
C     CALCULATE PERICOIC INITIAL CONDITIONS AND INITIALIZE              RV5 164
C                                                                       RV5 165
      DO 300 I=1,6                                                     1RV5 166
      BC(I)=0.0                                                        1RV5 167
      DO 300 J=1,NP                                                    2RV5 168
  300 BC(I)=ET(I,J)*FT(J)&EZ(I,J)*FZ(J)&EB(I,J)*FB(J)&BC(I)            2RV5 169
      DO 310 I=1,NP                                                    1RV5 170
      BDD(I)=0.0                                                       1RV5 171
      THDD(I)=0.0                                                      1RV5 172
      ZDD(I)=0.0                                                       1RV5 173
      DO 310 J=1,6                                                     2RV5 174
      BDD(I)=DB(I,J)*BC(J)&BDC(I)                                      2RV5 175
      ZDD(I)=DZ(I,J)*BC(J)&ZDC(I)                                      2RV5 176
  310 THDD(I)=DT(I,J)*BC(J)&THDC(I)                                    2RV5 177
      DO 350 JKK=1,3                                                   1RV5 178
      READ (L7) NVO,(PT1(I),PT3(I),PT4(I),I=1,NVO)                     1RV5 179
      JK=0                                                             1RV5 180
      DO 350 I=1,NP                                                    2RV5 181
      DO 350 J=1,I                                                     3RV5 182
      JK=JK&1                                                          3RV5 183
      GO TO (320,330,340), JKK                                         3RV5 184
  320 THDD(I)=PT1(JK)*FT(J)&PT3(JK)*FZ(J)&PT4(JK)*FB(J)&THDD(I)        3RV5 185
      GO TO 350                                                        3RV5 186
  330 ZDD(I)=PT1(JK)*FT(J)&PT3(JK)*FZ(J)&PT4(JK)*FB(J)&ZDD(I)          3RV5 187
      GO TO 350                                                        3RV5 188
  340 BDD(I)=PT1(JK)*FT(J)&PT3(JK)*FZ(J)&PT4(JK)*FB(J)&BDD(I)          3RV5 189
  350 CONTINUE                                                         3RV5 190
      TH0      =BC(1)                                                   RV5 191
      THD0(1)  =BC(2)                                                   RV5 192
       Z0      =BC(3)                                                   RV5 193
       ZD0(1)  =BC(4)                                                   RV5 194
       B0      =BC(5)                                                   RV5 195
       BD0(1)  =BC(6)                                                   RV5 196
      ICHK=0                                                            RV5 197
      DO 500 I=1,NP                                                    1RV5 198
      IF(I-1) 360,370,360                                              1RV5 199
  360 BD0(I)=BD0(I-1)&(BDD(I)&BDD(I-1))*DPSI2                          1RV5 200
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      THDD(I)=THDD(I-1)&(THDD(I)&THDD(I-1))*DPSI2                    IRV5 201
      ZDD(I)=ZDD(I-1)&(ZDD(I)&ZDD(I-1))*DPSI2                        IRV5 202
      THD=THD&(THDD(I)&THDD(I-1))*DPSI2                              IRV5 203
      ZD=ZD&(ZDD(I)&ZDD(I-1))*DPSI2                                  IRV5 204
      BD=BD&(BDD(I)&BDD(I-1))*DPSI2                                  IRV5 205
  370 DBETAD=BDD(I)-BD(I)                                            IRV5 206
      DBETA =BD-B(I)                                                 IRV5 207
      DTHD  =THDD(I)-THD(I)                                          IRV5 208
      DTH   =THD-TH(I)                                               IRV5 209
      DZETAD=ZDD(I)-ZD(I)                                            IRV5 210
      DZETA = ZD   - Z(I)                                            IRV5 211
      IF(ABS(DBETA)-ATOLB) 400,400,380                               IRV5 212
  380 IF(BD) 390,460,390                                             IRV5 213
  390 IF(ABS(DBETA/BD)-RTOL) 400,400,460                             IRV5 214
  400 IF(ABS(DTH)-ATOLB) 430,430,410                                 IRV5 215
  410 IF(THD) 420,460,420                                            IRV5 216
  420 IF(ABS(DTH/THD)-RTOL) 430,430,460                              IRV5 217
  430 IF(ABS(DZETA)-ATOLB) 450,450,440                               IRV5 218
  440 IF(ZD) 450,460,450                                             IRV5 219
  450 IF(ABS(DZETA/ZD)-RTOL) 470,470,460                             IRV5 220
  460 ICHK=1                                                         IRV5 221
  470 BD   (I)=BDD(I)                                                IRV5 222
      B    (I)=BD                                                    IRV5 223
      IF (ABS(B(I))-1.57) 480,480,1080                               IRV5 224
  480 THD  (I)=THDD(I)                                               IRV5 225
      TH   (I)=THD                                                   IRV5 226
      ZD(I)=ZDD(I)                                                   IRV5 227
      Z (I)=ZD                                                       IRV5 228
  490 CB(I)=CCS(B(I))                                                IRV5 229
      SB(I)=SIN(B(I))                                                IRV5 230
      STH(I)=SIN(TH(I))                                              IRV5 231
      CTH(I)=COS(TH(I))                                              IRV5 232
      SZ(I)=SIN(Z(I))                                                IRV5 233
      CZ(I)=CCS(Z(I))                                                IRV5 234
  500 CONTINUE                                                       IRV5 235
C                                                                     RV5 236
C     CALCULATES NON DIMENSIONAL  DTDX(R,PSI),DMDX(R,PSI)            RV5 237
C                                                                     RV5 238
C                                                                     RV5 239
      DO 1040 I=1,NP                                                 IRV5 240
      PS=PSI(I)/57.2958                                              IRV5 241
      SPSZ=SIN(PS&Z(I))                                              IRV5 242
      CPSZ = CCS(PS&Z(I))                                            IRV5 243
      Q2P2 = .5 * (Q2*CPSI(I)-P2*SPSI(I))                            IRV5 244
      DO 1040 J=1,NXF2                                               2RV5 245
      IF (J-2) 510,520,530                                           2RV5 246
  510 UP(J,I)=ALAM(J,I)                                              2RV5 247
      UT=X1GAMUC(J,I)*SPSI(I)                                        2RV5 248
      GO TO 540                                                      2RV5 249
  520 UP(J,I)=ALAM(J,I)                                              2RV5 250
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      UT=X2&AMUC(J,I)*SPSZ&XE21*ZC(I)                                    2RV5 251
      GO TO 540                                                          2RV5 252
  530 UP(J,I)=ALAP(J,I)*CB(I)-XXI(J)*PC(I)-AMUC(J,I)*CPSZ*SB(I)          2RV5 253
     1&X(J)*Q2P2                                                         2RV5 254
      XCB=XXI(J)*CB(I)                                                   2RV5 255
      UT=X1&XCB&XE21&AMUC(J,I)*SPSZ&ZC(I)*(XF21&XCB)                     2RV5 256
  540 IF(UT) 550,620,550                                                 2RV5 257
  550 UPT=UP(J,I)/UT                                                     2RV5 258
  560 ABUPT=ABS(UPT)                                                     2RV5 259
      IF(UT) 570,620,660                                                 2RV5 260
  570 IF(UP(J,I)) 580,610,580                                            2RV5 261
  580 IF(ABUPT-0.2) 590,590,600                                          2RV5 262
  590 PHI=UPT&3.14159                                                    2RV5 263
      GO TO 730                                                          2RV5 264
  600 PHI=ATAN(UPT)&3.14159                                              2RV5 265
      GO TO 730                                                          2RV5 266
  610 PHI=3.14159                                                        2RV5 267
      GO TO 730                                                          2RV5 268
  620 IF(UP(J,I)) 630,640,650                                            2RV5 269
  630 PHI=4.71239                                                        2RV5 270
      GO TO 730                                                          2RV5 271
  640 PHI=0.0                                                            2RV5 272
      GO TO 730                                                          2RV5 273
  650 PHI=1.57080                                                        2RV5 274
      GO TO 730                                                          2RV5 275
  660 IF(UP(J,I)) 700,640,670                                            2RV5 276
  670 IF(ABUPT-0.2) 680,680,690                                          2RV5 277
  680 PHI=UPT                                                            2RV5 278
      GO TO 730                                                          2RV5 279
  690 PHI=ATAN(UPT)                                                      2RV5 280
      GO TO 730                                                          2RV5 281
  700 IF(ABUPT-0.2) 710,710,720                                          2RV5 282
  710 PHI=UPT&6.28318                                                    2RV5 283
      GO TO 730                                                          2RV5 284
  720 PHI=ATAN(UPT)&6.28318                                              2RV5 285
  730 U=SQRT(LT*UT&UP(J,I)*UP(J,I))                                      2RV5 286
      VLL(J,I) = U                                                       2RV5 287
      IF(J-2) 740,740,750                                                2RV5 288
  740 CDC=CDDR                                                           2RV5 289
      GO TO 960                                                          2RV5 290
  750 ALFAC(J,I)=TH(I)&TWIST(J)&PHI                                      2RV5 291
  760 AMACHC(J,I)=L/REEM                                                 2RV5 292
      DO 770 M=2,NOMN                                                    3RV5 293
      IF(AMACHC(J,I)-AMACH(M)) 780,780,770                               3RV5 294
  770 CONTINUE                                                           3RV5 295
      M=NOMN                                                             2RV5 296
  780  AMACHO=(AMACHC(J,I)-A MACH(M-1))/(AMACH(M)-AMACH(M-1))            2RV5 297
      DO 790 NS=2,NCSEC                                                  3RV5 298
      IF (X(J)-RADS(NS)) 800,800,790                                     3RV5 299
  790 CONTINUE                                                           3RV5 300
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      NS=NOSEC                                                          2RV5 301
  800 RADD = (X(J)-RADN(NS-1))/(RADN(NS)-RADN(NS-1))                    2RV5 302
      IF(ALFAC(J,I)) 810,850,820                                        2RV5 303
  810 ALFAC(J,I)=ALFAC(J,I)&6.28318                                     2RV5 304
      GO TO 840                                                         2RV5 305
  820 IF(ALFAC(J,I)-6.28318) 840,840,830                                2RV5 306
  830 ALFAC(J,I)=ALFAC(J,I)-6.28318                                     2RV5 307
  840 IF(ALFAC(J,I)-3.14159) 850,850,910                                2RV5 308
  850 ASTALP=ASTLP(M-1)&AMACHD*(ASTLP(M)-ASTLP(M-1))                    2RV5 309
      IF(NAERO) 860,870,860                                             2RV5 310
  860 CALL AERDAT (DMY)                                                 2RV5 311
      GO TO 960                                                         2RV5 312
  870 DO 880 IJ=2,NOAL                                                  3RV5 313
      IF(ALFAC(J,I)-ALFA(IJ)) 890,890,880                               3RV5 314
  880 CONTINUE                                                          3RV5 315
      IJ=NOAL                                                           2RV5 316
  890 ALFAD=(ALFAC(J,I)-ALFA(IJ-1))/(ALFA(IJ)-ALFA(IJ-1))               2RV5 317
  900 IF(ALFAC(J,I)-ASTALP) 950,950,940                                 2RV5 318
  910 ASTALN=ASTLN(M-1)&AMACHD*(ASTLN(M)-ASTLN(M-1))                    2RV5 319
      DO 920  IK=1,NCAL                                                 3RV5 320
      IJ=NOAL-IK                                                        3RV5 321
      IF(ALFAC(J,I)-ALFA(IJ)) 920,930,930                               3RV5 322
  920 CONTINUE                                                          3RV5 323
  930 ALFAD=(ALFAC(J,I)-ALFA(IJ))/(ALFA(IJ&1)-ALFA(IJ))                 2RV5 324
      IJ=IJ&1                                                           2RV5 325
      IF(ALFAC(J,I)-ASTALN) 940,950,950                                 2RV5 326
  940 M=2                                                               2RV5 327
      AMACHD=0.                                                         2RV5 328
  950 CALL INTLIN(AMACHD,ALFAC,RADD,CL,IJ,M,NS,CLC)                     2RV5 329
      CALL INTLIN(AMACHD,ALFAC,RADD,CD,IJ,M,NS,CDC)                     2RV5 330
      CALL INTLIN(AMACHD,ALFAC,RADD,CM,IJ,M,NS,CMC)                     2RV5 331
  960 CR=C(J)*CD                                                        2RV5 332
      UC=U*C(J)*RHOC(J,I)                                               2RV5 333
      UCU=UC*U                                                          2RV5 334
      DPDXP(J,I)=UC*CDC*UT                                              2RV5 335
      IF(J-2) 970,980,1000                                              2RV5 336
  970 DTDX(J,I)=0.0                                                     2RV5 337
      DZDX(J,I)=0.0                                                     2RV5 338
      GO TO 990                                                         2RV5 339
  980 DTDX(J,I) = UC*CDC*UP(J,I)                                        2RV5 340
      DZDX(J,I)=-UC*XE21*CDC*UT                                         2RV5 341
  990 DPDXI(J,I) = 0.0                                                  2RV5 342
      DMDX(J,I) = 0.0                                                   2RV5 343
      GO TO 1040                                                        2RV5 344
 1000 CLCD = CLC * COS(ALFAC(J,I)) & CDC * SIN (ALFAC (J,I))            2RV5 345
      DMDX(J,I)=UCU*CR*(XA(J)*CLCD  &CMC)/R                             2RV5 346
      DTDX(J,I)= UC *(CLC*UT&CDC*UP(J,I))                               2RV5 347
      DPDXI(J,I)=-UC*CLC*UP(J,I)                                        2RV5 348
      DZDX(J,I)=UC*XX(J)  *(CLC*UP(J,I)-CDC*UT)                         2RV5 349
 1010 IF(ALFAC(J,I)-3.14159) 1030,1030,1020                             2RV5 350
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1020 ALFAC(J,I)=(ALFAC(J,I)-6.28318)*57.2958                          2RV5 351
     GO TO 1040                                                       2RV5 352
1030 ALFAC(J,I)=ALFAC(J,I)*57.2958                                    2RV5 353
1040 CONTINUE                                                         2RV5 354
1050 IF (ICHK) 1060,1100,1060                                          RV5 355
1060 IF(ITERB-1-NITB) 1070,1070,1090                                   RV5 356
1070 IF(LSS2) 1130,1100,1130                                           RV5 357
1080 WRITE (L2,1280)                                                   RV5 358
     CALL EXIT                                                         RV5 359
1090 WRITE (L2,1290)                                                   RV5 360
     CALL EXIT                                                         RV5 361
1100 WRITE (L2,1300) ITERB                                             RV5 362
     WRITE (L2,1310)(PSI(I),B(I),TH(I),Z(I),I=1,NP)                    RV5 363
     WRITE (L2,1220) (XR(J),J=3,NXF2)                                  RV5 364
     DO 1110 I=1,NP                                                   1RV5 365
1110 WRITE (L2,1230) PSI(I),(ALFAC(J,I),J=3,NXF2)                     1RV5 366
     WRITE (L2,1240) (XR(J),J=3,NXF2)                                  RV5 367
     DO 1120 I=1,NP                                                   1RV5 368
1120 WRITE (L2,1230) PSI(I),(AMACHC(J,I),J=3,NXF2)                    1RV5 369
     IF(ICHK) 1130,1210,1130                                           RV5 370
1130 READ (L7) (TTPPT(I),TTPT(I),TTT(I),TZPPT(I),TZPT(I),TZT(I),       RV5 371
    1  TBPPT(I),TBPT(I),TBT(I),TTPPZ(I),TTPZ(I),TTZ(I),TZPPZ(I),TZPZ(I) RV5 372
    2  ,TZZ(I),TPPPZ(I),TBPZ(I),TBZ(I),TTPPB(I),TTPB(I),TTB(I),TZPPB(I, RV5 373
    3  ,TZPB(I),TZB(I),TBPPB(I),TBPB(I),TBB(I),I=1,NP)                  RV5 374
     DO 1170 I=1,NP                                                   1RV5 375
     SBCB=SB(I)*CB(I)                                                 1RV5 376
     CBSQ=CB(I)*CB(I)                                                 1RV5 377
     SBSQ=SB(I)*SB(I)                                                 1RV5 378
     CBMSB=CBSQ-SBSQ                                                  1RV5 379
     TH2=2.0*TH(I)                                                    1RV5 380
     C2TH=COS(TH2)                                                    1RV5 381
     SCTH=STH(I)*CTH(I)                                               1RV5 382
     STHSQ=STH(I)*STH(I)                                              1RV5 383
     CTHSQ=CTH(I)*CTH(I)                                              1RV5 384
     C1=S(1)                                                          1RV5 385
     C22 = S(2)*CTH(I)                                                1RV5 386
     C23 = S(3)*CTH(I)                                                1RV5 387
     C24 = S(2)*STH(I)                                                1RV5 388
     C25 = S(3)*STH(I)                                                1RV5 389
     C42 = AI(2)*CTH(I)                                               1RV5 390
     C43 = AI(3)*CTH(I)                                               1RV5 391
     C44 = AI(2)*STH(I)                                               1RV5 392
     C45 = AI(3)*STH(I)                                               1RV5 393
     CA1=C22&C25                                                      1RV5 394
     CA3=AI(5)*SCTH                                                   1RV5 395
     CA4=C23-C24                                                      1RV5 396
     CA6=C44-C43                                                      1RV5 397
     CA10=C42&C45                                                     1RV5 398
     CA11=AI(5)*CTHSQ                                                 1RV5 399
     CA18=AI(5)*STHSQ                                                 1RV5 400
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      ZD1=ZD(I)&1.0                                                      1RV5 401
      CAB1=C1*SB(I)-CA1*CB(I)                                            1RV5 402
      CC3=-CA6*SB(I)-CA3*CB(I)                                           1RV5 403
      CC5=CA1C*CB(I)&AI(4)*SB(I)                                         1RV5 404
      CAFG=1.-CA18                                                       1RV5 405
      CAEG1=CA10*SB(I)-CA18*CB(I)                                        1RV5 406
      THDSQ=THD(I)*THD(I)                                                1RV5 407
      BDDSQ=BDD(I)*BDD(I)                                                1RV5 408
      BDSQ =BD (I)*BD (I)                                                1RV5 409
      ZDDSQ=ZDD(I)*ZDD(I)                                                1RV5 410
      BDTHD=BD(I)*THD(I)                                                 1RV5 411
      ZD1BD=ZD1*BD(I)                                                    1RV5 412
      ZD1TD=ZD1*THD(I)                                                   1RV5 413
      TDDSQ=THDD(I)*THDD(I)                                              1RV5 414
      ZD1SQ=ZD1*ZD1                                                      1RV5 415
      SUMM=0.0                                                           1RV5 416
      SUMT=0.0                                                           1RV5 417
      SUMZ=0.0                                                           1RV5 418
      XEND = 1.0 - X(NXF2)                                               1RV5 419
      DO 1140 J = 2,NXF2                                                 2RV5 420
      XJ= X(J)-X(J-1)                                                    2RV5 421
      SUMT=SUMT&(DTDX(J,I)*XXI(J)&DTDX(J-1,I)*XXI(J-1))*XJ               2RV5 422
      SUMZ=SUMZ&(DZDX(J,I)&DZDX(J-1,I))*XJ                               2RV5 423
1140  SUMM=SUMM&(DMDX(J,I)&DMDX(J-1,I))*XJ                               2RV5 424
      SUMT=SUMT&DTDX(NXF2,I)*XXI(NXF2)*XEND                              1RV5 425
      SUMM=SUMM&DMDX(NXF2,I)*XEND                                        1RV5 426
      SUMZ=SUMZ&DZDX(NXF2,I)*XEND                                        1RV5 427
      GAMMA4=GAMMA2*0.5                                                  1RV5 428
      P2S=P2*SPSI(I)                                                     1RV5 429
      P2C=P2*CPSI(I)                                                     1RV5 430
      Q2S=Q2*SPSI(I)                                                     1RV5 431
1150  Q2C=Q2*CPSI(I)                                                     1RV5 432
      FB1(I)=E1*CAB1*CZ(I)&(E21*CAB1&SBCB*CAEG-CA10*CBMSB)*ZD1SQ&2.0     1RV5 433
     1*(CAEG1*ZD1TD&CA3*BDTHD)                                           1RV5 434
      FB1(I)=FB1(I)&CA10*THDSQ-CC3*ZDD(I)&BDD(I)*(1.&CA18)&CA6*THDD(I)   1RV5 435
      FB1(I)=-FB1(I)&GAMMA4*SUMT&TTPPB(I)*THDD(I)&TTPB(I)*THD(I)&TTB(I)  1RV5 436
     1  *TH(I)&TZPPB(I)*ZDD(I)&TZB(I)*Z(I)&TBPPB(I)*BDD(I)&TBPB(I)*BD(I)1RV5 437
     2  &TBB(I)*B(I)&TZPB(I)*ZD(I)-FCNSP*AKTB*THIN(I)&BSPRNG*BOA         1RV5 438
     3-(1.&F2*S(1))*(P2C&Q2S)*CPSC-AI(3)*(Q2C-P2S)                       1RV5 439
      FT1(I)=F1*(CA1*SZ(I)-CA4*SB(I)*CZ(I))-(E21*CA4*SB(I)-CA6*SBCB-CA3*1RV5 440
     1CBSQ)*ZD1SQ-2.*(CAEG1*ZD1BD&CA3*BDSQ)                              1RV5 441
      FT1(I)=FT1(I)&CA6*BDD(I)&(E21*CA1&CC5)*ZDD(I)&AI(4)*THDD(I)        1RV5 442
      FT1(I)=-FT1(I)&GAMMA4*SUMM&TTPPT(I)*THDD(I)&TTT(I)*TH(I)           1RV5 443
     1  &TZPPT(I)*ZDD(I)&TZT(I)*Z(I)&TBPPT(I)*BDD(I)&TBPT(I)*BD(I)       1RV5 444
     2  &TBT(I)*B(I)&TZPT(I)*ZD(I)&FCNSP*THIN(I)&FSPRNG*FOA              1RV5 445
     3-(AI(3)&E2*S(3))*(Q2S&P2C) -AI(5)*.Q2C-P2S)                        1RV5 446
1160  FZ1(I)=F1*(SZ(I)*(E21*AM&C1*CB(I)&CA1*SB(I))-CA4*CZ(I))            1RV5 447
      FZ1(I)=FZ1(I)&2.*((E21*(-C1*SB(I)&CA1*CB(I))-CAEG*SBCB-CA10*CBMSB 1RV5 448
     1 )*ZD1BD&(E21*CA4*SB(I)-CA6*SBCB-CA3*CBSQ)*ZD1TD)                  1RV5 449
      FZ1(I)=FZ1(I)&2.*CA11*CB(I)*BDTHD&(CA6*CB(I)-CA3*SB(I))*BDSQ&( E21RV5 450
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     1*CA4-CA6*CB(I))*THDSQ                                                    IRV5 451
      FZ1(I)=FZ1(I)-CC3*BDD(I)&(E21*CA1&CC5)*THDD(I)&                          IRV5 452
     1  (E21*(E21*AM62.0*(C1*CB(I)&CA1*SB(I)))&CBSQ&CA10*SBCB                  IRV5 453
     2&A1(5)*(CTHSQ&STHSQ*SB&C))*ZDD(I)                                       IRV5 454
1170 FZ1(I)=-FZ1(I)&GAMMA4*SUMZ&TTPPZ(I)*THDD(I)&TTPZ(I)*THD(I)&TTZ(I)*      IRV5 455
     1  TH(I)&TZPPZ(I)*ZDD(I)&TZZ(I)*Z(I)&TBPPZ(I)*BDD(I)&TBPZ(I)*BD(I)       RV5 456
     2  &TBZ(I)*B(I)&TZPZ(I)*ZD(I)-FCNSP*AKTZ*THIN(I)&ZSPRNG*ZOA               RV5 457
1180 DO 1190 I=1,NP                                                           IRV5 458
      FT(I)=(FT1(I)&FT(I))/2.0                                                IRV5 459
      FB(I)=(FB1(I)&FB(I))/2.0                                                IRV5 460
1190 FZ(I)=(FZ1(I)&FZ(I))/2.0                                                 IRV5 461
      REWIND L7                                                                RV5 462
      DO 1200 NTMS = 1,7                                                      IRV5 463
1200 READ (L7)                                                                IRV5 464
      GO TO 250                                                                RV5 465
1210 REWIND L3                                                                 RV5 466
      READ (L3)                                                                RV5 467
      READ (L3)                                                                RV5 468
      WRITE(L3)X1,FCPC,FCHO,EL,CONST,E2,S(1),AI(1),                            RV5 469
     1R,(X(I),XXI(I),DMB(I),I=1,NXF2),(CB(I),SB(I),CPSI(I),BDD(I),CZ(I),      RV5 470
     2 SPSI(I),BD(I),I=1,NP),((DPDXP(J,I),DPDXI(J,I),DTDX(J,I),DMDX(J,I)      RV5 471
     3 ,J=1,NXF2),I=1,NP),CCCAST,ACONST,BELN,ALFAR,DMSQ,NCASE,AM,              RV5 472
     4 LSS1,((ALFAC(J,I),J=1,NXF2),I=1,NP),(PSI(I),I=1,NP),XE21,XO,           RV5 473
     5 (B(I),TH(I),Z(I),I=1,NP),INTAN,NHARB,NOHAR,IRATE,LEAR,XEND,NM,         RV5 474
     6 BEQ,REQ,AMINF,TIN,UR,GAMM,RHC,OMEGAR,E21,E1,A1S,B1S,FDAMP,AKTZ,        RV5 475
     7 DREF,XREF,ALL,ALH,DELAL,ZDC,THIN,AKTB,BOA,FCNSP,BDAMP,BSPRNG           RV5 476
     8,FSPRNG,TOA,THC,((VLL(J,I),J=1,NXF2),I=1,NP)                            RV5 477
      REWIND L3                                                                RV5 478
      REWIND L6                                                                RV5 479
1220 FORMAT(1H1,30X,34HBLADE ANGLE OF ATTACK DISTRIBUTION/43X,11HRADIAL       RV5 480
     1 STA./7H     PSI,12F10.3//)                                             RV5 481
1230 FORMAT(F7.1,12F10.3//)                                                   RV5 482
1240 FORMAT(29X,26HMACH  NUMBER  DISTRIBUTION,12X/43X,11HRADIAL STA./         RV5 483
     17H     PSI,12F10.3//)                                                   RV5 484
1250 FORMAT(11H CP FACTOR=F8.4,9X,11H CH FACTOR=F8.4//)                       RV5 485
1260 FORMAT(//////////19H    BLADE PARAMETERS//5H   R=F8.2,10H FT.     E=     RV5 486
     1F8.4,11H FT.     I1=F10.5,11HSLUG-FT.SQ.,5X,10HNO BLADES=F4.0//////)   RV5 487
1270 FORMAT(/5X,9HCONDITION/6H  MU =F7.4,5X,15HLAMBDA(STEADY)=F8.4/10X,       RV5 488
     116HTHETA 0(STEADY)=F6.2,9X,13HTHETA 1(COS)=F6.2,5X,13HTHETA 1(SIN)      RV5 489
     2=F6.2 /)                                                                RV5 490
1280 FORMAT(/53H BETA GREATER THAN 90 DEGREES  CONDITION DISCONTINUED/)        RV5 491
1290 FORMAT(20X33HLAST ITERATION  **NOT CONVERGED**/)                         RV5 492
1300 FORMAT(17H ITERATION COUNT=I2)                                           RV5 493
1310 FORMAT(12H AZIMUTH STA,4X,4HBETA,5X,5HTHETA,5X,9HLAG ANGLE//(F9.1       RV5 494
     1,F12.4,F9.4,F12.4))                                                     RV5 495
1320 RETURN                                                                   RV5 496
      END                                                                     RV5 497
```

```
      SUBROUTINE INTLIN (AMACSL,ALFASL,DELTSL,PAR,N,K,L,PARFNL)          INL    1
C     THIS SUBROUTINE IS CATALOGED IN THE RELOCATABLE LIBRARY AS SUB0501 INL    2
C                                                                        INL    3
C     LINEAR INTERPOLATION FOR FUNCTION OF UP TO THREE VARIABLES         INL    4
C                                                                        INL    5
      DIMENSION PAR(48, 8,6)                                             INL    6
C                                                                        INL    7
C                                                                        INL    8
      J=L-1                                                              INL    9
      PAR1=PAR(N-1,K-1,J)&ALFASL*(PAR(N,K-1,J)-PAR(N-1,K-1,J))           INL   10
      PAR2=PAR(N-1,K  ,J)&ALFASL*(PAR(N,K  ,J)-PAR(N-1,K  ,J))           INL   11
      PAR3=PAR1&AMACSL*(PAR2-PAR1)                                       INL   12
      PARFNL=PAR3                                                        INL   13
      IF (DELTSL) 100,110,100                                            INL   14
  100 PAR4 = PAR(N-1,K-1,L)&ALFASL*(PAR(N,K-1,L)-PAR(N-1,K-1,L))         INL   15
      PAR5 = PAR(N-1,K,L)&ALFASL*(PAR(N,K,L)-PAR(N-1,K,L))               INL   16
      PAR6 = PAR4 & AMACSL * (PAR5-PAR4)                                 INL   17
      PARFNL = PAR3 & DELTSL * (PAR6-PAR3)                               INL   18
  110 RETURN                                                             INL   19
      END                                                                INL   20
```

```
      SUBROUTINE AERCAT(DMY)                                            AER    1
      RETURN                                                            AER    2
      END                                                               AER    3
```

```
      SUBROUTINE RVSPC6                                                  RV6   1
C                                                                        RV6   2
C                                                                        RV6   3
C                                                                        RV6   4
      DIMENSION                                                          RV6   5
     1S(3),AI(5),X(12),XXI(12),CBA(24),SBA(24),BDD(24),SPSI(24),CPSI(24) RV6   6
     2,DPDXP(12,24),DPDXI(12,24),DTDX(12,24),DPDSII(24),DPDSIP(24),      RV6   7
     3DQDSII(24),DQDSIP(24),CTCPSI(24),DYMPSI(24),OM(4),CQ(4),XJ2(12),   RV6   8
     4DQDPSI(24),DPDPSI(24),CCEF(3,4),ABC(3),DMDX(12,24),DOUTDR(12,24),  RV6   9
     5DINDR(12,24),XB(12),XB1(12),DMB(12),BD(24),ZDD(24),                RV6  10
     6HEAD(17),PSI(24),ALFAC(12,24),B(24),TH(24),Z(24),C(12),ALAM(12,24) RV6  11
     7,RHOC(12,24),AMUC(12,24),RC(24),CZ(24),DXMPSI(24),THIN(24),THD(24) RV6  12
C                                                                        RV6  13
C                                                                        RV6  14
C                                                                        RV6  15
      COMMON L1,L2,L3,L4,L5,L6,L7,L8,NCHK,ALAM,X,PSI,ALFAC,NX,NP,DOUTDR, RV6  16
     1DINDR,NOPBNC,RHO,OMRSQ,B,TH,Z,INTAN,ITERB,EBC,EBD,ETC,ETD,         RV6  17
     2FXC,FZC,ALFAR,AOS,A1S,B1S,THRUST,HFORCE,HP,YFORCE,CT,CH,CP,CY,BD,  RV6  18
     3CPSI,SPSI,XO,ALL,ALH,DELAL,NHARB,C,OMEGA,R,DMDX,HEAD,NOHAR,E2,     RV6  19
     4AMUC,BEQ,REQ,AMINF,TIN,UR,GAMM,NXF2,OMEGAR,ALAMO,                  RV6  20
     5RC,XREF,DREF,RHOC,DPSI,AMU,YMOM,XMOM,XFT(12),CN,SN,VLL(12,24)      RV6  21
C                                                                        RV6  22
      REWIND L6                                                          RV6  23
      REWIND L8                                                          RV6  24
      READ (L6) ACS,AC1,NIOM,IKOM,KOM,CQTOL,NCHK,(CQ(I),OM(I),I=1,3)     RV6  25
     1,ALAMO,IDYN                                                        RV6  26
      IF(IDYN) 110,100,110                                               RV6  27
  100 READ (L8) AMUFS,ALAMFS,AMOCK,ITEST                                 RV6  28
      GO TO 120                                                          RV6  29
  110 READ (L8)                                                          RV6  30
      READ (L8)  AMUFS,ALAMFS,AMOCK,ITEST                                RV6  31
  120 REWIND L3                                                          RV6  32
      READ  (L3) LCCN,NXF2,NP,((ALAM(J,I),AMUC(J,I),RHOC(J,I),J=1,NXF2), RV6  33
     1    I=1,NP)                                                        RV6  34
      READ (L3) NTCR,Q2,P2,OMEGA,ALAMO,AMU,TOROSV,ALFAR                  RV6  35
      READ (L3)X1,FCPO,FCHO,BL,CONST,E2,S(1),AI(1),R,(X(I),              RV6  36
     1XXI(I),DMB(I),I=1,NXF2),(CBA(I),SBA(I),CPSI(I),BDD(I),CZ(I),       RV6  37
     2 SPSI(I),BD(I),I=1,NP),((DPDXP(J,I),DPDXI(J,I),DTDX(J,I),DMDX(J,I) RV6  38
     3 ,J=1,NXF2),I=1,NP),CCONST,ACONST,BFLN,DMY   ,OMSQ,NCASE,AM,       RV6  39
     4 LSS1,((ALFAC(J,I),J=1,NXF2),I=1,NP),(PSI(I),I=1,NP),XE21,XO,      RV6  40
     5 (B(I),TH(I),Z(I),I=1,NP),INTAN,NHARB,NOHAR,IRATE,LFAR,XEND,NM,    RV6  41
     6 BEQ,REQ,AMINF,TIN,UR,GAMM,RHO,OMEGAR,E21,E1,A1S,B1S,FDAMP,AKTZ,   RV6  42
     7 DREF,XREF,ALL,ALH,DELAL,ZDD,THIN,AKTR,BOA,FCNSP,BDAMP,BSPRNG      RV6  43
     8,FSPRNG,TOA,THD,((VLL(J,I),J = 1,NXF2),I = 1,NP)                   RV6  44
      OMEGAR = OMEGA * R                                                 RV6  45
      NX = NXF2                                                          RV6  46
      SUMTO=0.0                                                          RV6  47
      SUMTH=0.0                                                          RV6  48
      XEND = XEND * .5                                                   RV6  49
      BCONST = ACONST*R                                                  RV6  50
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      CON7 = CONST * PHO                                                 RV6   51
      DO 140 I=1,NP                                                     1RV6   52
      SUMQI=0.0                                                         1RV6   53
      SUMQP=0.0                                                         1RV6   54
      SUMT=0.0                                                          1RV6   55
      DO 130 J=2,NXF2                                                   2RV6   56
      XFT(J) = X(J) * R                                                 2RV6   57
      XCBA = X1*CZ(I)&XE2I                                              2RV6   58
      XJ2(J)=0.5*(X(J)-X(J-1))                                          2RV6   59
      XB(J)=XCBA&XXI(J)*CBA(I)                                          2RV6   60
      XB1(J)=XCBA&XXI(J-1)*CBA(I)                                       2RV6   61
      SUMT=SUMT&XJ2(J)*(DTDX(J,I)&DTDX(J-1,I))*CBA(I)                   2RV6   62
      SUMQP=SUMQP&XJ2(J)*(DPDXP(J,I)*XB(J)&DPDXP(J-1,I)*XB1(J))*R       2RV6   63
  130 SUMQI=SUMQI&XJ2(J)*(DPDXI(J,I)*XB(J)&DPDXI(J-1,I)*XB1(J))*R       2RV6   64
      DTDPSI(I)=SUMT&DTDX(NXF2,I)*XEND*CBA(I)                           1RV6   65
      SUMTO=SUMQI&SUMQP*FCPO&SUMT*(DPDXI(NXF2,I)&DPDXP(NXF2,I))*        1RV6   66
     1XEND*XB(NXF2)*R                                                   1RV6   67
  140 SUMTH = SUMTH & DTDPSI(I)                                         1RV6   68
      TORQUE=SUMTO*CCONST                                                RV6   69
      DQ = TORQUE - TORQSV                                               RV6   70
      TORQSV = TORQUE                                                    RV6   71
      CP=TORQUE/(CONZ *R)                                                RV6   72
      THRUST=SUMTH*CCONST                                                RV6   73
      CT=THRUST/CONZ                                                     RV6   74
      IF (NTOR) 530,150,530                                              RV6   75
  150 OM(KOM)=AOS                                                        RV6   76
      CQ(KOM) = TORQUE                                                   RV6   77
      IF(ABS(CQ(KOM))-CQTOL) 160,160,180                                 RV6   78
  160 WRITE (L2,170)                                                     RV6   79
  170 FORMAT (1H1,/,19H TORQUE EQUILIBRIUM )                             RV6   80
      GO TO 410                                                          RV6   81
  180 IF(IKOM-NIOM) 210,210,190                                          RV6   82
  190 WRITE(L2,200)                                                      RV6   83
  200 FORMAT(10X,34H MAXIMUM ITERATIONS ON CQ EXCEEDED///)               RV6   84
      CALL EXIT                                                          RV6   85
  210 GO TO (220,220,330), KOM                                           RV6   86
  220 IF(ALAMC) 240,230,240                                              RV6   87
  230 AOS1=AOS                                                           RV6   88
      AOS=.6667*AOS                                                      RV6   89
      GO TO 310                                                          RV6   90
  240 DCQDO=-ALAMC*ACONST*RHO*BL*R*R*4./57.2958*.08333333                RV6   91
      AOS1=AOS                                                           RV6   92
      DAOS=-TORQUE/DCQDO                                                 RV6   93
      IF(ALAMC) 260,310,250                                              RV6   94
  250 DAOS=-DAOS                                                         RV6   95
  260 IF(ABS(DAOS)-5.) 300,300,270                                       RV6   96
  270 IF(DAOS) 280,300,290                                               RV6   97
  280 DAOS=-5.0                                                          RV6   98
      GO TO 300                                                          RV6   99
  290 DAOS=5.                                                            RV6  100
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300 AOS=AOS&DAOS                                                        RV6 101
310 KOM = 2                                                             RV6 102
     GO TO 650                                                          RV6 103
320 KOM1 = KOM-1                                                        RV6 104
    AOS1=AOS                                                            RV6 105
    AOS=OM(KOM)-CQ(KOM)*(OM(KOM1)-OM(KOM))/(CQ(KOM1)-CQ(KOM))           RV6 106
    KOM = 3                                                             RV6 107
     GO TO 650                                                          PV6 108
330 DO 340 I1 = 1,3                                                     1RV6 109
    COEF(I1,1) = OM(I1)*OM(I1)                                          1RV6 110
    COEF(I1,2) = OM(I1)                                                 1RV6 111
340 COEF(I1,3) = 1.0                                                    1RV6 112
    CALL INVRS (COEF,3)                                                 RV6 113
    DO 360 L = 1,3                                                      1RV6 114
    SUM = 0.                                                            1RV6 115
    DO 350 K = 1,3                                                      2RV6 116
350 SUM = COEF(L,K)*CQ(K)&SUM                                           2RV6 117
360 ABC(L) = SUM                                                        1RV6 118
    DO 370 I1 = 2,3                                                     1RV6 119
    OM(I1-1) = OM(I1)                                                   1RV6 120
370 CQ(I1-1) = CQ(I1)                                                   1RV6 121
    AOS1=AOS                                                            RV6 122
    RADCL=ABC(2)**2-4.*ABC(1)*ABC(3)                                    RV6 123
    IF(RADCL) 390,380,380                                               RV6 124
380 AOS=(-ABC(2)&SQRT(RADCL))/(2.*ABC(1))                               RV6 125
    AOS=(AOS&AOS1)/2.                                                   RV6 126
    GO TO 650                                                           RV6 127
390 WRITE (L2,400)                                                      RV6 128
400 FORMAT(46H NO CONVERGENCE  INFLOW RATIO MUST BE ALTERED ///)        RV6 129
    CALL EXIT                                                           RV6 130
410 NCHK = 0                                                            RV6 131
    GO TO (420,430,440), LFAR                                           RV6 132
420 ALFAR=0.0                                                           RV6 133
    GO TO 470                                                           RV6 134
430 ALFAR = 1.5708                                                      RV6 135
    GO TO 470                                                           RV6 136
440 IF(NMOCK-1) 450,460,450                                             RV6 137
450 ALFAR=ATAN(ALAMO/AMU&0.5*CT/(AMU*SQRT(ALAMO*ALAMO&AMU*AMU)))        RV6 138
    GO TO 470                                                           RV6 139
460 ALFAR=ATAN(ALAMFS/AMUFS)                                            RV6 140
470 IF (LCON) 520,480,520                                               RV6 141
480 WRITE (L2,490)                                                      RV6 142
490 FORMAT ( 66H CAPSULE BOW WAVE-ROTOR DISK INTERSECTION HAS NOT BEEN  RV6 143
   1 CALCULATED  /)                                                     RV6 144
    WRITE (L2,500) AOS,THRUST,TORQUE                                    RV6 145
500 FORMAT (5X,19HBLADE PITCH(TH75) =  ,F10.3,10H  THRUST = ,F10.3,     RV6 146
   1 10H  TORQUE = ,F10.3)                                              RV6 147
    CALL INFLOW                                                         RV6 148
    LCON = 1                                                            RV6 149
    KOM=1                                                               RV6 150
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      IKOM=1                                                                 RV6 151
      DO 510 I=1,3                                                          1RV6 152
      OM(I)=0.                                                              1RV6 153
  510 CQ(I)=0.                                                              1RV6 154
      GO TO 670                                                              RV6 155
  520 NTOR = 1                                                               RV6 156
  530 SUMHF=0.0                                                              RV6 157
      SUMYF=0.0                                                              RV6 158
      SUMYM=0.0                                                              RV6 159
      SUMXM = 0.0                                                            RV6 160
      FCTB = FCNSP * AKTB                                                    RV6 161
      DO 550 I=1,NP                                                         1RV6 162
      PZ = (PSI(I)/57.2958)-Z(I)                                            1RV6 163
      CPZ = COS(PZ)                                                         1RV6 164
      SPZ = SIN(PZ)                                                         1RV6 165
      SUMPI=0.0                                                             1RV6 166
      SUMPP=0.0                                                             1RV6 167
      DO 540 J=2,NXF2                                                       2RV6 168
      SUMPI=SUMPI&XJ2(J)*(DPDXI(J,I)&DPDXI(J-1,I))                          2RV6 169
  540 SUMPP=SUMPP&XJ2(J)*(DPDXP(J,I)   &DPDXP(J-1,I)     )                  2RV6 170
      DPDSII(I)=SUMPI&DPDXI(NXF2,I)*XEND                                    1RV6 171
      DPDSIP(I)=SUMPP&DPDXP(NXF2,I)*XEND                                    1RV6 172
      YMF = DTDPSI(I)*BCCNST-S(I)*OMSQ*(BDD(I)&Q2*SPSI(I)&P2*CPSI(I))       1RV6 173
     1*CBA(I)*AI(I)                                                         1RV6 174
      YMMB=(-BDAMP*BE(I)-BSPRNG*(P(I)-BOA)-FCTB*(AKTB*B(I)&THIN(I)-TH(I))1RV6 175
     1&AKTZ*Z(I)))*AI(1)*CMSQ                                               1RV6 176
      YMMT=(-BDAMP*THD(I)-BSPRNG*(TH(I)-TOA)&FCNSP*(THIN(I)-TH(I)&AKTB*     1RV6 177
     1B(I)&AKTZ*Z(I)))*AI(1)*CMSQ                                           1RV6 178
      DYMPSI(I) = -YMF*(E21*CPZ&CPSI(I)*E1)-YMMB*CPZ&YMMT*SPZ               1RV6 179
      DXMPSI(I) =  YMF*(E21*SPZ&SPSI(I)*E1)& YMMB*SPZ&YMMT*CPZ              1RV6 180
      DPDPSI(I)=DPDSII(I)&DPDSIP(I)                                         1RV6 181
      SUMYM=SUMYM&DYMPSI(I)                                                 1RV6 182
      SUMXM = SUMXM & DXMPSI(I)                                             1RV6 183
      SUMHF=(DPDSII(I)&DPDSIP(I)*ECHO)*SPSI(I)-DTDPSI(I)*SBA(I)*CPSI(I)/1RV6 184
     1CBA(I)&SUMHF                                                          1RV6 185
  550 SUMYF=-DPDPSI(I)*CPSI(I)-DTDPSI(I)*SBA(I)*SPSI(I)/CBA(I)&SUMYF      1RV6 186
      YFORCE=SUMYF*CCONST                                                    RV6 187
      HFORCE=SUMHF*CCONST                                                    RV6 188
      YMOM= SUMYM*RELN                                                       RV6 189
      XMOM = SUMXM*RELN                                                      RV6 190
  560 HP=TORQUE*OMEGA/550.0                                                  RV6 191
      CY=YFORCE/CONZ                                                         RV6 192
      CH=HFORCE/CONZ                                                         RV6 193
      IF(ALFAR-1.570E) 580,570,580                                           RV6 194
  570 SALFAR=1.                                                              RV6 195
      CALFAR=0.                                                              RV6 196
      GO TO 590                                                              RV6 197
  580 SALFAR=SIN(ALFAR)                                                      RV6 198
      CALFAR=COS(ALFAR)                                                      RV6 199
  590 FZC=THRUST*CALFAR-HFORCE*SALFAR                                        RV6 200
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      FXC=&HFORCE*CALFAR&THRUST*SALFAR                                  RV6 201
600   DO 620 I=1,NP                                                    1RV6 203
      DO 620 J=3,NXF2                                                  2RV6 204
      DMDX(J,I)=DMDX(J,I)*ACCNST*R                                     2RV6 205
      DOUTDR(J,I)=DYDX(J,I)*ACCNST*CBA(I)                              2RV6 206
610   DINDR(J,I)=-((DPDXP(J,I)&DPDXI(J,I))*ACONST-OMSQ*R*XXI(J)*SBA(I) 2RV6 207
     1*BD(I)*DMB(J)*0.062189*12.)                                      2RV6 208
620   CONTINUE                                                         2RV6 209
630   WRITE (L2,640) NCASE                                              RV6 210
      CALL OUT2(DMY,LSS1)                                               RV6 211
      LCON = C                                                          RV6 212
      GO TO 670                                                         RV6 213
640   FORMAT (15H1       CASE NO= I3///)                                RV6 214
650   WRITE (L2,660) IKOM,AOS,AOS1,THRUST,TORQUE                        RV6 215
      REWIND L3                                                         RV6 216
660   FORMAT (//20H ITER'COUNT ON TH75= I2,5X,10H NEW TH75= F6.1,5X,    RV6 217
     19HOLD TH75= F6.1,5X,7HTHRUST= F10.1,5X,7HTORQUE= F10.1////)       RV6 218
      NCHK = 1                                                          RV6 219
      IKOM = IKOM & 1                                                   RV6 220
      GO TO 68C                                                         RV6 221
67C   REWIND L3                                                         RV6 222
      WRITE(L3) LCON,NXF2,NP,((ALAM(J,I),AMUC(J,I),RHOC(J,I),J=1,NXF2), RV6 223
     1     I=1,NP)                                                      RV6 224
      WRITE (L3) NTOR,Q2,P2,OMEGA,ALAMO,AMU,TORQSV,ALFAO                RV6 225
680   REWIND L6                                                         RV6 226
      WRITE (L6) AOS,NC1,NICM,IKOM,KCM,CQTOL,NCHK,(CQ(I),OM(I),I=1,3)   RV6 227
     1,ALAMO,IDYN                                                       RV6 228
      IF (NTOR) 69C,E1C,690                                             RV6 229
690   CALL FOROUT (DMY)                                                 RV6 230
      IF(IDYN) 720,7CO,720                                              RV6 231
700   WRITE (L2,710)                                                    RV6 232
710   FORMAT (////20X,11HEND OF CASE/20X,26HTIME HISTORY NOT REQUESTED) RV6 233
      CALL EXIT                                                         RV6 234
720   WRITE (L3) TORQUE,HFORCE,YFORCE,THRUST,YMOM,XMOM,CT               RV6 235
      GO TO (730,810), ITEST                                            RV6 236
730   IF (CALFAR) 78C,74C,78C                                           RV6 237
740   IF(NMOCK-1) 75C,760,75C                                           RV6 238
75C   W=OMEGAR*(ALAMFS&.5*CT/ALAMFS)                                    RV6 239
      GO TO 770                                                         RV6 240
76C   W=OMEGAR*ALAMFS                                                   RV6 241
770   VFREE = W                                                         RV6 242
      GO TO 79C                                                         RV6 243
78C   VFREE = AMLFS * OMEGAR / CALFAR                                   RV6 244
      W=VFREE*SALFAR                                                    RV6 245
79C   REWIND L8                                                         RV6 246
      DO 800 J=1,4                                                     1RV6 247
800   READ (L8)                                                        1RV6 248
      WRITE (L8) VFREE,W,ALFAR,AMUFS,ALAMFS                             RV6 249
810   RETURN                                                            RV6 250
      END                                                               RV6 251
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      SUBROUTINE FORCUT(DMY)                                                FOT   1
      DIMENSION PSI(24),CPSI(24),SPSI(24),R(24),TH(24),Z(24),               FOT   2
     1   ALFAC(12,24),DOUTDR(12,24),DINDR(12,24),X(12),C(12),BD(24),        FOT   3
     2    DMDX(12,24),HEAD(17),ALAM(12,24),AMUC(12,24),RHOC(12,24)          FOT   4
      DIMENSION RC(24)                                                      FOT   5
      COMMON L1,L2,L3,L4,L5,L6,L7,L8,NCHK,ALAM,X,PSI,ALFAC,NX,NP,DOUTDR,    FOT   6
     1DINDR,NCPBMC,RHO,OMRSQ,R,TH,Z,INTAN,ITERR,EBC,FBD,ETC,ETD,           FOT   7
     2FXC,FZC,ALFAR,AOS,AIS,BIS,THRUST,HFORCE,HP,YFORCE,CT,CH,CP,CY,BD,    FOT   8
     3CPSI,SPSI,XO,ALL,ALH,DELAL,NHARB,C,OMEGA,R,DMDX,HEAD,NOHAR,F2,       FOT   9
     4AMUC,BEG,REQ,AMINF,TIN,UR,GAMM,NXF2,OMEGAR,ALAMO,                    FOT  10
     5RC,XREF,DREF,RHCC,DPSI,AMU,YMOM,XMOM,XFT(12),CN,SN                   FOT  11
      ALFAR1 = ALFAR * 57.2958                                              FOT  12
  100 WRITE (L2,120) FXC,FZC,ALFAR1                                         FOT  13
      WRITE (L2,140) AOS,AIS,BIS                                            FOT  14
      WRITE (L2,130) THRUST,HFORCE,HP,YFORCE,CT,CH,CP,CY                    FOT  15
      WRITE(L2,110) YMOM,XMOM                                               FOT  16
  110 FORMAT (24H  MOMENT ABOUT Y AXIS  =F10.2,6H FT LB /                   FOT  17
     1        24H  MOMENT ABOUT X AXIS  =F10.2,6H FT LB/////)                FOT  18
  120 FORMAT( 31H (FORCE ALONG FLIGHT PATH)CALC=F7.0,36H  (FORCE NORMAL     FOT  19
     1TO FLIGHT PATH)CALC=F7.0,3X,                    6HALFAR=F7.2,5H(DEG)/ FOT  20
     2)                                                                     FOT  21
  130 FORMAT(8H THRUST=F8.1,13X,7HHFORCE=F8.1/5X,3HHP=F8.1,13X,7HYFORCE=    FOT  22
     1F8.1//5X3HCT=F8.5,17X,3HCH=F8.5/5X3HCP=F8.5,17X,3HCY=F8.5///)         FOT  23
  140 FORMAT(1X,13HCONTROL INPUT/3X,16HFEATHERING (DEG)/7X,13HSTEADY        FOT  24
     1  =F7.3/7X,12HCYCLIC(COS)=F7.3/7X,12HCYCLIC(SIN)=F7.3///)             FOT  25
  150 RETURN                                                                FOT  26
      END                                                                   FOT  27
```

```
      SUBROUTINE HRANAL(K,N,NCHAR,F,CPSI,SPSI,X,LSS1)                    HRL   1
C     K = NUMBER OF RADIAL STATIONS                                      HRL   2
C     N = NUMBER OF ORDINATES (AZIMUTH STATIONS)                         HRL   3
C     F = TWO-ARRAY FUNCTION (N,K) TO BE HARMONICALLY ANALYZED AT EACH   HRL   4
C         DIMENSIONLESS RADIAL STATION X                                 HRL   5
C     X = SINGLE ARRAY DEFINING EACH DIMENSIONLESS RADIAL STATION        HRL   6
C     CPSI = SINGLE ARRAY DEFINING COSINE OF ANGLE AT EACH ORDINATE      HRL   7
C     SPSI = SINGLE ARRAY DEFINING SINE OF ANGLE AT EACH ORDINATE        HRL   8
      DIMENSION F(12,24),CPSI(24),SPSI(24),X(12)                         HRL   9
      COMMON L1,L2,L3,L4,L5,L6,L7,L8,NCHK                                HRL  10
      AN=N                                                               HRL  11
  100 DO 180 J=3,K                                                      1HRL  12
      WRITE (L2,190) X(J)                                               1HRL  13
      DO 170 NC=1,NCHAR                                                 2HRL  14
      SUMSN=0.0                                                         2HRL  15
      SUMCN=0.0                                                         2HRL  16
      SUMAO=0.0                                                         2HRL  17
      DO 140 I=1,N                                                      3HRL  18
      NOE=NC*(I-1)&1                                                    3HRL  19
  110 IF(NOE-N) 130,130,120                                             3HRL  20
  120 NOE=(NOE-N)                                                       3HRL  21
      GO TO 110                                                         3HRL  22
  130 SNOPSI=SPSI(NOE)                                                  3HRL  23
      CNOPSI=CPSI(NOE)                                                  3HRL  24
      SUMCN=SUMCN&F(J,I)*CNOPSI                                         3HRL  25
      SUMSN=SUMSN&F(J,I)*SNOPSI                                         3HRL  26
  140 SUMAO=SUMAO&F(J,I)                                                3HRL  27
      IF(NC-1) 150,150,160                                              2HRL  28
  150 AO=SUMAO/AN                                                       2HRL  29
  160 CN=2.0*SUMCN/AN                                                   2HRL  30
      SN=2.0*SUMSN/AN                                                   2HRL  31
  170 WRITE (L2,200) AO,CN,SN                                           2HRL  32
  180 WRITE (L2,210) AO                                                 1HRL  33
      RETURN                                                            HRL   34
C                                                                       HRL   35
  190  FORMAT(24X,16HRADIAL STATION =F6.3/10X,18HHARMONIC COMPONENT,16X, HRL   36
     16HCOSINE,16X,4HSINE)                                              HRL   37
  200 FORMAT(10X,I10,F32.6,F20.6)                                       HRL   38
  210 FORMAT(10X,17HSTEADY COMPONENT=F15.6///)                          HRL   39
      END                                                               HRL   40
```

```
      SUBROUTINE HRA1AR(NBTH)                                              HR1    1
C     THIS SUBROUTINE, HRA1AR, HARMONICALLY ANALYZES THE ONE-ARRAY         HR1    2
C     FUNCTION DENOTED BY B, FOR THE NUMBER OF HARMONICS DENOTED BY        HR1    3
C     NOHAR .                                                              HR1    4
C     NP= NUMBER OF ORDINATES                                              HR1    5
C     FLOATN = FLOATING NUMBER CORRESPONDING TO N                          HR1    6
C     CPSI = SINGLE ARRAY DEFINING COSINE OF ANGLE AT EACH ORDINATE        HR1    7
C     SPSI = SINGLE ARRAY DEFINING SINE OF ANGLE AT EACH ORDINATE          HR1    8
      DIMENSION PSI(24),CPSI(24),SPSI(24),B(24),TH(24),Z(24),              HR1    9
     1 ALFAC(12,24),COUTDR(12,24),DINDR(12,24),X(12),C(12),BD(24),         HR1   10
     2    DMDX(12,24),HEAD(17),ALAM(12,24),AMUC(12,24),RHOC(12,24)        HR1   11
      DIMENSION RC(24),V(24)                                               HR1   12
      COMMON L1,L2,L3,L4,L5,L6,L7,L8,NCHK,ALAM,X,PSI,ALFAC,NX,NP,DOUTDR,   HR1   13
     1DINDR,NCPBMC,RHO,OMRSQ,B,TH,Z,INTAN,ITERB,EBC,EBD,ETC,ETD,          HR1   14
     2FXC,FZC,ALFAR,AOS,AIS,BIS,THRUST,HFORCE,HP,YFORCE,CT,CH,CP,CY,BD,   HR1   15
     3CPSI,SPSI,NO,ALL,ALH,DELAL,NHARB,C,OMEGA,R,DMDX,HEAD,NOHAR,E2,      HR1   16
     4AMUC,BEQ,REC,AMINF,TIN,UR,GAMM,NXF2,OMEGAR,ALAMO,                   HR1   17
     5RG,XREF,DREF,RHCC,DPSI,AMU,YMOM,XMOM,XFT(12),CN,SN                  HR1   18
      GO TO (100,120), NBTH                                               HR1   19
  100 DO 110 I = 1,NP                                                    1HR1   20
  110 V(I) = B(I)                                                        1HR1   21
      GO TO 140                                                           HR1   22
  120 DO 130 I = 1,NP                                                    1HR1   23
  130 V(I) = TH(I)                                                       1HR1   24
  140 ANP=NP                                                              HR1   25
      DO 210 NO=1,NOHAR                                                  1HR1   26
      SUMSN=0.0                                                          1HR1   27
      SUMCN=0.0                                                          1HR1   28
      SUMAO=0.0                                                          1HR1   29
      DO 180 I=1,NP                                                      2HR1   30
      NOE=NO*(I-1)&1                                                     2HR1   31
  150 IF(NOE-NP) 170,170,160                                             2HR1   32
  160 NOE=(NOE-NP)                                                       2HR1   33
      GO TO 150                                                          2HR1   34
  170 SNOPSI=SPSI(NOE)                                                   2HR1   35
      CNOPSI=CPSI(NOE)                                                   2HR1   36
      SUMCN=SUMCN&V(I)*CNOPSI                                            2HR1   37
      SUMSN=SUMSN&V(I)*SNOPSI                                            2HR1   38
  180 SUMAO=SUMAO&V(I)                                                   2HR1   39
  190  AO=SUMAO/ANP                                                      1HR1   40
  200 CN=-2.0*SUMCN/ANP                                                  1HR1   41
      SN=-2.0*SUMSN/ANP                                                  1HR1   42
  210 WRITE (L2,220) NO,CN,SN                                            1HR1   43
      WRITE (L2,230) AO                                                   HR1   44
  220 FORMAT(10X,I10,F32.6,F20.6/)                                        HR1   45
  230 FORMAT(20X,18H STEADY COMPONENT=F15.6///)                           HR1   46
  240 RETURN                                                              HR1   47
      END                                                                 HR1   48
```

```
      SUBROUTINE INTANG(DMY)                                                  ING   1
C                                                                             ING   2
      DIMENSION PSI(24),CPSI(24),SPSI(24),B(24),TH(24),Z(24),                 ING   3
     1 ALFAC(12,24),COUTDR(12,24),DINDR(12,24),X(12),C(12),BD(24),            ING   4
     2    DMDX(12,24),HEAD(17),ALAM(12,24),AMUC(12,24),RHOC(12,24)           ING   5
      DIMENSION RC(24)                                                        ING   6
      COMMON L1,L2,L3,L4,L5,L6,L7,L8,NCHK,ALAM,X,PSI,ALFAC,NX,NP,DOUTDR,      ING   7
     1DINDR,NOPBMC,RHO,OMRSQ,B,TH,Z,INTAN,ITERB,EBC,EBD,ETC,ETD,             ING   8
     2FXC,FZC,ALFAR,AOS,A1S,B1S,THRUST,HFORCE,HP,YFORCE,CT,CH,CP,CY,BD,      ING   9
     3CPSI,SPSI,XO,ALL,ALH,DELAL,NHARB,C,OMEGA,R,DMDX,HEAD,NOHAR,E2,         ING  10
     4AMUC,BEC,REC,AMINF,TIN,UR,GAMM,NXF2,OMEGAR,ALAMO,                      ING  11
     5RC,XREF,DREF,RHOC,DPSI,AMU,YMOM,XMOM,XFT(12),CN,SN                     ING  12
      WRITE (L2,100)                                                          ING  13
  100 FORMAT (50H1    ANGLE OF ATTACK DATA AT EACH AZIMUTH POSITION///)       ING  14
      DO 340 I=1,NP                                                          1ING  15
      WRITE (L2,110) PSI(I)                                                  1ING  16
  110 FORMAT (11H AZIMUTH =  F5.1 )                                          1ING  17
       AMIN=ALFAC(3,I)                                                       1ING  18
      AMAX=AMIN                                                              1ING  19
      XMIN=X(3)                                                              1ING  20
      XMAX=XMIN                                                              1ING  21
      DO 150 J=4,NX                                                          2ING  22
      IF(AMIN-ALFAC(J,I)) 120,120,130                                        2ING  23
  120 IF(AMAX-ALFAC(J,I)) 140,140,150                                        2ING  24
  130 AMIN=ALFAC(J,I)                                                        2ING  25
      XMIN=X(J)                                                              2ING  26
      GO TO 150                                                              2ING  27
  140 AMAX=ALFAC(J,I)                                                        2ING  28
      XMAX=X(J)                                                              2ING  29
  150 CONTINUE                                                               2ING  30
      ALTIP=(ALFAC(NX,I)-ALFAC(NX-1,I))*(1.0-X(NX))/(X(NX)-X(NX-1))&         1ING  31
     1ALFAC(NX,I)                                                            1ING  32
      ALXO=ALFAC(3,I)-(ALFAC(4,I)-ALFAC(3,I))*(X(3)-XO)/(X(4)-X(3))          1ING  33
      IF(ALTIP-ALXO) 160,160,200                                             1ING  34
  160 IF(ALTIP-AMIN) 170,180,180                                             1ING  35
  170 AMIN=ALTIP                                                             1ING  36
      XMIN=1.0                                                               1ING  37
  180 IF(ALXO-AMAX) 240,240,190                                              1ING  38
  190 AMAX=ALXO                                                              1ING  39
      XMAX=XO                                                                1ING  40
      GO TO 240                                                              1ING  41
  200 IF(ALXO-AMIN) 210,220,220                                              1ING  42
  210 AMIN=ALXO                                                              1ING  43
      XMIN=XO                                                                1ING  44
  220 IF(ALTIP-AMAX) 240,240,230                                             1ING  45
  230 AMAX=ALTIP                                                             1ING  46
      XMAX=1.0                                                               1ING  47
  240 WRITE (L2,250) AMIN,XMIN,AMAX,XMAX                                     1ING  48
      WRITE (L2,360) ALTIP,ALXO                                              1ING  49
      IF(ALL-AMIN) 260,260,250                                               1ING  50
```

```
250 ALF=ALL                                                                    1ING  51
    GO TO 280                                                                  1ING  52
260 IAMIN=AMIN/DELAL                                                           1ING  53
    AMIN=IAMIN                                                                 1ING  54
    ALF=AMIN*DELAL                                                             1ING  55
    KI=NX-1                                                                    1ING  56
    WRITE (L2,270)                                                             1ING  57
270 FORMAT (/,47H    ANGLE OF ATTACK       NONDIMENSIONAL RADIUS    /)        1ING  58
280 DO 320 J=3,KI                                                              2ING  59
    IF(ALF-ALFAC(J,I)) 290,310,300                                             2ING  60
290 IF(ALF-ALFAC(J&1,I)) 320,310,310                                           2ING  61
300 IF(ALF-ALFAC(J&1,I)) 310,310,320                                           2ING  62
310 Y=(ALF-ALFAC(J,I))*(X(J&1)-X(J))/(ALFAC(J&1,I)-ALFAC(J,I))&X(J)             2ING  63
    WRITE (L2,380) ALF,Y                                                       2ING  64
320 CONTINUE                                                                   2ING  65
    ALF=ALF&DELAL                                                              1ING  66
    IF(ALF-ALH) 330,330,340                                                    1ING  67
330 IF(ALF-AMAX) 280,280,340                                                   1ING  68
340 WRITE (L2,370)                                                             1ING  69
    RETURN                                                                      ING  70
350 FORMAT(25H MINIMUM ANGLE OF ATTACK=F7.1,7X,10HBLADE STA=F5.3/25H M         ING  71
   1AXIMUM ANGLE OF ATTACK=F7.1,7X,10HBLADE STA=F5.3//)                        ING  72
360 FORMAT(21H TIP ANGLE OF ATTACK=F7.1,13X,34HBLADE INBOARD END ANGLE         ING  73
   1 OF ATTACK=F7.1//)                                                         ING  74
370 FORMAT (///)                                                               ING  75
380 FORMAT (F14.1,F21.3)                                                       ING  76
    END                                                                        ING  77
```

```
      SUBROUTINE INVRS(A,N)                                              INV   1
C                                                                        INV   2
      DIMENSION A(3,4),D(3,4),IROW(5),ICOL(5)                            INV   3
      M=N&1                                                              INV   4
         DO 100    I=1,N                                               1INV   5
      IROW(I)=I                                                          1INV   6
  100 ICOL(I)=I                                                          1INV   7
      DO 250 K=1,N                                                       1INV   8
      AMAX= A(K,K)                                                       1INV   9
      DO 120 I=K,N                                                       2INV  10
      DO 120 J=K,N                                                       3INV  11
      IF(ABS( A(I,J))-ABS(AMAX)) 120,110,110                             3INV  12
  110 AMAX= A(I,J)                                                       3INV  13
      IC=I                                                               3INV  14
      JC=J                                                               3INV  15
  120 CONTINUE                                                           3INV  16
      KI=ICOL(K)                                                         1INV  17
      ICOL(K)=ICOL(IC)                                                   1INV  18
      ICOL(IC)=KI                                                        1INV  19
      KI=IROW(K)                                                         1INV  20
      IROW(K)=IROW(JC)                                                   1INV  21
      IROW(JC)=KI                                                        1INV  22
      IF(AMAX) 150,130,150                                               1INV  23
  130 WRITE (L2,140)                                                     1INV  24
  140 FORMAT(41H SOLUTION OF EXISTING MATRIX NOT POSSIBLE)               1INV  25
      CALL EXIT                                                          1INV  26
  150 DO 160 J=1,N                                                       2INV  27
      E=A(K,J)                                                           2INV  28
      A(K,J)=A(IC,J)                                                     2INV  29
  160 A(IC,J)=E                                                          2INV  30
      DO 170 I=1,N                                                       2INV  31
      E=A(I,K)                                                           2INV  32
      A(I,K)=A(I,JC)                                                     2INV  33
  170 A(I,JC)=E                                                          2INV  34
      DO 200 I=1,N                                                       2INV  35
      IF(I-K) 190,180,190                                                2INV  36
  180 A(I,M)=1.                                                          2INV  37
      GO TO 200                                                          2INV  38
  190 A(I,M)=0.                                                          2INV  39
  200 CONTINUE                                                           2INV  40
      PVT=A(K,K)                                                         1INV  41
      DO 210 J=1,M                                                       2INV  42
  210 A(K,J)=A(K,J)/PVT                                                  2INV  43
      DO 240 I=1,N                                                       2INV  44
      IF(I-K) 220,240,220                                                2INV  45
  220 AMULT=A(I,K)                                                       2INV  46
      DO 230 J=1,M                                                       3INV  47
  230 A(I,J)=A(I,J)-AMULT*A(K,J)                                         3INV  48
  240 CONTINUE                                                           2INV  49
      DO 250 I=1,N                                                       2INV  50
```

```
250   A(I,K)=A(I,M)                                          2INV  51
      DO 280 I=1,N                                           1INV  52
      DO 260 L=1,N                                           2INV  53
      IF(IROW(I)-L) 260,270,260                              2INV  54
260 CONTINUE                                                 2INV  55
270 DO 280 J=1,N                                             2INV  56
280 D(L,J)=A(I,J)                                            2INV  57
      DO 310 J=1,N                                           1INV  58
      DO 290 L=1,N                                           2INV  59
      IF(ICOL(J)-L) 290,300,290                              2INV  60
290 CONTINUE                                                 2INV  61
300 DO 310 I=1,N                                             2INV  62
310 A(I,L)=D(I,J)                                            2INV  63
320 RETURN                                                    INV  64
      END                                                     INV  65
```

```
      SUBROUTINE OUT2(DMY,LSS1)                                          OUT    1
C                                                                        OUT    2
      DIMENSION PSI(24),CPSI(24),SPSI(24),B(24),TH(24),Z(24),            OUT    3
     1    ALFAC(12,24),DOUTDR(12,24),DINDR(12,24),X(12),C(12),BD(24),    OUT    4
     2    DMDX(12,24),HEAD(17),ALAM(12,24),AMUC(12,24),RHOC(12,24)       OUT    5
      DIMENSION RC(24)                                                   OUT    6
      COMMON L1,L2,L3,L4,L5,L6,L7,L8,NCHK,ALAM,X,PSI,ALFAC,NX,NP,DOUTDR, OUT    7
     1DINDR,NCPBMC,RHO,OMRSQ,E,TH,Z,INTAN,ITERR,EBC,EBD,ETC,ETD,         OUT    8
     2FXC,FZC,ALFAR,A0S,A1S,B1S,THRUST,HFORCE,HP,YFORCE,CT,CH,CP,CY,BD,  OUT    9
     3CPSI,SPSI,XO,ALL,ALH,DELAL,NHARB,C,OMEGA,R,DMDX,HEAD,NOHAR,E2,     OUT   10
     4AMUC,REQ,REQ,AMINF,TIN,LR,GAMM,NXF2,OMEGAR,ALAMO,                  OUT   11
     5RC,XREF,DREF,RHOO,DPSI,AMU,YMOM,XMOM,XFT(12),CN,SN                 OUT   12
      REWIND L3                                                          OUT   13
      WRITE (L2,220) (XFT(J),J=3,NX)                                     OUT   14
      DO 100 I=1,NP                                                     1OUT   15
  100 WRITE (L2,300) PSI(I),(ALFAC(J,I),J=3,NX)                         1OUT   16
      WRITE (L2,250) (XFT(J),J=3,NX)                                     OUT   17
      DO 110  I= 1, NP                                                  1OUT   18
  110 WRITE (L2,260) PSI(I),(DOUTDR(J,I),J=3,NX)                        1OUT   19
      WRITE (L2,270) (XFT(J),J=3,NX)                                     OUT   20
      DO 120  I= 1, NP                                                  1OUT   21
  120 WRITE (L2,260) PSI(I),(DINDR(J,I),J=3,NX)                         1OUT   22
      WRITE (L2,290) (XFT(J),J=3,NX)                                     OUT   23
      DO 130 I=1,NP                                                     1OUT   24
  130 WRITE (L2,260) PSI(I),(DMDX(J,I),J=3,NX)                          1OUT   25
  140 IF(NOHAR) 150,160,150                                              OUT   26
  150 WRITE (L2,230)                                                     OUT   27
      CALL HRANAL (NX,NP,NOHAR,DOUTDR,CPSI,SPSI,XFT,LSS1)                OUT   28
      WRITE (L2,240)                                                     OUT   29
      CALL HRANAL (NX,NP,NOHAR,DINDR,CPSI,SPSI,XFT,LSS1)                 OUT   30
      WRITE (L2,280)                                                     OUT   31
      CALL HRANAL (NX,NP,NOHAR,DMDX,CPSI,SPSI,XFT,LSS1)                  OUT   32
  160 WRITE (L2,170)                                                     OUT   33
  170 FORMAT (1H1,//)                                                    OUT   34
      IF(NHARB) 180,200,180                                              OUT   35
  180 WRITE (L2,310)                                                     OUT   36
      NOHAR=NHARB                                                        OUT   37
      CALL HRAIAR(1)                                                     OUT   38
C                                                                        OUT   39
C                                                                        OUT   40
      WRITE (L2,190)                                                     OUT   41
  190 FORMAT(///)                                                        OUT   42
      WRITE (L2,320)                                                     OUT   43
      CALL HRAIAR(2)                                                     OUT   44
  200 IF(INTAN) 210,330,210                                              OUT   45
  210 CALL INTANG(DMY)                                                   OUT   46
C                                                                        OUT   47
C       FORMAT  STATEMENTS                                               OUT   48
  220 FORMAT(49X,38HBLADE  ANGLE  OF  ATTACK  DISTRIBUTION/63X,11HRADIAL OUT   49
     1 STA.//7H    PSI,12F9.4///)                                        OUT   50
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230 FORMAT(43H1   OUT-OF-SHAFT PLANE AIR LOADING, LB./FT.//)                OUT   51
240 FORMAT(39H1   IN-SHAFT PLANE AIR LOADING, LB./FT.//)                    OUT   52
250 FORMAT(1H139X,40HOUT-OF-SHAFT PLANE AIR LOADING,  LB./FT.//51X,15H OUT   53
   1RADIAL  STATION/7H    PSI,12F9.4//)                                     OUT   54
260 FORMAT(F7.1,12F9.4)                                                     OUT   55
270 FORMAT(1H139X,36HIN-SHAFT PLANE AIR LOADING,  LB./FT.//51X,15HRADI OUT   56
   1AL  STATION/7H    PSI,12F9.4//)                                        OUT   57
280 FORMAT(41H1   MOMENT ABOUT FEATHERING AXIS FT LB/FT//)                  OUT   58
290 FORMAT(1H139X,37HMOMENT ABOUT FEATHERING AXIS FT LB/FT//   51X,15H OUT   59
   1RADIAL  STATION/7H    PSI,12F9.4//)                                     OUT   60
300 FORMAT (F7.1,12F9.4)                                                    OUT   61
310 FORMAT(10X,30HHARMONIC ANALYSIS ON BLADE FLAPPING ANGLE(RADIANS)// OUT   62
   142X,13HCOS COMPONENT,7X,13HSIN COMPONENT/)                              OUT   63
320 FORMAT(10X,32HHARMONIC ANALYSIS ON BLADE FEATHERING ANGLE(RADIANS) OUT   64
   1//41X,13HCOS COMPONENT,7X,13HSIN COMPONENT/)                            OUT   65
330 RETURN                                                                  OUT   66
    END                                                                     OUT   67
```

```
      SUBROUTINE INFLOW                                                      INF    1
C                                                                            INF    2
C       3F   INFLOW PROGRAM      N. GIANSANTE                                INF    3
      DIMENSION  RC(24),B(24),RHOC(12,24),AMUC(12,24),ALAM(12,24),X(12)      INF    4
      DIMENSION PSI(24),CPSI(24),SPSI(24),TH(24),Z(24),RD(24),               INF    5
     1 ALFAC(12,24),DOUTDR(12,24),DINDR(12,24),C(12),                        INF    6
     2     DMDX(12,24),HEAD(17)                                              INF    7
      COMMON L1,L2,L3,L4,L5,L6,L7,L8,NCHK,ALAM,X,PSI,ALFAC,NX,NP,DOUTDR,     INF    8
     1DINDR,NCP8MC,RHO,OMRSQ,R,TH,Z,INTAN,ITERB,EBC,EBD,ETC,ETD,             INF    9
     2EXC,EZC,ALFAR,AOS,AIS,BIS,THRUST,HFORCE,HP,YFORCE,CT,CH,CP,CY,BD,      INF   10
     3CPSI,SPSI,XO,ALL,ALH,DELAL,NHARB,C,OMEGA,R,DMDX,HEAD,NOHAR,E2,         INF   11
     4AMUC,BEC,REQ,AMINF,TIN,UR,GAMM,NXF2,OMEGAR,ALAMO,                      INF   12
     5RC,XREF,DREF,RHCC,DPSI,AMU,YMOM,XMOM,XFT(12),CN,SN,VLL(12,24)          INF   13
      GAMM1=GAMM-1.                                                          INF   14
      GAMP1=GAMM&1.                                                          INF   15
      AMIN2=AMINF*AMINF                                                      INF   16
      CO3=AMIN2-1.                                                           INF   17
      RO=REQ&DREF                                                            INF   18
      CALL INTRSC(NP,AMINF,XREF,RO,REC,E2,R,B,RC,ALFAR,XP,N1)                INF   19
      WRITE (L2,100)                                                         INF   20
  100 FORMAT (1H1,5X,56H POINTS OF INTERSECTION OF BOW SHOCK WAVE AND RO     INF   21
     1TOP DISK  ,//,10X,8H AZIMUTH,2X,8H  RADIUS ,/)                         INF   22
      WRITE (L2,110) (PSI(I),RC(I), I = 1,NP)                                INF   23
  110 FORMAT (10X,F10.1,F10.3)                                               INF   24
      IF(XP) 130,120,130                                                     INF   25
  120 XP=R                                                                   INF   26
  130 XPE1=XP-E2                                                             INF   27
      XPOR=(XREF&DREF&REQ)-(E2&XPE1*COS(B(N1)))*COS(ALFAR)                   INF   28
     1&(BEQ&XPE1*SIN(B(N1)))*SIN(ALFAR)                                      INF   29
  140 PHIM=ATAN( XPOR/SQRT((XPOR*XPOR-XREF*XREF)*CO3))                       INF   30
      PHIMM= AMIN2*SIN(PHIM)*SIN(PHIM)                                       INF   31
      RINPO=GAMP1*PHIMM/(GAMM1*PHIMM&2.)                                     INF   32
      RHO1=RINRO*RHO                                                         INF   33
      VRAD =SQRT(1.0-4.0*(PHIMM-1.0)*(GAMM*PHIMM&1.0)/                       INF   34
     1(PHIMM*AMIN2*GAMP1**2))                                                INF   35
      VEL1=AMINF*SQRT(GAMM*UR*TIN*32.1739)                                   INF   36
      VC=VRAD*VEL1/OMEGAR                                                    INF   37
      VCS = VC*SIN(ALFAR)                                                    INF   38
      VCC = VC*COS(ALFAR)                                                    INF   39
      SIN1 = 1. - .5* SIN(ALFAR)                                             INF   40
      RHO2 = RHO1 * SIN1 * VC ** 2                                           INF   41
      COS2 = COS(ALFAR)                                                      INF   42
      RHO3 = .2 * RHO * (1. & 3. * COS2) * ( VEL1 / OMEGAR) ** 2             INF   43
      DO 150 I=1,NP                                                         1INF   44
      COS1 =(1.0 & COS(PSI(I) / 57.2958)) * COS2 ** 2                       1INF   45
      DO 150 J=1,NXF2                                                       2INF   46
      RHOC(J,I) =(      RHO2& .5 * (RHO3 - RHO2) * COS1) / VLL(J,I) ** 2  2INF   47
      ALAM(J,I)=VCS                                                         2INF   48
  150 AMUC(J,I) = VCC                                                       2INF   49
      DO 200 I=1,NP                                                         1INF   50
```

```
      IF(RC(I)) 200,200,160                                          1INF   51
  160 RC(I)=RC(I)/R                                                  1INF   52
      DO 190 J=1,NXF2                                                2INF   53
      IF(X(J)-RC(I)) 190,190,170                                     2INF   54
  170 DO 180 L=J,NXF2                                                3INF   55
      RHOC(L,I)=RHO                                                  3INF   56
      AMUC(L,I)=AMU                                                  3INF   57
  180 ALAM(L,I)=ALAMO                                                3INF   58
      GO TO 200                                                      2INF   59
  190 CONTINUE                                                       2INF   60
  200 CONTINUE                                                       1INF   61
C                                                                     INF   62
C     WRITE RHOC,AMUC,ALAM                                            INF   63
C                                                                     INF   64
      WRITE (L2,210)                                                  INF   65
      WRITE (L2,260)(XFT(NRW),NRW = 3,NXF2)                           INF   66
      WRITE (L2,290)                                                  INF   67
  210 FORMAT (1H1,/,30X,20HDENSITY DISTRIBUTION )                     INF   68
      DO 220 NRW = 1,NP                                              1INF   69
  220 WRITE (L2,230) PSI(NRW),(RHOC(NCL,NRW),NCL = 3,NXF2)           1INF   70
  230 FORMAT (F7.1,12F9.4)                                            INF   71
      WRITE (L2,240)                                                  INF   72
  240 FORMAT(//,30X,13HADVANCE RATIO )                                INF   73
      WRITE (L2,280)(XFT(NRW),NRW = 3,NXF2)                           INF   74
      WRITE (L2,290)                                                  INF   75
      DO 250 NRW = 1,NP                                              1INF   76
  250 WRITE (L2,230) PSI(NRW),(AMUC(NCL,NRW),NCL = 3,NXF2)           1INF   77
      WRITE (L2,260)                                                  INF   78
      WRITE (L2,280)(XFT(NRW),NRW = 3,NXF2)                           INF   79
      WRITE (L2,290)                                                  INF   80
  260 FORMAT (1H1,/,30X,19HINFLOW DISTRIBUTION  )                     INF   81
      DO 270 NRW = 1,NP                                              1INF   82
  270 WRITE (L2,230) PSI(NRW),(ALAM(NCL,NRW),NCL = 3,NXF2)           1INF   83
  280 FORMAT (/,30X,17HRADIAL STATION,FT ,/,7X,12F9.4)                INF   84
  290 FORMAT (7H     PSI )                                            INF   85
      ANX=NXF2                                                        INF   86
      ANP=NP                                                          INF   87
      ALAMO=0.                                                        INF   88
      AMU=0.                                                          INF   89
      DO 310 I=1,NP                                                  1INF   90
      AVG=0.                                                         1INF   91
      AVGM=0.                                                        1INF   92
      DO 300 J=1,NXF2                                                2INF   93
      AVGM=AVGM&AMUC(J,I)                                            2INF   94
  300 AVG=AVG&ALAM(J,I)                                              2INF   95
      AMU=AMU&AVGM                                                   1INF   96
  310 ALAMO=ALAMO&AVG                                                1INF   97
      ALAMO=ALAMO/(ANP*ANX)                                           INF   98
      AMU=AMU/(ANP*ANX)                                               INF   99
      RETURN                                                          INF  100
```

END

INF 101

```
      SUBROUTINE INTRSC (N,AM,A,RC,B,C,RAD,BETA,RC,AS,XP,N1)                INC    1
C                                                                           INC    2
C  INTERSECTION OF HYPERBOLOICAL SHOCK WAVE AND CONED, FLAPPING ROTOR       INC    3
      DIMENSION R(4),BETA(24),RC(24)                                        INC    4
      CAS=COS(AS)                                                           INC    5
      SAS=SIN(AS)                                                           INC    6
      V=A&RD                                                                INC    7
      AM2 = AM*AM-1.                                                        INC    8
      AN = N                                                                INC    9
      DPSID = 360.0 / AN                                                    INC   10
      DPSIR=DPSID/57.296                                                    INC   11
      A2=A*A                                                                INC   12
      DO 100 I=1,4                                                         1INC   13
  100 R(I)=0.                                                              1INC   14
      PSIR=0.                                                               INC   15
      PSID=0.                                                               INC   16
      N1=N/2&1                                                              INC   17
      DO 310 I=1,N1                                                        1INC   18
      RC(I)=0.0                                                            1INC   19
      NR=0                                                                 1INC   20
      S=SIN(PSIR)                                                          1INC   21
      C=COS(PSIR)                                                          1INC   22
      SS=S*S                                                               1INC   23
      CB=COS(BETA(I))                                                      1INC   24
      SB=SIN(BETA(I))                                                      1INC   25
      C10=CAS*C                                                            1INC   26
      C20=-SAS*C                                                           1INC   27
      C1=C10*CB&SAS*SB                                                     1INC   28
      C2=C20*CB&CAS*SB                                                     1INC   29
      C3=B*SAS&0*CAS*C&V                                                   1INC   30
      C4=B*CAS-0*SAS*C                                                     1INC   31
      DD=C10*C10-(C20*C20&CB*CB*SS)*AM2                                    1INC   32
      E0=C10*C3-(C20*C4&0*CB*SS)*AM2                                       1INC   33
      F=C3*C3-(C4*C4&0*0*SS)*AM2-A2                                        1INC   34
      IF(DD) 150,110,150                                                   1INC   35
  110 R1=-F/2.0/E0&0                                                       1INC   36
  120 IF(R1) 200,140,130                                                   1INC   37
  130 IF(R1-0) 140,140,200                                                 1INC   38
  140 NR=NR&1                                                              1INC   39
      R(NR)=R1                                                             1INC   40
       GO TO 200                                                           1INC   41
  150 E0=E0/DC                                                             1INC   42
      SURD=E0*E0-F/DC                                                      1INC   43
      IF(SURD) 200,160,170                                                 1INC   44
  160 R1=-E0&C                                                             1INC   45
      GO TO 120                                                            1INC   46
  170 ROOT=SQRT(SURD)                                                      1INC   47
      R1=-E0&ROOT&0                                                        1INC   48
      R2=-E0-ROOT&0                                                        1INC   49
      IF(R2) 120,180,180                                                   1INC   50
```

```
180 IF(R2-0) 150,190,120                                              1INC  51
190 NR=NR&1                                                           1INC  52
    R(NR)=R2                                                          1INC  53
    GO TO 120                                                         1INC  54
200 D=C1*S1-(C2*C2&CB*C9*SS)*AM2                                      1INC  55
    E=C1*C3-(C2*C4&C0*CB*SS)*AM2                                      1INC  56
    IF(D) 250,210,250                                                 1INC  57
210 R1=-F/2.0/E&0                                                     1INC  58
220 IF(R1-0) 300,300,230                                              1INC  59
230 IF(R1-RAD) 240,240,300                                            1INC  60
240 NR=NR&1                                                           1INC  61
    R(NR)=R1                                                          1INC  62
    GO TO 300                                                         1INC  63
250 E=E/D                                                             1INC  64
    SURD=E*E-F/D                                                      1INC  65
    IF(SURD) 300,260,270                                              1INC  66
260 R1=-E&0                                                           1INC  67
    GO TO 220                                                         1INC  68
270 ROOT=SQRT(SURD)                                                   1INC  69
    R1=-E&RCOT&0                                                      1INC  70
    R2=-E-RCOT&0                                                      1INC  71
    IF(R2-0) 220,220,280                                              1INC  72
280 IF(R2-RAD) 290,290,220                                            1INC  73
290 NR=NR&1                                                           1INC  74
    R(NR)=R2                                                          1INC  75
    GO TO 220                                                         1INC  76
300 RC(I)=R(1)                                                        1INC  77
    PSID=PSID&DPSIC                                                   1INC  78
310 PSIR=PSIR&DPSIR                                                   1INC  79
    XP=RC(N1)                                                          INC  80
    K=N1&1                                                             INC  81
    J=1                                                                INC  82
    DO 320 I=K,N                                                      1INC  83
    J=J&1                                                             1INC  84
    KJ=K-J                                                            1INC  85
320 RC(I)=RC(KJ)                                                      1INC  86
    RETURN                                                             INC  87
    END                                                                INC  88
```

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      SUBROUTINE REVC7                                                  RV7   1
C                                                                       RV7   2
C     REENTRY VEHICLE STABILITY                                         RV7   3
C                                                                       RV7   4
C                                                                       RV7   5
      DIMENSION  PRMT(5),F(6),FR(6)                                     RV7   6
      DIMENSION A(9,13)                                                 RV7   7
      EXTERNAL DERIV                                                    RV7   8
      REAL M,IX,IY,IZ,JXZ,I1,I2,I3,I4,I5,I6,I7,I8,IR                   RV7   9
      COMMON L1, L2, L3, L4, L5, L6, L7, L8, I3F,ITEST                  RV7  10
      COMMON M,IX,IY,IZ,JXZ,I1,I2,I3,I4,I5,I6,I7,I8,ALPHA,R,            RV7  11
     2IR,G,NALPHA,COEF(20,4),RMC,ATOR,AZ,DQ,B                           RV7  12
     3,FH,FY,T,A1,B1,VREL ,SY(4),TCL(8),FR,H                            RV7  13
     4, RDUM,VDUM,QDUM,CT,PRMT,ZZMX,ZZMY,ZZMZ,ZMXQ,ZMYQ,ZMZQ            RV7  14
      REWIND L3                                                         RV7  15
      REWIND L8                                                         RV7  16
      READ  (L8) G,AZ,BMC,M,IX,IY,IZ,JXZ,DQ,I1,I2,I3,I4,I5,I6,NDIM     RV7  17
     1,I7,I8,B,IR,MACH,MACH1,MACH2                                      RV7  18
     2,BM1,NALPHA,((COEF(I,J),I=1,NALPHA),J=1,4),SIDSLP                 RV7  19
     3,R,(TOL(I),I=1,8)                                                 RV7  20
      READ (L8) AMUFS,ALAMFS,AMOCK,ITEST                                RV7  21
      READ  (L8) A,(PRMT(I),I=1,4),I3F                                  RV7  22
      READ (L8)  RDUM,VDUM,QDUM,ZZMX,ZZMY,ZZMZ                          RV7  23
      READ (L3)                                                         RV7  24
      READ (L3)                                                         RV7  25
      READ (L3) DQ,FH,FY,T,A1,B1,CT                                     RV7  26
      IF (I3F) 110,100,110                                              RV7  27
  100 READ (L8) VEREF,A(1,3),(SY(I),I=1,3)                              RV7  28
      A(1,2) = VEREF * SIN(SIDSLP/57.2958)                              RV7  29
      A(1,1) = SQRT(VEREF **2 - A(1,2) **2 - A(1,3)**2)                 RV7  30
      A(1,1) = -A(1,1)                                                  RV7  31
      A(1,3) = -A(1,3)                                                  RV7  32
C     AMU=SY(2)                                                         RV7  33
C     ALAMD=SY(3)                                                       RV7  34
C     OMEGA=SY(4)                                                       RV7  35
      GO TO 120                                                         RV7  36
  110 READ (L8) VEREF,DMMY,(SY(I),I=1,3)                                RV7  37
  120 SY(4)=A(1,7)                                                      RV7  38
      IF(A(1,8)) 140,130,140                                            RV7  39
  130 A(1,8)=SY(1)                                                      RV7  40
  140 IF(A(1,10)) 160,150,160                                           RV7  41
  150 A(1,10)=SIDSLP                                                    RV7  42
  160 NTOR = 1                                                          RV7  43
C                              CALCULATE INITL ACCELERATIONS            RV7  44
      WRITE (12,170)                                                    RV7  45
  170 FORMAT (1H1,59X,12HTIME HISTORY///6X,6HT(SEC),7X,9HU(FT/SEC),6X   RV7  46
     1 9HV(FT/SEC),6X,9HW(FT/SEC),5X,10HP(RAD/SEC),5X,10HQ(RAD/SEC),5X, RV7  47
     2 10HR(RAD/SEC),4X,14HOMEGA(RAD/SEC)/19X,10HTHETA(RAD),5X,         RV7  48
     3 8HPHI(RAD),7X,8HPSI(RAD),9X,5HX(FT),10X,5HY(FT),10X,5HZ(FT)//)   RV7  49
      LINE = 3                                                          RV7  50
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```
      PRMT(5) = 2.0                                                    RV7  51
      X = PRMT(1)                                                      RV7  52
      H = PRMT(3)                                                      RV7  53
      WRITE (L2,180) X,(A(1,I), I = 1,13)                              RV7  54
  180 FORMAT (4X,F8.3,2X,1P7E15.4 / 14X,1P6E15.4//)                    RV7  55
C                              CALCULATE TIME HISTORY                 RV7  56
  190 CALL RESULT (A,1,X)                                              RV7  57
      H1=H/10.                                                         RV7  58
      KOUNT=0                                                          RV7  59
      IF(PRMT(5)-1.) 210,210,200                                       RV7  60
  200 CALL ADAMS(X,A,DERIV,H1,-1,13)                                   RV7  61
  210 CALL ADAMS(X,A,DERIV,H1,1,13)                                    RV7  62
      KOUNT=KOUNT&1                                                    RV7  63
      IF(KOUNT-10) 210,220,220                                         RV7  64
  220 CALL RESULT (A,2,X)                                              RV7  65
      IF(ITEST-2) 230,250,230                                          RV7  66
  230 WRITE (L2,240) ZMXO,ZMYO,ZMZO                                    RV7  67
  240 FORMAT (///10X,47HMOMENTS ADDED TO BRING VEHICLE INTO TRIM AT T=0 RV7  68
     1 //15X,3HMX=F10.2,6H FT-LB/15X,3HMY=F10.2,6H FT-LB/15X,3HMZ=F10.2 RV7  69
     2 ,6H FT-LB////)                                                  RV7  70
      LINE=LINE&12                                                     RV7  71
  250 IF (LINE - 43) 270,260,260                                       RV7  72
  260 WRITE (L2,170)                                                   RV7  73
      LINE = 3                                                         RV7  74
  270 WRITE (L2,180) X,(A(1,I), I = 1,13)                              RV7  75
      LINE = LINE & 3                                                  RV7  76
      IF (X - PRMT(2)) 310,280,280                                     RV7  77
  280 WRITE (L2,290)                                                   RV7  78
  290 FORMAT (///,30X,24HEND OF CASE - END OF RUN  )                   RV7  79
      WRITE (L2,300)                                                   RV7  80
  300 FORMAT (30X,29HEND OF JOB NORMAL TERMINATION )                   RV7  81
      CALL EXIT                                                        RV7  82
  310 CALL CHECK (A,NDIM,ALARMS,AMUFS,AMOCK,X)                         RV7  83
      IF (PRMT(5)) 150,320,150                                         RV7  84
  320 RETURN                                                           RV7  85
      END                                                              RV7  86
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      SUBROUTINE DERIV (X,A)                                                    DRV    1
      DIMENSION PRMT(5) ,F(6),FR(6),A(9,13)                                     DRV    2
      REAL M,IX,IY,IZ,JXZ,I1,I2,I3,I4,I5,I6,I7,I8,IR                            DRV    3
      COMMON L1, L2, L3, L4, L5, L6, L7, L8, I3F,ITEST                          DRV    4
      COMMON M,IX,IY,IZ,JXZ,I1,I2,I3,I4,I5,I6,I7,I8,ALPHA,R,                    DRV    5
     2IR,G,NALPHA,COEF(20,4),BMC,ATOR,AZ,DQ,A                                   DRV    6
     3,FH,FY,T,A1,B1,VREL ,SY(4),TCL(8),FR,H                                    DRV    7
     4, RDUM,VDUM,ODUM,CT,PRPT,ZZMX,ZZMY,ZZMZ,ZMXO,ZMYO,ZMZO                    DRV    8
      UV = SQRT(A(1,1)*A(1,1) & A(1,2)*A(1,2))                                  DRV    9
      IF (UV) 110,100,110                                                       DRV   10
  100 ALPHA = 1.5708                                                            DRV   11
      GO TO 120                                                                 DRV   12
  110 ALPHA=ATAN(-A(1,3)/UV)                                                    DRV   13
  120 SINT = SIN(A(1,8))                                                        DRV   14
      COST = COS(A(1,8))                                                        DRV   15
      COSP = COS(A(1,9))                                                        DRV   16
      SINP = SIN(A(1,9))                                                        DRV   17
      COSPS = COS(A(1,10))                                                      DRV   18
      SINPS = SIN(A(1,10))                                                      DRV   19
      IF (A(1,1)) 140,130,140                                                   DRV   20
  130 RO = 1.5708*A(1,2)/ABS(A(1,2))                                            DRV   21
      GO TO 150                                                                 DRV   22
  140 RO = ATAN(A(1,2)/A(1,1))                                                  DRV   23
  150 SIRO = SIN(RO)                                                            DRV   24
      CORO = COS(RO)                                                            DRV   25
      COSA = COS (ALPHA)                                                        DRV   26
      SINA = SIN (ALPHA)                                                        DRV   27
      FR(1) = (FH * CORO - FY * SIRO) / M                                       DRV   28
      FR(2) = (FY * CORO & FH * SIRO) / M                                       DRV   29
      FR(3)=T/M                                                                 DRV   30
      FR(4)=   ( B1* CORO -A1* SIRO )/IX                                        DRV   31
      FR(5)=   ( B1* SIRO &A1* CORO )/IY                                        DRV   32
      FR(6) = DQ/IR                                                             DRV   33
  160 VREL2=( A(1,1)*A(1,1) & A(1,2)*A(1,2) & A(1,3)*A(1,3))*VDUM**2            DRV   34
      VREL = SQRT( VREL2 )                                                      DRV   35
      IF(ALPHA-COEF(1,1)) 170,170,180                                           DRV   36
  170 IA=1                                                                      DRV   37
      I=2                                                                       DRV   38
      GO TO 230                                                                 DRV   39
  180 IF(ALPHA-COEF(NALPHA,1)) 200,190,190                                      DRV   40
  190 IA=NALPHA-1                                                               DRV   41
      I=NALPHA                                                                  DRV   42
      GO TO 230                                                                 DRV   43
  200 DO 210 I=1,NALPHA                                                        1DRV   44
      IF(ALPHA-COEF(I,1)) 220,220,210                                          1DRV   45
  210 CONTINUE                                                                 1DRV   46
      I=NALPHA                                                                  DRV   47
  220 IA=I-1                                                                    DRV   48
  230 AL1=COEF(IA,1)                                                            DRV   49
      AL2=COEF(I   ,1)                                                          DRV   50
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      DAL=AL2-AL1                                                        DRV  51
      F1=(AL2-ALPHA)/DAL                                                 DRV  52
      F2=(ALPHA-AL1)/DAL                                                 DRV  53
      CLB=F1  *COEF(IA,2)&F2*COEF(I    ,2)                               DRV  54
      CDB=F1  *COEF(IA,3)&F2*COEF(I    ,3)                               DRV  55
      CMB=F1  *COEF(IA,4)&F2*COEF(I    ,4)                               DRV  56
      CLBV=CLB*VREL2                                                     DRV  57
      CDBV=CDB*VREL2                                                     DRV  58
      CMBV=CMB*VREL2                                                     DRV  59
      COMA = CDBV * COSA - CLBV * SINA                                   DRV  60
      F(1) = CCMB * CCRO / M                                             DRV  61
      F(2) = CCMB * SIRO / M                                             DRV  62
      F(3) = (CLBV * COSA & CDBV * SINA)/M                               DRV  63
      F(4) = -CMBV * SIRO / IY                                           DRV  64
      F(5) = CMBV * CCRO / IY                                            DRV  65
      F(6) = F(2)                                                        DRV  66
      IF(ITEST-1) 250,240,250                                            DRV  67
  240 ZZMX1=(F(4)&FR(4)-(B*FR(2)&BMC*F(2))*M/IX)*I3                      DRV  68
      ZZMX2=(FR(2)&F(2))*AZ*M*I4/IZ                                      DRV  69
      ZZMX=ZZMX1-ZZMX2                                                   DRV  70
      ZZMY1=F(5)&FR(5)                                                   DRV  71
      ZZMY2=(B*FR(1)&AZ*(FR(3)&F(3))&BMC*F(1))*M/IY                      DRV  72
      ZZMY=ZZMY1&ZZMY2                                                   DRV  73
      ZZMZ=-(FR(2)&F(6))*M*AZ/IZ                                         DRV  74
      ZMX0= ZZMX1*IX/I3-ZZMX2*IZ/I4                                      DRV  75
      ZMY0= ZZMY*IY                                                      DRV  76
      ZMZ0= ZZMZ*IZ                                                      DRV  77
      ITEST=3                                                            DRV  78
  250 A(2,1) = A(1,6)*A(1,2)-A(1,5)*A(1,3)&G*SINT& F(1)&FR(1)            DRV  79
      A(2,2) = A(1,4)*A(1,3)-A(1,6)*A(1,1)-G*COST*SINP&F(2)&FR(2)        DRV  80
      A(2,3) = A(1,5)*A(1,1)-A(1,4)*A(1,2)-G*COST*COSP&F(3)&FR(3)        DRV  81
      A(2,4) = A(1,4)*A(1,5)*I1&A(1,5)*A(1,6)*I2&(F(4)&FR(4)-(B*FR(2)    DRV  82
     1 &BMC*F(2))*M/IX)*I3-((FR(2)&F(6))*M*AZ      )*I4/IZ  -ZZMX        DRV  83
      A(2,5) = A(1,4)*A(1,6)*I5&I6*(A(1,6)*A(1,6)-A(1,4)*A(1,4))&F(5)    DRV  84
     1&(B*FR(1)&AZ*(FR(3)&F(3))&BMC*F(1))*M/IY&FR(5)  -ZZMY              DRV  85
      A(2,6) =  I8*A(1,4)*A(1,5)&(A(2,4)-A(1,5)*A(1,6))*I7-((FR(2)&F(6)  DRV  86
     1 )*M*AZ )/IZ  -ZZMZ                                               DRV  87
      A(2,7) = A(2,6)-FR(6)                                              DRV  88
      A(2,8) = A(1,5)*COSP-A(1,6)*SINP                                   DRV  89
      A(2,9) = A(1,4)&(A(1,5)*SINP&A(1,6)*COSP)*(SINT/COST)              DRV  90
      A(2,10) = (A(1,5)*SINP&A(1,6)*COSP)/COST                           DRV  91
      AA = A(1,1)*COST&(A(1,2)*SINP&A(1,3)*COSP)*SINT                    DRV  92
      BB = A(1,2)*COSP-A(1,3)*SINP                                       DRV  93
      A(2,11) = AA*COSPS-BB*SINPS                                        DRV  94
      A(2,12) = AA*SINPS&BB*COSPS                                        DRV  95
      A(2,13) = -A(1,1)*SINT&(A(1,2)*SINP&A(1,3)*COSP)*COST              DRV  96
      RETURN                                                             DRV  97
      END                                                                DRV  98
```

```
      SUBROUTINE CHECK (A,NDIM,ALAMFS,AMUFS,NMOCK,X)                    CHK    1
      DIMENSION A(9,13),PRMT(5),F(6),FR(6)                              CHK    2
     1 ,RHOC(12,24),Y1(4),ALAM(12,24),AMUC(12,24)                       CHK    3
      REAL M,IX,IY,IZ,JXZ,I1,I2,I3,I4,I5,I6,I7,I8,IR                    CHK    4
      COMMON L1, L2, L3, L4, L5, L6, L7, L8, I3F,ITEST                  CHK    5
      COMMON M,IX,IY,IZ,JXZ,I1,I2,I3,I4,I5,I6,I7,I8,ALPHA,R,            CHK    6
     2IR,G,NALPHA,COEF(20,4),RMC,NTOR,AZ,DQ,B                           CHK    7
     3,FH,FY,T,A1,B1,VREL ,SY(4),TOL(8),FR,H                            CHK    8
     4, RDUM,VDUM,ODUM,CT,PRMT,ZZMX,ZZMY,ZZMZ,ZMXO,ZMYO,ZMZO            CHK    9
      Y1(1)=ALPHA                                                       CHK   10
      OMEGAR=A(1,7)*R                                                   CHK   11
      CON=1.0/OMEGAR                                                    CHK   12
      VREL=SQRT(A(1,1)*A(1,1)&A(1,2)*A(1,2)&A(1,3)*A(1,3))              CHK   13
      IF(A(1,1)) 110,100,110                                            CHK   14
  100 RO=1.570796*A(1,2)/ABS(A(1,2))                                    CHK   15
      GO TO 120                                                         CHK   16
  110 RO = ATAN (A(1,2)/A(1,1))                                         CHK   17
  120 CORO = COS(RO)                                                    CHK   18
      SIRO = SIN(RO)                                                    CHK   19
      Y1(2)=VREL*COS(Y1(1))*CON                                         CHK   20
      IF(NMOCK-1) 130,160,130                                           CHK   21
  130 IF(Y1(2)) 140,150,140                                             CHK   22
  140 Y1(3)=Y1(2)*SIN(Y1(1))/COS(Y1(1))-.5*CT/SQRT(Y1(2)**2&SY(3)**2)   CHK   23
      GO TO 170                                                         CHK   24
  150 Y1(3)=.5*(VREL/OMEGAR&SQRT((VREL/OMEGAR)**2-2.*CT))               CHK   25
      GO TO 170                                                         CHK   26
  160 Y1(3)=VREL*SIN(Y1(1))/OMEGAR                                      CHK   27
  170 Y1(4)=A(1,7)                                                      CHK   28
      DO 200 I=1,4                                                     1CHK   29
      DDY=Y1(I)-SY(I)                                                  1CHK   30
      IF(ABS(DDY)-TOL(I)) 200,200,180                                  1CHK   31
  180 IF(SY(I)) 190,210,190                                            1CHK   32
  190 IF(ABS(DDY/SY(I))-TOL(I+4)) 200,200,210                          1CHK   33
  200 CONTINUE                                                         1CHK   34
      NTOR=2                                                            CHK   35
      PRMT(5)=1.                                                        CHK   36
      RETURN                                                            CHK   37
  210 REWIND L8                                                         CHK   38
  220 PRMT(1)=X                                                         CHK   39
      PRMT(5) = 0.0                                                     CHK   40
      I3F=1                                                             CHK   41
      AMUFS=Y1(2)                                                       CHK   42
      ALAMFS=Y1(3)                                                      CHK   43
      ITEST=2                                                           CHK   44
      READ (L8)                                                         CHK   45
      WRITE (L8) AMUFS,ALAMFS,NMOCK,ITEST                               CHK   46
      WRITE (L8) A,(PRMT(I),I=1,4),I3F                                  CHK   47
      WRITE (L8)  RDUM,VDUM,ODUM,ZZMX,ZZMY,ZZMZ                         CHK   48
      WRITE (L8) VREL,A(1,3),Y1(1),AMUFS,ALAMFS                         CHK   49
      IF(SY(3)) 240,230,240                                             CHK   50
```

```
230 CON=Y1(3)                                                                  CHK   51
    GO TO 250                                                                  CHK   52
240 CON = Y1(3)/SY(3)                                                          CHK   53
250 REWIND L3                                                                  CHK   54
    READ  (L3) LCON,NXF2,NP,((ALAM(J,I),AMUC(J,I),RHOC(J,I),J=1,NXF2),         CHK   55
   1I=1,NP)                                                                    CHK   56
    READ (L3) NTOR,Q2,P2,OMEGA,ALAMO,AMU,TORQSV,ALFAR                          CHK   57
    IF(SY(2)) 270,260,270                                                      CHK   58
260 CON1=Y1(2)                                                                 CHK   59
    GO TO 280                                                                  CHK   60
270 CON1=Y1(2)/SY(2)                                                           CHK   61
280 IF(SY(2)) 300,290,300                                                      CHK   62
290 IF(SY(3)) 330,310,330                                                      CHK   63
300 IF(SY(3)) 350,310,350                                                      CHK   64
310 DO 320 I=1,NP                                                             1CHK   65
    DO 320 J=1,NXF2                                                           2CHK   66
    AMUC(J,I)=CON1*AMUC(J,I)                                                  2CHK   67
320 ALAM(J,I)=CON                                                             2CHK   68
    GO TO 370                                                                  CHK   69
330 DO 340 I=1,NP                                                             1CHK   70
    DO 340 J=1,NXF2                                                           2CHK   71
    AMUC(J,I)=CON1                                                            2CHK   72
340 ALAM(J,I)=CON*ALAM(J,I)                                                   2CHK   73
    GO TO 370                                                                  CHK   74
350 DO 360 I=1,NP                                                             1CHK   75
    DO 360 J=1,NXF2                                                           2CHK   76
    AMUC(J,2)=CON1*AMUC(J,I)                                                  2CHK   77
360 ALAM(J,I)=CON*ALAM(J,I)                                                   2CHK   78
370 IF (Y1(4)) 390,380,390                                                     CHK   79
380 CON1 = 0.0                                                                 CHK   80
    GO TO 400                                                                  CHK   81
390 CON1=2./Y1(4)                                                              CHK   82
400 Q2 = (A(1,5) * CORO - A(1,4) * SIRO ) * CON1                               CHK   83
    P2 =  (A(1,5) * SIRO & A(1,4)*CORO)*CON1                                   CHK   84
    REWIND L3                                                                  CHK   85
    WRITE (L3) LCON,NXF2,NP,((ALAM(J,I),AMUC(J,I),RHOC(J,I),J=1,NXF2),         CHK   86
   1I=1,NP)                                                                    CHK   87
    WRITE (L3) NTOR,Q2,P2,A(1,7),Y1(3),Y1(2),TORQSV,Y1(1)                      CHK   88
    RETURN                                                                     CHK   89
    END                                                                        CHK   90
```

```
      SUBROUTINE RESLLT (A,IJ,X)                                        RST   1
      DIMENSION A(9,13),FR(6),PRMT(5)                                   RST   2
      REAL M,IX,IY,IZ,JXZ,I1,I2,I3,I4,I5,I6,I7,I8,IR                   RST   3
      COMMON L1, L2, L3, L4, L5, L6, L7, L8, I3F,ITEST                  RST   4
      COMMON M,IX,IY,IZ,JXZ,I1,I2,I3,I4,I5,I6,I7,I8,ALPHA,R,           RST   5
     2IR,G,NALPHA,COEF(20,4),BMC,NTOR,AZ,DQ,B                           RST   6
     3,FH,FY,T,A1,B1,VREL ,SY(4),TOL(8),FR,H                            RST   7
     4, RDUM,VDUM,ODUM,CT,PRMT,ZZMX,ZZMY,ZZMZ,ZMXO,ZMYO,ZMZO            RST   8
C     IJ=1  REDUCE MAGNITUDE                                            RST   9
C     IJ=2  RETURN REDUCED TERMS TO ORIGINAL FORM                       RST  10
      ODUM2=ODUM*ODUM                                                   RST  11
      VO2=ODUM2*RDUM                                                    RST  12
      IF(IJ-2) 100,130,100                                              RST  13
  100 DO 110 J=1,3                                                      1RST  14
      A(1,J)=A(1,J)/VDUM                                                1RST  15
  110 A(1,J&10)=A(1,J&10)/RDUM                                          1RST  16
      DO 120 J=4,7                                                      1RST  17
  120 A(1,J)=A(1,J)/ODUM                                                1RST  18
      X=X*ODUM                                                          RST  19
      H=H*ODUM                                                          RST  20
      IX=IX*ODUM2                                                       RST  21
      IY=IY*ODUM2                                                       RST  22
      IZ=IZ*ODUM2                                                       RST  23
      JXZ=JXZ*ODUM2                                                     RST  24
      IR=IR*ODUM2                                                       RST  25
      M=M*VO2                                                           RST  26
      G=G/VO2                                                           RST  27
      RETURN                                                            RST  28
  130 DO 140 J=1,3                                                      1RST  29
      A(1,J)=A(1,J)*VDUM                                                1RST  30
  140 A(1,J&10)=A(1,J&10)*RDUM                                          1RST  31
      DO 150 J=4,7                                                      1RST  32
  150 A(1,J)=A(1,J)*ODUM                                                1RST  33
      X=X/ODUM                                                          RST  34
      H=H/ODUM                                                          RST  35
      IX=IX/ODUM2                                                       RST  36
      IY=IY/ODUM2                                                       RST  37
      IZ=IZ/ODUM2                                                       RST  38
      JXZ=JXZ/ODUM2                                                     RST  39
      IR=IR/ODUM2                                                       RST  40
      M=M/VO2                                                           RST  41
      G=G*VO2                                                           RST  42
      RETURN                                                            RST  43
      END                                                               RST  44
```

```
      SUBROUTINE ACAMS(T,A,DERIV,H,K,N)                                 ADM   1
      DIMENSION A(9,13)                                                 ADM   2
C                                                                       ADM   3
C     DO LOOPS ON THE SECOND SUBSCRIPT IN THE A ARRAY ARE INDICATED BY  ADM   4
C     J=1(1)N IN THE COMMENTS. THE SUBSCRIPT J DENOTES THE JTH COMPONENT ADM   5
C     OF WHATEVER VECTOR IS INDICATED (I.E., THE JTH COMPONENT OF X, F, ADM   6
C     ETC.). SECOND SUBSCRIPT IS OMITTED IN THE COMMENTS (I.E., A1=A(1,J) ADM   7
C     A2=A(2,J), ETC.).                                                 ADM   8
C                                                                       ADM   9
C     NOTATION--                                                        ADM  10
C     T=INDEPENDENT VARIABLE                                            ADM  11
C     A=ARRAY OF DEPENDENT VARIABLES,DERIVATIVES,BACKWARD DIFFERENCES,  ADM  12
C     DERIV=NAME OF THE SUBROUTINE THAT CALCULATES THE DERIVATIVES      ADM  13
C       AND FIRST SUMS                                                  ADM  14
C           F(X,T) AND STORES THEM IN A2 FOR J=1(1)N.                   ADM  15
C     H=INCREMENT OF INTEGRATION (I.E.,INTEGRATION STEP,STEP-SIZE,OR    ADM  16
C       DELTA T)                                                        ADM  17
C     K=ENTRY CODE (DEFINED BELOW)                                      ADM  18
C     N=NUMBER OF FIRST ORDER DIFFERENTIAL EQUATIONS                    ADM  19
C                                                                       ADM  20
C     FOR A DISCUSSION OF THE METHOD SEE NASA TN D-2936, SELF-STARTING  ADM  21
C     MULTISTEP METHODS FOR THE NUMERICAL INTEGRATION OF ORDINARY       ADM  22
C     DIFFERENTIAL EQUATIONS, BY WILLIAM A. MERSMAN, JULY, 1965.        ADM  23
C                                                                       ADM  24
C     ENTRY POINT--BEGIN SUBROUTINE--                                   ADM  25
C                                                                       ADM  26
      IF (H) 110,100,110                                                ADM  27
  100 CALL EXIT                                                         ADM  28
  110 DT=H                                                              ADM  29
      B=T                                                               ADM  30
      M=N                                                               ADM  31
C                                                                       ADM  32
C     SELECT MODE--                                                     ADM  33
C       A. FORWARD STARTER (K=0)                                        ADM  34
C       B. BACKWARD STARTER (K=-1)                                      ADM  35
C       C. INTEGRATE ONE STEP WITH PREDICTOR - CORRECTOR (K GE 1)       ADM  36
C                                                                       ADM  37
C                                                                       ADM  38
      IF (K) 130,120,400                                                ADM  39
C     - - F O R W A R D - B A C K W A R D   S T A R T E R - - - - - -   ADM  40
C                                                                       ADM  41
C     H IS SET TO -H IF THE FORWARD STARTER IS REQUESTED.               ADM  42
C     THE CODING IS WRITTEN FOR THE BACKWARD STARTER.                   ADM  43
C                                                                       ADM  44
C     BEFORE THE FORWARD OR BACKWARD STARTERS CAN BE EXECUTED THE A     ADM  45
C     ARRAY MUST CONTAIN --                                             ADM  46
C       A1=X0, THE INITIAL VALUES OF X FOR J=1(1)N, ALSO SET T=T0, THE  ADM  47
C       INITIAL VALUE OF T.                                             ADM  48
C                                                                       ADM  49
  120 DT=-DT                                                            ADM  50
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```
  150 D=DT/1440.                                                          ADM   51
      CALL DERIV(B,A)                                                     ADM   52
      DO 150 J=1,M                                                       1ADM   53
      A(9,J)=A(1,J)                                                      1ADM   54
      A(8,J)=A(1,J)-0.5*DT*A(2,J)                                        1ADM   55
      DO 140 I=3,7                                                       2ADM   56
  140 A(I,J)=A(2,J)                                                      2ADM   57
  150 CONTINUE                                                           1ADM   58
C                                                                        ADM   59
C     STATEMENTS 2 - 24 CALCULATES F0, SAVES X0, SETS F0=F1=F2=F3=F4,    ADM   60
C     AND COMPUTES FS4 (THE FIRST SUM AT T=T064H). THIS COMMENT, AND ALL ADM   61
C     FURTHER COMMENTS FOR THE FORWARD STARTER, APPLIES TO THE BACKWARD  ADM   62
C     STARTER, TOO, IN WHICH CASE REPLACE F1 BY F-1, F2 BY F-2, F3 BY    ADM   63
C     F-3, F4 BY F-4, FS4 BY FS0 AND X1 TO X4 BY X-1 TO X-4.             ADM   64
C                                                                        ADM   65
C     THE A ARRAY NOW CONTAINS FOR J=1(1)N                               ADM   66
C     A1=X0                                                              ADM   67
C     A2=F0                                                              ADM   68
C     A3=F0                                                              ADM   69
C     A6=F0                                                              ADM   70
C     A7=F0                                                              ADM   71
C     A8=FS4 OR FS0                                                      ADM   72
C     A9=X0                                                              ADM   73
C                                                                        ADM   74
      DO 260 II=1,8                                                     1ADM   75
  160 B=B-DT                                                            1ADM   76
C                                                                       1ADM   77
C     SET T=T06H OR T=T0-H                                              1ADM   78
C                                                                       1ADM   79
      DO 170 J=1,M                                                      2ADM   80
  170 A(1,J)=A(8,J)&0*(11.0*A(7,J)-66.0*A(6,J)&192.0*A(5,J)-830.0*A(4,J)2ADM   81
     1-1467.0*A(3,J))                                                   1ADM   82
      CALL DERIV(B,A)                                                   1ADM   83
      DO 180 J=1,M                                                      2ADM   84
  180 A(4,J)=A(2,J)                                                     2ADM   85
C                                                                       1ADM   86
C     A NOW CONTAINS FOR J=1(1)N                                        1ADM   87
C     A1=X1 OR X-1                                                      1ADM   88
C     A2=F1 OR F-1                                                      1ADM   89
C     A3=F0                                                             1ADM   90
C     A4=F1 OR F-1                                                      1ADM   91
C     A5=F0                                                             1ADM   92
C     A6=F0                                                             1ADM   93
C     A7=F0                                                             1ADM   94
C     A8=FS4 OR FS0                                                     1ADM   95
C     A9=X0                                                             1ADM   96
C                                                                       1ADM   97
      B=B-DT                                                            1ADM   98
C                                                                       1ADM   99
C     SET T=T02H OR T=T0-2H                                             1ADM  100
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C                                                                               1ADM 101
      DO 190 J=1,M                                                              2ADM 102
  190 A(1,J)=A(8,J)-D*(11.0*A(7,J)-82.0*A(6,J)&720.0*A(5,J)&1522.0*A(4,J2ADM 103
     1)&1429.0*A(3,J))                                                          1ADM 104
      CALL DERIV(B,A)                                                           1ADM 105
      DO 200 J=1,M                                                              2ADM 106
  200 A(5,J)=A(2,J)                                                             2ADM 107
C                                                                               1ADM 108
C     A NOW CONTAINS FOR J=1(1)M                                                1ADM 109
C     A1=X2 OR X-2                                                              1ADM 110
C     A2=F2 OR X-2                                                              1ADM 111
C     A3=F0                                                                     1ADM 112
C     A4=F1  OR F-1                                                             1ADM 113
C     A5=F2  OR F-2                                                             1ADM 114
C     A6=F0                                                                     1ADM 115
C     A7=F0                                                                     1ADM 116
C     A8=FS4 OR FS0                                                             1ADM 117
C     A9=X0                                                                     1ADM 118
C                                                                               1ADM 119
      B=B-DT                                                                    1ADM 120
C                                                                               1ADM 121
C     SET T=TC&3H OR T=T0-3H                                                    1ADM 122
C                                                                               1ADM 123
      DO 210 J=1,M                                                              2ADM 124
  210 A(1,J)=A(8,J)&D*(27.0*A(7,J)-610.0*A(6,J)-1632.0*A(5,J)-1374.0*A(42ADM 125
     1,J)-1451.0*A(3,J))                                                        1ADM 126
      CALL DERIV(B,A)                                                           1ADM 127
      DO 220 J=1,M                                                              2ADM 128
  220 A(6,J)=A(2,J)                                                             2ADM 129
C                                                                               1ADM 130
C     A NOW CONTAINS FOR J=1(1)M                                                1ADM 131
C     A1=X3 OR X-3                                                              1ADM 132
C     A2=F3 OR F-3                                                              1ADM 133
C     A3=F0                                                                     1ADM 134
C     A4=F1 OR F-1                                                              1ADM 135
C     A5=F2 OR F-2                                                              1ADM 136
C     A6=F3 OR F-3                                                              1ADM 137
C     A7=F0                                                                     1ADM 138
C     A8=FS4 OR FS0                                                             1ADM 139
C     A9=X0                                                                     1ADM 140
C                                                                               1ADM 141
      B=B-DT                                                                    1ADM 142
C                                                                               1ADM 143
C     SET T=TC&4H OR T=T0-4H                                                    1ADM 144
C                                                                               1ADM 145
      DO 230 J=1,M                                                              2ADM 146
  230 A(1,J)=A(8,J)-D*(475.0*A(7,J)&1902.0*A(6,J)&1104.0*A(5,J)&1586.0*A2ADM 147
     1(4,J)&1413.0*A(3,J))                                                      1ADM 148
      CALL DERIV(B,A)                                                           1ADM 149
      DO 240 J=1,M                                                              2ADM 150
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  240 A(7,J)=A(2,J)                                                      2ADM 151
C                                                                        1ADM 152
C     A NOW CONTAINS FOR J=1(1)N                                         1ADM 153
C     A1=X4 OR X-4                                                       1ADM 154
C     A2=F4 OR F-4                                                       1ADM 155
C     A3=F0                                                              1ADM 156
C     A4=F1 OR F-1                                                       1ADM 157
C     A5=F2 OR F-2                                                       1ADM 158
C     A6=F3 OR F-3                                                       1ADM 159
C     A7=F4 OR F-4                                                       1ADM 160
C     A8=FS4 OR FS0                                                      1ADM 161
C     A9=X0                                                              1ADM 162
C                                                                        1ADM 163
      DO 250 J=1,M                                                       2ADM 164
  250 A(0,J)=A(9,J)&D*(27.0*A(7,J)-146.0*A(6,J)&336.0*A(5,J)-462.0*A(4,J2ADM 165
     1)&965.0*A(3,J))                                                    1ADM 166
      B=T                                                                1ADM 167
  260 CONTINUE                                                           1ADM 168
C                                                                         ADM 169
C     STATEMENTS 28 THROUGH 38 CONSTITUTE AN ITERATION LOOP (WITH EIGHT   ADM 170
C     ITERATIONS) FOR THE FORWARD OR BACKWARD STARTER.                    ADM 171
C                                                                         ADM 172
C     DURING THE ITERATION THE A ARRAY CONTAINS FOR J=1(1)N               ADM 173
C     A1=X1,X2,X3, OR X4 -- OR X-1,X-2,X-3, OR X-4                        ADM 174
C     A2=F1,F2,F3, OR F4 -- OR F-1,F-2,F-3, OR F-4                        ADM 175
C     A3=F0          (ORIGINAL VALUE)                                     ADM 176
C     A4=F1 OR F-1 (CURRENT VALUE)                                        ADM 177
C     A5=F2 OR F-2 (CURRENT VALUE)                                        ADM 178
C     A6=F3 OR F-3 (CURRENT VALUE)                                        ADM 179
C     A7=F4 OR F-4 (CURRENT VALUE)                                        ADM 180
C     A8=FS4 OR FS0 (CURRENT VALUE)                                       ADM 181
C     A9=X0          (ORIGINAL VALUE)                                     ADM 182
C                                                                         ADM 183
C     BEGIN CALCULATION OF BACKWARD DIFFERENCES --                        ADM 184
C                                                                         ADM 185
  270 IF (K) 350,280,280                                                  ADM 186
C                                                                         ADM 187
C     DIFFERENCES FOR FORWARD STARTER --                                  ADM 188
C                                                                         ADM 189
C     THE A ARRAY CONTAINS FOR J=1(1)N                                    ADM 190
C     A1=X4                                                               ADM 191
C     A2=F4                                                               ADM 192
C     A3=F0                                                               ADM 193
C     A4=F1                                                               ADM 194
C     A5=F2                                                               ADM 195
C     A6=F3                                                               ADM 196
C     A7=F4                                                               ADM 197
C     A8=FS4                                                              ADM 198
C     A9=X0                                                               ADM 199
C                                                                         ADM 200
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```
  280 DO 320 J=1,M                                                    1ADM 201
C                                                                     1ADM 202
C     STEP ONE                                                        1ADM 203
C                                                                     1ADM 204
      A(1,J)=A(9,J)                                                   1ADM 205
      A(2,J)=A(3,J)                                                   1ADM 206
      DO 290 I=3,6                                                    2ADM 207
  290 A(I,J)=A(I&1,J)-A(I,J)                                          2ADM 208
C                                                                     1ADM 209
C     STEP TWO                                                        1ADM 210
C                                                                     1ADM 211
      DO 300 I=1,3                                                    2ADM 212
      L=7-I                                                           2ADM 213
  300 A(L,J)=A(L,J)-A(L-1,J)                                          2ADM 214
C                                                                     1ADM 215
C     STEP THREE                                                      1ADM 216
C                                                                     1ADM 217
      A(6,J)=A(6,J)-A(5,J)                                            1ADM 218
      A(5,J)=A(5,J)-A(4,J)                                            1ADM 219
C                                                                     1ADM 220
C     STEP FOUR                                                       1ADM 221
C                                                                     1ADM 222
      A(6,J)=A(6,J)-A(5,J)                                            1ADM 223
      DO 310 I=1,3                                                    2ADM 224
      L=6-I                                                           2ADM 225
  310 A(L,J)=A(L,J)-A(L&1,J)                                          2ADM 226
C                                                                     1ADM 227
C     STEP FIVE                                                       1ADM 228
C                                                                     1ADM 229
      A(7,J)=A(5,J)-A(6,J)                                            1ADM 230
      A(4,J)=A(4,J)-A(7,J)                                            1ADM 231
  320 A(5,J)=A(7,J)-A(6,J)                                            1ADM 232
C                                                                     ADM 233
C     THE DIFFERENCES OF FO HAVE BEEN CONSTRUCTED ACCORDING TO THE    ADM 234
C     FOLLOWING TABLE.  AN EXAMPLE OF THE NOTATION IS 2D3F3, WHICH MEANS ADM 235
C     THAT THE SECOND ITEM STORED IN THIS COLUMN (INDICATED BY THE FIRST ADM 236
C     DIGIT 2) IS THE SECOND DIFFERENCE (INDICATED BY D2) OF F3.  THE  ADM 237
C     SECOND COLUMN IS THE DATA THAT WAS IN THE A ARRAY AT THE TIME OF ADM 238
C      COMPLETION OF THE ITERATION.  ALL TABLE VALUES ARE FOR J=1(1)N.  ADM 239
C                                                                     ADM 240
C     LOC      STEP ONE  STEP TWO  STEP THREE  STEP FOUR   STEP FIVE  ADM 241
C                                                                     ADM 242
C     A1  X4   1XC                                                    ADM 243
C     A2  F4   2FC                                                    ADM 244
C     A3  F0   3D1F1                          4D1F0                   ADM 245
C     A4  F1   4D1F2      3D2F2               3D2F1       2D2F0       ADM 246
C     A5  F2   5D1F3      2D2F3     2D3F3     2D3F2       3D3F0       ADM 247
C     A6  F3   6D1F4      1D2F4     1D3F4     1D4F0                   ADM 248
C     A7  F4                                              1D3F1       ADM 249
C     A8  F54                                                         ADM 250
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C      A9  X0                                                                  ADM 251
C                                                                              ADM 252
C      NOTE -- IT IS ASSUMED THAT D4F4=D4F3=D4F2=D4F1=D4F0=CONSTANT             ADM 253
C                                                                              ADM 254
C      THE A ARRAY NOW CONTAINS FOR J=1(1)N                                    ADM 255
C      A1=X0                                                                   ADM 256
C      A2=F0                                                                   ADM 257
C      A3=D1F0                                                                 ADM 258
C      A4=D2F0                                                                 ADM 259
C      A5=D3F0                                                                 ADM 260
C      A6=D4F0                                                                 ADM 261
C      A7=D3F1                                                                 ADM 262
C      A8=FS4                                                                  ADM 263
C      A9=X0                                                                   ADM 264
C                                                                              ADM 265
C      FSO WILL NOW BE CALCULATED AND STORED IN A8                             ADM 266
C                                                                              ADM 267
       D=-D                                                                    ADM 268
  330  DO 340 J=1,M                                                           1ADM 269
  340  A(8,J)=A(1,J)&C*(27.0*A(6,J)&38.0*A(5,J)&60.0*A(4,J)&120.0*A(3,J)&1ADM 270
      1720.0*A(2,J))                                                           ADM 271
C                                                                              ADM 272
C      END OF FORWARD STARTER                                                  ADM 273
C                                                                              ADM 274
       CALL DERIV(T,A)                                                         ADM 275
       RETURN                                                                  ADM 276
C                                                                              ADM 277
C      DIFFERENCES FOR BACKWARD STARTER                                        ADM 278
C                                                                              ADM 279
  350  DO 390 J=1,M                                                           1ADM 280
C                                                                             1ADM 281
C      STEP ONE                                                               1ADM 282
C                                                                             1ADM 283
       A(1,J)=A(9,J)                                                          1ADM 284
       A(2,J)=A(3,J)                                                          1ADM 285
       DO 360 I=3,6                                                           2ADM 286
  360  A(I,J)=A(I,J)-A(I&1,J)                                                 2ADM 287
C                                                                             1ADM 288
C      STEPS TWO, THREE AND FOUR                                              1ADM 289
C                                                                             1ADM 290
       DO 380 I=1,3                                                           2ADM 291
       L=6                                                                    2ADM 292
       LL=I&2                                                                 2ADM 293
  370  A(L,J)=A(L-1,J)-A(L,J)                                                 2ADM 294
       L=L-1                                                                  2ADM 295
       IF (L-LL) 370,380,370                                                  2ADM 296
  380  CONTINUE                                                               2ADM 297
  390  CONTINUE                                                              1ADM 298
C                                                                              ADM 299
C      THE DIFFERENCES OF FO HAVE BEEN COMPUTED ACCORDING TO THE               ADM 300
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C      FOLLOWING TABLE.  AN EXAMPLE OF THE  NOTATION IS 2D2F-1, WHICH      ADM 301
C      MEANS THAT THE SECOND ITEM STORED IN THIS COLUMN (INDICATED BY THE ADM 302
C      FIRST DIGIT 2) IS THE SECOND DIFFERENCE (INDICATED BY D2) OF F-1.  ADM 303
C      THE SECOND COLUMN IS THE DATA THAT WAS IN THE A ARRAY AT THE TIME  ADM 304
C      OF COMPLETION  OF THE ITERATION. ALL VALUES ARE FOR J=1(1)N.       ADM 305
C                                                                         ADM 306
C      LOC.      STEP ONE   STEP TWO   STEP THREE   STEP FOUR            ADM 307
C                                                                         ADM 308
C      A1  X-4   1XC                                                      ADM 309
C      A2  F-4   2FC                                                      ADM 310
C      A3  F0    3D1F0                                                    ADM 311
C      A4  F-1   4D1F-1    3D2FC                                          ADM 312
C      A5  F-2   5D1F-2     2D2F-1     2D3F0                             ADM 313
C      A6  F-3   6D1F-3     1D2F-2     1D3F-1       1D4F0                ADM 314
C      A7  F-4                                                            ADM 315
C      A8  FS0                                                            ADM 316
C      A9  X0                                                             ADM 317
C                                                                         ADM 318
C      THE A ARRAY NOW CONTAINS FOR J=1(1)N                               ADM 319
C      A1=X0                                                              ADM 320
C      A2=F0                                                              ADM 321
C      A3=D1F0                                                            ADM 322
C      A4=D2F0                                                            ADM 323
C      A5=D3F0                                                            ADM 324
C      A6=D4F0                                                            ADM 325
C      A7=F-4                                                             ADM 326
C      A8=FS0                                                             ADM 327
C      A9=X0                                                              ADM 328
C                                                                         ADM 329
C      END OF BACKWARD STARTER                                            ADM 330
C                                                                         ADM 331
       GO TO 330                                                          ADM 332
C                                                                         ADM 333
C      BEGIN INTEGRATION WITH THE ADAMS-BASHFORTH PREDICTOR AND THE       ADM 334
C      ADAMS-MOULTON CORRECTOR.  AT THIS ENTRY POINT THE A ARRAY CONTAINS ADM 335
C      FOR J=1(1)N                                                        ADM 336
C      A1=XI                                                              ADM 337
C      A2=FI                                                              ADM 338
C      A3=D1FI                                                            ADM 339
C      A4=D2FI                                                            ADM 340
C      A5=D3FI                                                            ADM 341
C      A6=D4FI                                                            ADM 342
C      A7=D5FI                                                            ADM 343
C      A8=FSI                                                             ADM 344
C      A9=PREDICTED VALUE OF FI FROM THE PREVIOUS INTEGRATION STEP        ADM 345
C                                                                         ADM 346
C      WHERE FI=F(XITO&IH),TO&IH), I=1,2,3,...                            ADM 347
C                                                                         ADM 348
C      D5FI SHOULD BE NEARLY ZERO AND IS AN INDICATION OF THE ACCURACY    ADM 349
C      OF THE INTEGRATION.                                                ADM 350
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C                                                                       ADM 351
C      - - A C A M S - B A S H F O R T H   P R E D I C T O R - - - - - - ADM 352
C                                                                       ADM 353
C     BEGIN PREDICTOR                                                   ADM 354
C                                                                       ADM 355
  400 DO 530 KK=1,K                                                    1ADM 356
      B=B&DT                                                           1ADM 357
      DO 420 J=1,M                                                     2ADM 358
      I=7                                                              2ADM 359
  410 A(I,J)=A(I-1,J)                                                  2ADM 360
      I=I-1                                                            2ADM 361
      IF (I-2) 410,420,410                                             2ADM 362
  420 CONTINUE                                                         2ADM 363
      D=DT/1440.0                                                      1ADM 364
      DO 430 J=1,M                                                     2ADM 365
  430 A(1,J)=A(8,J)&D*(475.0*A(7,J)&502.0*A(6,J)&540.0*A(5,J)&600.0*A(4,2ADM 366
     1J)&720.0*A(3,J))                                                 1ADM 367
      CALL DERIV(B,A)                                                  1ADM 368
      DO 450 J=1,M                                                     2ADM 369
      DO 440 L=3,7                                                     3ADM 370
  440 A(L,J)=A(L-1,J)-A(L,J)                                           3ADM 371
  450 CONTINUE                                                         2ADM 372
C                                                                      1ADM 373
C     THE SOLUTIONS X(I&1)=X(TO&(I&1)H), DERIVATIVES AND BACKWARD      1ADM 374
C     DIFFERENCES HAVE BEEN COMPUTED IN THE ORDER INDICATED IN THE     1ADM 375
C     FOLLOWING TABLE                                                  1ADM 376
C                                                                      1ADM 377
C     LOC.          CAF    TWO      THREE                             1ADM 378
C                                                                      1ADM 379
C     A1    XI              X(I&1)                                     1ADM 380
C     A2    FI              F(I&1)                                     1ADM 381
C     A3    D1FI    FI                D1F(I&1)                         1ADM 382
C     A4    D2FI    D1FI              D2F(I&1)                         1ADM 383
C     A5    D3FI    D2FI              D3F(I&1)                         1ADM 384
C     A6    D4FI    D3FI              D4F(I&1)                         1ADM 385
C     A7    D5FI    D4FI              D5F(I&1)                         1ADM 386
C     A8    FSI                                                        1ADM 387
C                                                                      1ADM 388
C     END PREDICTOR                                                    1ADM 389
C                                                                      1ADM 390
C      - - A C A M S - M O U L T O N   C O R R E C T O R - - - - - - - -1ADM 391
C                                                                      1ADM 392
C     BEGIN CORRECTOR                                                  1ADM 393
C                                                                      1ADM 394
C     THE A ARRAY CONTAINS THE FOLLOWING FROM THE PREDICTOR FOR J=1(1)N 1ADM 395
C     (THE LEADING P IN THE ENTRIES MEANS PREDICTED VALUE)             1ADM 396
C                                                                      1ADM 397
C     A1=PX(I&1)                                                       1ADM 398
C     A2=PF(I&1)                                                       1ADM 399
C     A3=PD1F(I&1)                                                     1ADM 400
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C       A4=PD2F(I&1)                                                    1ADM 401
C       A5=PD3F(I&1)                                                    1ADM 402
C       A6=PD4F(I&1)                                                    1ADM 403
C       A7=PD5F(I&1)                                                    1ADM 404
C       A8=FSI                                                          1ADM 405
C                                                                       1ADM 406
  460 DO 470 J=1,N                                                      2ADM 407
      A(1,J)=A(1,J)&475.0*D*A(7,J)                                      2ADM 408
  470 A(9,J)=A(2,J)                                                     2ADM 409
      CALL DERIV(3,A)                                                   1ADM 410
  480 DO 500 J=1,N                                                      2ADM 411
      DELTA=A(2,J)-A(9,J)                                               2ADM 412
      DO 490 I=3,7                                                      3ADM 413
  490 A(I,J)=A(I,J)&DELTA                                               3ADM 414
  500 CONTINUE                                                          2ADM 415
C                                                                       1ADM 416
C       THE CORRECTOR FORMULA HAS NOW BEEN APPLIED TO THE PREDICTED     1ADM 417
C       VALUES, AND THE PREDICTED BACKWARD DIFFERENCES HAVE BEEN ADJUSTED 1ADM 418
C       IN TERMS OF THE CORRECTED VALUES. THE ORDER IN WHICH ALL THIS WAS 1ADM 419
C       DONE IS SHOWN IN THE FOLLOWING TABLE.(THE LEADING P INDICATES   1ADM 420
C       PREDICTED VALUES AND THE LEADING C INDICATES CORRECTED VALUES).  1ADM 421
C       ALL ENTRIES IN THE TABLE ARE FOR J=1(1)N.                       1ADM 422
C                                                                       1ADM 423
C       LOC.              ONE       TWO       THREE                   1ADM 424
C                                                                       1ADM 425
C       A1    PX(I&1)               1CX(I&1)                            1ADM 426
C       A2    PF(I&1)               2CF(I&1)                            1ADM 427
C       A3    PD1F(I&1)                       1CD1F(I&1)=PD1F(I&1)&DELTA 1ADM 428
C       A4    PD2F(I&1)                       2CD2F(I&1)=PD2F(I&1)&DELTA 1ADM 429
C       A5    PD3F(I&1)                       3CD3F(I&1)=PD3F(I&1)&DELTA 1ADM 430
C       A6    PD4F(I&1)                       4CD4F(I&1)=PD4F(I&1)&DELTA 1ADM 431
C       A7    PD5F(I&1)                       5CD5F(I&1)=PD5F(I&1)&DELTA 1ADM 432
C       A8    FSI                                                       1ADM 433
C       A9                PF(I&1)                                       1ADM 434
C                                                                       1ADM 435
C       THE LEADING DIGIT IN COLUMNS TWO AND THREE INDICATES THE ORDER IN 1ADM 436
C       WHICH THE ENTRIES WERE STORED.                                  1ADM 437
C                                                                       1ADM 438
C       THE A ARRAY NOW CONTAINS FOR J=1(1)N                            1ADM 439
C       A1=CX(I&1)=X                                                    1ADM 440
C       A2=CF(I&1)=F                                                    1ADM 441
C       A3=CD1F(I&1)=D1F                                                1ADM 442
C       A4=CD2F(I&1)=D2F                                                1ADM 443
C       A5=CD3F(I&1)=D3F                                                1ADM 444
C       A6=CD4F(I&1)=D4F                                                1ADM 445
C       A7=CD5F(I&1)=D5F                                                1ADM 446
C       A8=FSI                                                          1ADM 447
C                                                                       1ADM 448
C       END OF PREDICTOR CORRECTOR                                      1ADM 449
C                                                                       1ADM 450
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C       COMPUTE FIRST SUM                                              1ADM 451
  510 DO 520 J=1,M                                                     2ADM 452
  520 A(8,J)=A(8,J)CH*A(2,J)                                           2ADM 453
  530 CONTINUE                                                         1ADM 454
        T=R                                                             ADM 455
        RETURN                                                          ADM 456
C       ON RETURN- A ARRAY CONTAINS FOR J=1(1)N--                       ADM 457
C       A1=X                                                            ADM 458
C       A2=F                                                            ADM 459
C       A3=D1F                                                          ADM 460
C       A4=D2F                                                          ADM 461
C       A5=D3F                                                          ADM 462
C       A6=D4F                                                          ADM 463
C       A7=D5F                                                          ADM 464
C       A8=FS                                                           ADM 465
C                                                                       ADM 466
        END                                                             ADM 467
```

APPENDIX D

OUTPUT LISTING FOR

ROTOR RE-ENTRY VEHICLE (REV)

SAMPLE CASE INPUT LISTING

```
           1        0        1        1                                         CARD 0
    3    5    1.0                                                               CARD 1
    1        TEST CASE    ALTITUDE=96000 FT                                     CARD 2
18.75    2.165    2.165    11.604    88.015    931.84    .4248                  CARD 3
        759000.0           1.754     30.       130.      10.                    CARD 4
       10        3         5         1          0         1                     CARD 5
2.165    2.942    1.471                        1.646     .345
4.50     2.942    1.471                        1.646     .345
6.667    2.942    1.471                         .66      .024
9.333    2.942    1.471                         .66      .024
10.416   2.942    1.471                         .66      .02                     CARD 6 (… CARDS)
12.500   2.942    1.471                         .66      .02
14.583   2.942    1.471                         .66      .02
16.667   2.942    1.471                         .66      .02
17.92    2.942    1.471                         .66      .02
18.75    2.942    1.471                         .66      .02
.8937    59.49       96000.0         24                                         CARD 7
                  165000.                                                       CARD 8
       10                                                                       CARD 9
       0.      .0061   -.00217   -.0024      .81     .105      .124
       .6      .0085   -.00217   -.0024      .87     .105      .124
       .8      .01025  -.00217   -.0024      .92     .105      .124
       1.      .01025  -.00217   -.0024     1.12     .105      .124             CARD 10 (… CARDS)
       1.5     .01130   -.0023   -.00233    1.43      .13      .114
       2.      .01467   -.0023   -.00233    1.41      .13      .114
       2.5     .01467   -.0023   -.00233    1.28      .13      .114
       3.0     .01467   -.0023   -.00233    1.15      .13      .114
       3.5     .01467   -.0023   -.00233    1.05      .13      .114
       4.0     .01467  -.0023    -.00233     .99      .13      .114
       40.      40.      40.      .0839    -.0183
       40.      40.      40.      .0979    -.0214
       40.      40.      40.      .1223    -.0246
       40.      40.      40.      .1398    -.0267
       40.      40.      40.      .1398    -.0267                              CARD 11 (… CARDS)
       40.      40.      40.      .1398    -.0267
       40.      40.      40.      .1398    -.0267
       40.      40.      40.      .1398    -.0267
       40.      40.      40.      .1398    -.0267
       40.      40.      40.      .1398    -.0267
0
0
0
0                                                                               CARD 12 (… CARDS)
0
0
0
0
0
0
0
0
0
0                                                                               CARD 13 (… CARDS)
0
0
0
0
0
0
```

```
   -.0068   -.00217   -.0024      1.2        0.0        0.0
   -.0068   -.00217   -.0024      1.2        0.0        0.0
   -.0068   -.00217   -.0024      1.2        0.0        0.0
   -.0068   -.00217   -.0024      1.2        0.0        0.0
   -.0068   -.00217   -.0024      1.2        0.0        0.0                    CARD 14 (NN CARDS)
   -.0068   -.00217   -.0024      1.2        0.0        0.0
   -.0068   -.00217   -.0024      1.2        0.0        0.0
   -.0068   -.00217   -.0024      1.2        0.0        0.0
   -.0068   -.00217   -.0024      1.2        0.0        0.0
   -.0068   -.00217   -.0024      1.2        0.0        0.0
    90.0      90.0     90.0     .0839     -.0183
    90.0      90.0     90.0     .0839     -.0183
    90.0      90.0     90.0     .0839     -.0183
    90.0      90.0     90.0     .0839     -.0183                             CARD 15 (NN CARDS)
    90.0      90.0     90.0     .0839     -.0183
    90.0      90.0     90.0     .0839     -.0183
    90.0      90.0     90.0     .0839     -.0183
    90.0      90.0     90.0     .0839     -.0183
    90.0      90.0     90.0     .0839     -.0183
    90.0      90.0     90.0     .0839     -.0183
     100         0       20         3          1          0          1          1   CARD 16
                                                                                   CARD 17
-4.41                          .29       .01       10.                           CARD 18(*SEE NOTE BELOW)
        TEST CASE DYNAMIC STABILITY                                                CARD 20
                                                                                   CARD 21
  1       3.5                        13.0       32.0                              CARD 22
  2       -.52       2.665           342.      5510.      5600.      7225.      2100.   CARD 23
  3     42.165      88.015          4000.       6.5                                CARD 24
  4                                                                    58.49       CARD 25
 05       1.1345                                                    96000.        CARD 26
  7       0.0          50.          .10                                          CARD 27
 10                                                                                CARD 28
2.5       5.993       5.993                                                       CARD 29
0.0       -.259        .681        -.05                                          CARD 30 (MAX - 20)
70.       .443        1.303        -.038
 0                                                                                CARD 31
3.54                                                                              CARD 32
0.0       -.239        .637        -.042                                         CARD 33 (MAX - 20)
70.       .401        1.319        -.030
 0                                                                                CARD 34
 11                                                                               CARD 35
          36          4           2                                               CARD 36
         0.0         2.0         6.0        10.0       12.0       14.0       16.0       18.0
        20.0        30.0        40.0        60.0      100.0      128.0      144.0      156.0   CARD 37 (MAX - 6)
       164.0       172.0       188.0       196.0      204.0      216.0      232.0      240.0
       330.0       320.0       330.0       340.0      342.0      344.0      346.0      348.0
       350.0       350.0       358.0       360.0
         1.0         2.0         2.5         3.5                                   CARD 38
6.66      18.75                                                                   CARD 39
360.      360.        360.        360.                                            CARD 40
-360.     -360.       -360.       -360.                                           CARD 41
6.66      1.0         1.0         4.0                  1.0        .736            CARD 42
             1           4           4                                            CARD 43
7.335      6.5        3.54       53.354      1.4                                  CARD 44
          0.          .6          .8         1.0        1.5        2.0        2.5        3.0   CARD 45 (MAX - 8)
          3.5         4.0
          0.          1.4         1.9        2.5        4.1        6.41       9.94       14.8
         20.8        26.8                                                        CARD 46 (MAX - 8)
          1.6         1.19        1.05        .9         .54        .34        .225       .180
```

*NOTE: CARD 18 OMITTED SINCE ILAB = 0

.160	.150							CARD 47 (MAX - 2)
.10	.26	.32	.82	.93	1.03	1.11	1.18	
1.23	1.32	1.25	.63	-.24	-.72	-1.29	-1.30	
-1.11	-.70	.70	1.03	1.30	1.29	.72	.24	
-.63	-1.25	-1.32	-1.23	-1.18	-1.11	-1.03	-.93	
-.82	-.52	-.26	.10					
.020	.190	.180	.375	.450	.515	.590	.660	
.730	.965	1.02	.770	-.280	-.910	-1.015	-.850	
-.590	-.310	.310	.515	.850	1.015	.910	.280	
-.770	-1.020	-.965	-.730	-.660	-.590	-.515	-.450	
-.375	-.180	-.100	.020					
.000	.060	.180	.300	.360	.420	.480	.535	
.590	.840	.935	.750	-.270	-.870	-.910	-.700	
-.480	-.240	.240	.420	.700	.910	.870	.270	
-.750	-.935	-.840	-.590	-.535	-.480	-.420	-.360	
-.300	-.180	-.060	.000					
-.010	.020	.095	.190	.235	.290	.330	.390	
.440	.660	.810	.690	-.250	-.790	-.770	-.530	CARD 48 (MAX - 288)
-.330	-.140	.140	.290	.530	.770	.790	.250	
-.690	-.810	-.660	-.440	-.390	-.330	-.290	-.235	
-.190	-.095	-.020	-.010					
.10	.26	.52	.82	.93	1.03	1.11	1.18	
1.23	1.32	1.25	.63	-.24	-.72	-1.29	-1.30	
-1.11	-.70	.70	1.03	1.30	1.29	.72	.24	
-.63	-1.25	-1.32	-1.23	-1.18	-1.11	-1.03	-.93	
-.82	-.52	-.26	.10					
.020	.100	.180	.375	.450	.515	.590	.660	
.730	.965	1.02	.770	-.280	-.910	-1.015	-.850	
-.590	-.310	.310	.515	.850	1.015	.910	.280	
-.770	-1.020	-.965	-.730	-.660	-.590	-.515	-.450	
-.375	-.100	-.100	.020					
.000	.060	.180	.300	.360	.420	.480	.535	
.590	.840	.935	.750	-.270	-.870	-.910	-.700	
-.480	-.240	.240	.420	.700	.910	.870	.270	
-.750	-.935	-.840	-.590	-.535	-.480	-.420	-.360	
-.300	-.180	-.060	.000					
-.010	.020	.095	.190	.235	.290	.330	.390	
.440	.660	.810	.690	-.250	-.790	-.770	-.530	
-.330	-.140	.140	.290	.530	.770	.790	.250	
-.690	-.810	-.660	-.440	-.390	-.330	-.290	-.235	
-.190	-.095	-.020	-.010					
.220	.238	.280	.364	.410	.470	.530	.600	
.670	.570	.930	1.20	1.44	1.05	1.12	.755	
.550	.320	.320	.470	.755	1.12	1.05	1.44	
1.20	.930	.570	.670	.600	.530	.470	.410	
.364	.280	.238	.220					
.160	.163	.189	.230	.250	.285	.329	.375	
.430	.729	.990	1.430	1.640	1.280	.890	.555	
.329	.205	.205	.285	.555	.890	1.280	1.640	
1.430	.990	.720	.430	.375	.239	.285	.250	
.230	.189	.163	.160					
.160	.163	.185	.230	.250	.270	.295	.329	
.370	.670	.945	1.400	1.638	1.230	.840	.490	
.295	.205	.205	.270	.490	.840	1.230	1.638	
1.400	.945	.670	.370	.329	.295	.270	.250	
.230	.189	.163	.160					
.160	.163	.170	.200	.220	.240	.270	.295	
.330	.558	.860	1.345	1.565	1.180	.750	.400	CARD 49 (MAX - 288)
.270	.180	.180	.240	.400	.750	1.180	1.565	

1.345	.860	.558	.330	.295	.270	.240	.220	
.200	.170	.163	.160					
.220	.238	.280	.364	.410	.470	.520	.600	
.670	.570	.930	1.20	1.44	1.05	1.12	.795	
.530	.320	.320	.470	.755	1.12	1.05	1.44	
1.20	.930	.970	.670	.600	.530	.470	.410	
.364	.280	.238	.220					
.160	.163	.189	.230	.250	.285	.329	.375	
.430	.720	.990	1.430	1.640	1.280	.890	.555	
.329	.205	.205	.285	.555	.890	1.280	1.640	
1.430	.990	.720	.430	.375	.239	.285	.250	CARD 49 (CONTINUED)
.230	.189	.163	.160					
.160	.163	.189	.230	.250	.270	.295	.329	
.370	.670	.945	1.400	1.638	1.230	.840	.490	
.295	.205	.205	.270	.490	.840	1.230	1.638	
1.400	.945	.670	.370	.329	.295	.270	.250	
.230	.189	.163	.160					
.160	.163	.170	.200	.220	.240	.270	.295	
.330	.558	.860	1.345	1.565	1.180	.750	.400	
.270	.180	.180	.240	.400	.750	1.180	1.565	
1.345	.860	.558	.330	.295	.270	.240	.220	
.200	.170	.163	.160					
-.011	-.033	-.085	-.116	-.135	-.153	-.169	-.186	
-.200	-.257	-.278	-.260	-.392	-.41	-.567	-.528	
-.437	-.270	.276	.403	.524	.567	.414	.392	
.259	.279	.257	.200	.186	.169	.153	.135	
.116	.066	.033	-.011					
.0045	-.010	-.014	-.047	-.059	-.070	-.084	-.099	
-.114	-.186	-.248	-.340	-.436	-.476	-.446	-.356	
-.244	-.130	.130	.214	.356	.446	.476	.436	
.340	.248	.186	.114	.099	.078	.070	.059	
.047	.014	.010	.0045					
0	-.002	-.018	-.036	-.045	-.054	-.065	-.075	
-.066	-.158	-.223	-.351	-.435	-.460	-.418	-.305	
-.207	-.106	.106	.182	.305	.418	.460	.435	
.351	.223	.158	.086	.075	.065	.054	.045	
.036	.018	.002	0					
.0052	.0046	-.002	-.013	-.019	-.028	-.034	-.045	
-.056	-.114	-.185	-.331	-.416	-.438	-.374	-.249	CARD 50 (MAX - 288)
.331	.185	.114	.055	.045	.034	.028	.019	
.013	.002	-.005	.0052					
-.011	-.033	-.085	-.116	-.135	-.153	-.169	-.186	
-.162	-.075	.075	.142	.249	.374	.438	.416	
-.200	-.257	-.278	-.260	-.392	-.41	-.567	-.528	
-.437	-.270	.270	.403	.524	.567	.414	.392	
.259	.279	.257	.200	.186	.169	.153	.135	
.116	.066	.033	-.011					
.0045	-.010	-.014	-.047	-.059	-.070	-.084	-.099	
-.114	-.186	-.248	-.340	-.436	-.476	-.446	-.356	
-.244	-.130	.130	.214	.356	.446	.476	.436	
.340	.248	.186	.114	.099	.078	.070	.059	
.047	.014	.010	.0045					
0	-.002	-.018	-.036	-.045	-.054	-.065	-.075	
-.086	-.158	-.223	-.351	-.435	-.460	-.418	-.305	
-.207	-.106	.106	.182	.305	.418	.460	.435	
.351	.223	.150	.086	.075	.065	.054	.045	
.036	.018	.002	0					
.0052	.0046	-.002	-.013	-.019	-.028	-.034	-.045	
-.056	-.114	-.185	-.331	-.416	-.438	-.374	-.249	

-.162	-.075	.075	.142	.249	.374	.438	.436	CARD 50 (CONTINUED)
.331	.185	.114	.055	.045	.034	.028	.019	
.013	.002	-.005	.0052					

NOTE: The sample output was obtained using the shortened AT62 subroutine and not the complete version.

SAMPLE OUTPUT

THREE DEGREES OF FREEDOM

CALCULATION OF INERTIAS

CASE NO.= 1 TEST CASE ALTITUDE=S6COC FT

INPUT CATA FOR OPTIONAL TIME HISTORY

		FEATHERING		LAG		FLAPPING	
NOPT	NOCYCL	T	TP	Z	ZP	B	BP
3	5	1.0C000	0.0	0.0	C.0	0.0	0.0

TIME HISTORY (STABILITY) IS TO BE CALCULATED IN REV03 FOR NUMBER OF CYCLES=NOCYCL.ONLY IF NOPT=1 OR NOPT=3

FEATHERING CONTROL SPRING = 58000.0CFT.-LB/RAD.

AKTZ = 0.0

TOTAL(INERTIA INC. AERO.)STATIONS = 10 FIRST AERODYNAMIC STATION NUMBER (ROOT-TO-TIP ORDER) = 3

LAST AERODYNAMIC NUMBER = 9

NREF = 1 =1 (FEATHERING AXIS) OR =2 (LEADING EDGE), AS REFERENCE FROM WHICH CG AND IC ARE MEASURED .

BLADE PARAMETERS

BLADE RADIUS= 18.75000 FT LAG HINGE OFFSET = 2.16500 FT FLAPPING HINGE OFFSET = 2.16500 FT

BLADE MASS = 11.60400 SLUGS BLADE MOMENT CF INERTIA ABOUT FLAPPING HINGE = 931.840 SL FT SQ

BLADE MOMENT OF INERTIA ABOUT FEATHERING AXIS = 0.42480 SL FT SQ

BLADE SECTION PROPERTIES

RADIUS,FT.	CHORD,FT.	F.A.,FT.	C.G.,FT.	TWIST,DEG.	MASS,SL/FT.	IC,SL-FT.
2.1650	2.9420	1.4710	C.C	0.0	1.6460	C.0450
4.5000	2.9420	1.4710	0.0	0.0	1.6460	C.0450
6.6670	2.9420	1.4710	0.0	0.0	0.6600	C.0240
8.3330	2.9420	1.4710	C.0	0.0	0.6600	C.0240
10.4160	2.9420	1.4710	C.0	0.0	0.6600	C.0200
12.5000	2.9420	1.4710	0.0	0.0	0.6600	C.0200
14.5830	2.9420	1.4710	C.C	0.0	0.6600	C.0200
16.6670	2.9420	1.4710	C.0	0.0	0.6600	C.0200
17.9200	2.9420	1.4710	0.0	0.0	0.6600	C.0200
18.7500	2.9420	1.4710	C.C	0.0	0.6600	C.0200

AERODYNAMIC PARAMETERS

MU = 3.893700 OMEGA = 58.48999RAD/SEC ALTITUDE = 96000.

AKTB= 0.0 FSPRNG= 0.0 BSPRNG= 0.0 ZSPRNG= 0.0

FDAMP= 0.0 PDAMP= 0.0 ZDAMP=1.65000.000

STALL FRCN UT = 0.0 TC UT = 0.0

PARAMETERS FOR NORMAL-FLOW REGION

MACH NO.	CPO	AC	ALCL	CDO	CLAC	CPTAD
0.0	0.124000	0.000100	40.000000	0.105000	0.083900	-0.018200
0.600000	0.124000	0.008500	40.000000	0.105000	0.097900	-0.021400
0.800000	0.124000	0.010250	40.000000	0.105000	0.122300	-0.024600
1.000000	0.124000	0.010250	40.000000	0.105000	0.139800	-0.026700
1.500000	0.114000	0.011300	40.000000	0.130000	0.139800	-0.026700
2.000000	0.114000	0.014670	40.000000	0.130000	0.139800	-0.026700
2.500000	0.114000	0.014670	40.000000	0.130000	0.139800	-0.026700
3.000000	0.114000	0.014670	40.000000	0.130000	0.139800	-0.026700
3.500000	0.114000	0.014670	40.000000	0.130000	0.139800	-0.026700
4.000000	0.114000	0.014670	40.000000	0.130000	0.139800	-0.026700

ROTOCHUTE STABILITY TIME HISTORY

TEST CASE DYNAMIC STABILITY

MACH NUMBER = 3.50 DENSITY =0.0000399 SL/FT CU ACC OF GRAVITY =32.0000 FT/SEC/SEC

BODY DATA

ROTOR DATA

BODY DIA = 13.00 BODY MASS = 342.00 SL ROTOR DIA = 37.50 FT SB = 88.01 SL FT

A = -0.52 FT BC = 2.66 FT IR =4000.00 SL FT SQ BR = 6.50 FT

IX =5510.00 SL FT SQ IY =5600.00 SL FT SQ

IZ =7225.00 SL FT SQ JXZ =2000.00 SL FT SQ

START TIME = 0.0 SEC STOP TIME = 50.000 SEC INCREMENT = 0.100 SEC

AERODYNAMIC DATA

	MACH NO 2.500 BM 5.993			MACH NO 3.540 BM 5.993			INTERPOLATED DATA MACH NO 3.500 BM 5.993		
ALPHA	CL	CD	CM	CL	CD	CM	CL	CD	CM
0.0	-0.25900	0.68100	-0.05000	-0.23900	0.63700	-0.04200	-0.23977	0.63869	-0.04231
70.000	0.44300	1.30300	-0.03800	0.40100	1.31000	-0.03000	0.40262	1.30973	-0.03031

TIME HISTORY

CYCLE NO. = 1

PSI	T	TP	Z	ZP	B	BP
0.0	1.000E 00	0.0	0.0	0.0	0.0	0.0
15.0	2.264E-01	-5.910E 00	-5.826E-04	-4.451E-03	-1.506E-04	-1.150E-03
30.0	-8.114E-01	-2.018E 00	-1.868E-03	-5.367E-03	-9.457E-04	-4.924E-03
45.0	-4.822E-01	4.532E 00	-2.505E-03	4.964E-04	-2.156E-03	-4.319E-03
60.0	5.457E-01	3.321E 00	-1.873E-03	4.335E-03	-2.573E-03	1.130E-03
75.0	6.167E-01	-2.825E 00	-1.181E-03	9.479E-04	-1.963E-03	3.532E-03
90.0	-2.645E-01	-3.861E 00	-1.500E-03	-3.382E-03	-1.489E-03	9.081E-05
105.0	-6.217E-01	1.132E 00	-2.183E-03	-1.840E-03	-1.791E-03	-2.400E-03
120.0	1.773E-02	3.752E 00	-2.099E-03	2.487E-03	-2.044E-03	4.722E-04
135.0	5.483E-01	3.006E-01	-1.428E-03	2.640E-03	-1.435E-03	4.174E-03
150.0	1.699E-01	-3.192E 00	-1.226E-03	-1.100E-03	-3.764E-04	3.916E-03
165.0	-4.262E-01	-1.382E 00	-1.698E-03	-2.506E-03	3.463E-04	1.606E-03
180.0	-2.947E-01	2.368E 00	-1.585E-03	3.186E-04	6.763E-04	9.151E-04
195.0	2.809E-01	2.029E 00	-1.615E-03	2.508E-03	1.022E-03	1.728E-03
210.0	3.577E-01	-1.442E 00	-1.187E-03	7.608E-04	1.518E-03	2.060E-03
225.0	-1.356E-01	-2.327E 00	-1.305E-03	-1.665E-03	1.975E-03	1.430E-03
240.0	-3.685E-01	5.473E-01	-1.692E-03	-9.901E-04	2.229E-03	5.086E-04
255.0	6.652E-03	2.318E 00	-1.638E-03	1.101E-03	2.246E-03	-3.746E-04
270.0	3.410E-01	2.360E-01	-1.337E-03	1.200E-03	2.035E-03	-1.235E-03
285.0	1.011E-01	-2.069E 00	-1.245E-03	-4.959E-04	1.632E-03	-1.848E-03
300.0	-2.842E-01	-8.749E-01	-1.455E-03	-1.114E-03	1.093E-03	-2.271E-03
315.0	-1.871E-01	1.617E 00	-1.544E-03	4.404E-04	4.546E-04	-2.604E-03
330.0	1.986E-01	1.329E 00	-1.273E-03	1.626E-03	-1.983E-04	-2.384E-03
345.0	2.392E-01	-1.019E 00	-1.011E-03	3.731E-04	-7.646E-04	-1.943E-03
360.0	-9.570E-02	-1.539E 00	-1.133E-03	-1.299E-03	-1.301E-03	-2.157E-03

MAXIMUM ABSOLUTE RESPONSE

PSI	T	TP	Z	ZP	B	BP
0.0	1.00CE 00					
15.0		5.910E 00				
45.0			2.505E-03			
30.0				5.367E-03		
60.0					2.573E-03	
30.0						4.924E-03

NOTE: CYCLES 2 THROUGH 4 INCLUSIVE HAVE BEEN DELETED FOR COMPACTNESS FOR ALL ROTOR BLADE TIME HISTORIES

TIME HISTORY

CYCLE NO. = 5

PSI	T	TP	Z	ZP	B	BP
0.0	-3.177E-04	-3.167E-02	-3.413E-04	1.340E-06	-1.550E-03	1.706E-03
15.0	-4.706E-03	-1.858E-03	-3.409E-04	1.871E-06	-1.052E-03	2.102E-03
30.0	-1.372E-03	2.723E-02	-3.362E-04	3.424E-05	-4.696E-04	2.348E-03
45.0	3.625E-03	1.084E-02	-3.257E-04	4.562E-05	1.544E-04	2.419E-03
60.0	2.379E-03	-2.036E-02	-3.170E-04	2.140E-05	7.688E-04	2.274E-03
75.0	-2.437E-03	-1.643E-02	-3.138E-04	3.010E-06	1.318E-03	1.922E-03
90.0	-2.989E-03	1.220E-02	-3.111E-04	1.763E-05	1.756E-03	1.427E-03
105.0	1.049E-03	1.865E-02	-3.038E-04	3.794E-05	2.053E-03	8.433E-04
120.0	2.964E-03	-4.020E-03	-2.948E-04	3.096E-05	2.189E-03	1.893E-04
135.0	1.486E-04	-1.748E-02	-2.859E-04	9.401E-06	2.148E-03	-5.026E-04
150.0	-2.445E-03	-2.327E-03	-2.874E-04	6.400E-06	1.930E-03	-1.158E-03
165.0	-8.214E-04	1.473E-02	-2.836E-04	2.273E-05	1.555E-03	-1.706E-03
180.0	2.040E-03	7.134E-03	-2.768E-04	2.955E-05	1.056E-03	-2.107E-03
195.0	1.564E-03	-1.077E-02	-2.707E-04	1.640E-05	4.734E-04	-2.344E-03
210.0	-1.180E-03	-1.019E-02	-2.679E-04	5.636E-06	-1.472E-04	-2.397E-03
225.0	-1.702E-03	6.204E-03	-2.654E-04	1.321E-05	-7.561E-04	-2.255E-03
240.0	5.852E-04	1.127E-02	-2.605E-04	2.438E-05	-1.304E-03	-1.930E-03
255.0	1.787E-03	-2.086E-03	-2.544E-04	2.290E-05	-1.746E-03	-1.448E-03
270.0	6.669E-05	-1.105E-02	-2.498E-04	1.291E-05	-2.047E-03	-8.478E-04
285.0	-1.580E-03	-1.525E-03	-2.466E-04	1.206E-05	-2.181E-03	-1.787E-04
300.0	-5.030E-04	9.751E-03	-2.424E-04	1.986E-05	-2.138E-03	5.041E-04
315.0	1.366E-03	4.527E-03	-2.368E-04	2.283E-05	-1.922E-03	1.147E-03
330.0	9.776E-04	-7.494E-03	-2.319E-04	1.458E-05	-1.550E-03	1.696E-03
345.0	-8.891E-04	-6.766E-03	-2.290E-04	7.909E-06	-1.053E-03	2.104E-03
360.0	-1.213E-03	4.290E-03	-2.261E-04	1.355E-05	-4.709E-04	2.342E-03

MAXIMUM ABSOLUTE RESPONSE

PSI	T	TP	Z	ZP	B	BP
15.0	4.706E-03					
0.0		3.167E-02				
0.0			3.413E-04			
45.0				4.562E-05		
120.0					2.189E-03	
45.0						2.419E-03

TEST CASE ALTITUDE=96000 FT

BLADE PARAMETERS

R= 18.75 FT. E= 2.1650 FT. II= 931.83984SLUG-FT.SQ. NO BLADES= 4.

CONDITION

MU = 0.8937 LAMBDA(STEADY)= 1.7540

THETA 0(STEADY)= -4.41 THETA 1(COS)= 0.0 THETA 1(SIN)= 0.0

CP FACTOR= 1.0000 CH FACTOR= 1.0000

AERODYNAMIC PARAMETERS
TIP SPEED= 1096.69FT/SEC DENSITY RATIO= 0.017

SPRING RATES (FT LBS/RAD)
FEATHERING= 0.0
LAG= 0.0
FLAPPING= 0.0

DAMPING RATES (FT LBS/RAD/SEC)
FEATHERING= 0.0
LAG= 164599.9
FLAPPING= 0.0

CONTROL SPRING RATES (FT LBS/RAD)
FEATHERING= 58000.0

ITERATION COUNT=13

AZIMUTH STA	BETA	THETA	LAG ANGLE
0.0	0.0117	-0.0714	0.0002
15.0	0.0153	-0.0670	0.0003
30.0	0.0187	-0.0626	0.0003
45.0	0.0217	-0.0585	0.0003
60.0	0.0242	-0.0557	0.0003
75.0	0.0259	-0.0527	0.0003
90.0	0.0267	-0.0512	0.0002
105.0	0.0267	-0.0521	0.0001
120.0	0.0257	-0.0545	-0.0001
135.0	0.0239	-0.0585	-0.0002
150.0	0.0213	-0.0622	-0.0003
165.0	0.0182	-0.0663	-0.0004
180.0	0.0148	-0.0705	-0.0005
195.0	0.0112	-0.0741	-0.0005
210.0	0.0078	-0.0762	-0.0005
225.0	0.0046	-0.0771	-0.0005
240.0	0.0020	-0.0774	-0.0004
255.0	0.0001	-0.0779	-0.0003
270.0	-0.0008	-0.0784	-0.0002
285.0	-0.0007	-0.0784	-0.0002
300.0	0.0004	-0.0776	-0.0001
315.0	0.0023	-0.0767	0.0000
330.0	0.0050	-0.0760	0.0001
345.0	0.0082	-0.0745	0.0002

BLADE ANGLE OF ATTACK DISTRIBUTION

			RADIAL STA.				
PSI	6.667	8.333	10.416	12.500	14.583	16.667	17.920
0.0	74.351	71.562	68.167	64.889	61.745	58.741	57.006
15.0	67.489	64.898	61.756	58.765	55.924	53.233	51.687
30.0	61.603	59.219	56.373	53.676	51.130	48.730	47.356
45.0	57.004	54.824	52.234	49.751	47.452	45.330	44.094
60.0	53.830	51.809	49.414	47.160	45.042	43.053	41.916
75.0	52.066	50.146	47.873	45.736	43.729	41.844	40.767
90.0	51.594	49.713	47.486	45.393	43.428	41.582	40.527
105.0	52.318	50.412	48.158	46.036	44.044	42.173	41.104
120.0	54.257	52.267	49.908	47.686	45.599	43.637	42.516
135.0	57.500	55.366	52.830	50.438	48.186	46.068	44.857
150.0	62.078	59.754	56.980	54.352	51.871	49.532	48.192
165.0	67.877	65.342	62.293	59.385	56.624	54.009	52.508
180.0	74.593	71.868	68.556	65.363	62.305	59.387	57.701
195.0	81.720	78.870	75.361	71.934	68.612	65.408	63.545
210.0	88.584	85.699	82.098	78.525	75.022	71.597	69.567
225.0	94.501	91.653	88.057	84.444	80.848	77.291	75.134
240.0	98.951	96.174	92.635	89.043	85.429	81.819	79.663
255.0	101.662	98.946	95.466	91.912	88.311	84.689	82.514
270.0	102.557	99.866	96.411	92.872	89.279	85.655	83.474
285.0	101.653	98.940	95.461	91.903	88.295	84.662	82.479
300.0	98.978	96.202	92.658	89.054	85.421	81.785	79.609
315.0	94.573	91.717	88.131	84.459	80.823	77.220	75.082
330.0	88.632	85.720	82.077	78.454	74.885	71.392	69.339
345.0	81.647	78.750	75.173	71.671	68.269	64.982	63.068

MACH NUMBER DISTRIBUTION

			RADIAL STA.				
PSI	6.667	8.333	10.416	12.500	14.583	16.667	17.920
0.0	3.204	3.238	3.291	3.355	3.429	3.514	3.569
15.0	3.308	3.361	3.436	3.522	3.616	3.719	3.784
30.0	3.451	3.519	3.613	3.715	3.825	3.943	4.016
45.0	3.605	3.686	3.793	3.908	4.030	4.158	4.237
60.0	3.744	3.832	3.949	4.073	4.202	4.337	4.421
75.0	3.842	3.939	4.057	4.186	4.320	4.459	4.545
90.0	3.883	3.978	4.102	4.229	4.368	4.509	4.595
105.0	3.862	3.956	4.078	4.207	4.342	4.481	4.567
120.0	3.782	3.871	3.989	4.114	4.244	4.379	4.463
135.0	3.657	3.739	3.848	3.965	4.088	4.216	4.297
150.0	3.510	3.581	3.677	3.782	3.894	4.012	4.087
165.0	3.368	3.424	3.503	3.591	3.688	3.793	3.860
180.0	3.258	3.295	3.352	3.420	3.498	3.586	3.642
195.0	3.195	3.213	3.246	3.290	3.347	3.414	3.459
210.0	3.185	3.183	3.191	3.213	3.246	3.291	3.324
225.0	3.213	3.194	3.181	3.181	3.194	3.219	3.240
240.0	3.258	3.226	3.197	3.180	3.176	3.185	3.198
255.0	3.296	3.256	3.217	3.189	3.174	3.172	3.177
270.0	3.310	3.267	3.224	3.192	3.173	3.167	3.169
285.0	3.293	3.252	3.211	3.182	3.166	3.162	3.166
300.0	3.250	3.216	3.184	3.164	3.157	3.162	3.172
315.0	3.197	3.174	3.157	3.153	3.162	3.183	3.202
330.0	3.157	3.150	3.154	3.171	3.200	3.241	3.271
345.0	3.154	3.167	3.195	3.235	3.287	3.350	3.394

ITER COUNT ON TH75= 1 NEW TH75= -4.4 OLD TH75= -4.4 THRUST= 21824.7 TORQUE= -10.7

TEST CASE ALTITUDE=96000 FT

ITERATION COUNT=13

AZIMUTH STA	BETA	THETA	LAG ANGLE
0.0	0.0117	-0.0714	0.0002
15.0	0.0152	-0.0665	0.0003
30.0	0.0187	-0.0626	0.0003
45.0	0.0218	-0.0585	0.0003
60.0	0.0242	-0.0557	0.0003
75.0	0.0255	-0.0527	0.0003
90.0	0.0267	-0.0512	0.0002
105.0	0.0267	-0.0520	0.0001
120.0	0.0257	-0.0549	-0.0001
135.0	0.0239	-0.0585	-0.0002
150.0	0.0212	-0.0622	-0.0003
165.0	0.0182	-0.0662	-0.0004
180.0	0.0148	-0.0705	-0.0005
195.0	0.0112	-0.0740	-0.0005
210.0	0.0078	-0.0762	-0.0005
225.0	0.0046	-0.0770	-0.0005
240.0	0.0020	-0.0774	-0.0004
255.0	0.0001	-0.0779	-0.0003
270.0	-0.0008	-0.0784	-0.0003
285.0	-0.0007	-0.0784	-0.0002
300.0	0.0004	-0.0776	-0.0001
315.0	0.0023	-0.0767	0.0000
330.0	0.0050	-0.0760	0.0001
345.0	0.0082	-0.0745	0.0002

BLADE ANGLE OF ATTACK DISTRIBUTION

PSI	RADIAL STA. 6.667	8.333	10.416	12.500	14.583	16.667	17.920
0.0	74.353	71.564	68.169	64.891	61.746	58.743	57.008
15.0	67.491	64.889	61.757	58.767	55.926	53.235	51.689
30.0	61.604	59.221	56.375	53.678	51.132	48.732	47.357
45.0	57.005	54.826	52.236	49.752	47.493	45.331	44.095
60.0	53.831	51.811	49.416	47.162	45.044	43.054	41.918
75.0	52.067	50.148	47.875	45.737	43.731	41.846	40.769
90.0	51.596	49.715	47.488	45.365	43.430	41.584	40.529
105.0	52.320	50.415	48.160	46.038	44.046	42.175	41.106
120.0	54.259	52.269	49.909	47.688	45.601	43.639	42.518
135.0	57.502	55.368	52.832	50.440	48.188	46.070	44.859
150.0	62.080	59.756	56.982	54.354	51.873	49.534	48.194
165.0	67.879	65.344	62.295	59.387	56.626	54.011	52.509
180.0	74.595	71.869	68.557	65.365	62.307	59.389	57.705
195.0	81.721	78.872	75.363	71.936	68.614	65.410	63.547
210.0	88.586	85.701	82.100	78.552	75.024	71.599	69.589
225.0	94.503	91.655	88.059	84.446	80.650	77.293	75.186
240.0	98.953	96.176	92.637	89.049	85.431	81.821	79.664
255.0	101.664	98.948	95.468	91.913	88.313	84.691	82.516
270.0	102.599	99.868	96.413	92.874	89.281	85.657	83.476
285.0	101.655	98.962	95.463	91.904	88.297	84.664	82.481
300.0	98.980	96.204	92.660	89.056	85.423	81.786	79.611
315.0	94.575	91.719	88.103	84.461	80.825	77.222	75.084
330.0	88.634	85.722	82.079	78.456	74.887	71.394	69.341
345.0	81.649	78.752	75.175	71.673	68.271	64.984	63.070

MACH NUMBER DISTRIBUTION

PSI	RADIAL STA. 6.667	8.333	10.416	12.500	14.583	16.667	17.920
0.0	3.204	3.238	3.291	3.355	3.429	3.514	3.569
15.0	3.308	3.361	3.436	3.522	3.616	3.719	3.784
30.0	3.451	3.519	3.613	3.715	3.825	3.943	4.016
45.0	3.605	3.686	3.793	3.908	4.030	4.158	4.237
60.0	3.744	3.832	3.949	4.073	4.202	4.337	4.421
75.0	3.842	3.935	4.057	4.186	4.320	4.459	4.545
90.0	3.883	3.978	4.102	4.233	4.368	4.509	4.595
105.0	3.862	3.956	4.078	4.207	4.342	4.481	4.567
120.0	3.782	3.871	3.989	4.114	4.244	4.379	4.463
135.0	3.657	3.739	3.848	3.965	4.088	4.216	4.297
150.0	3.510	3.581	3.677	3.782	3.894	4.012	4.087
165.0	3.368	3.424	3.503	2.591	3.688	3.793	3.860
180.0	3.258	3.295	3.352	3.420	3.498	3.586	3.642
195.0	3.195	3.213	3.246	3.290	3.347	3.414	3.459
210.0	3.185	3.183	3.191	3.213	3.246	3.291	3.324
225.0	3.213	3.194	3.181	3.181	3.194	3.219	3.240
240.0	3.258	3.226	3.197	3.180	3.176	3.185	3.196
255.0	3.296	3.256	3.217	3.189	3.174	3.172	3.177
270.0	3.310	3.267	3.224	3.192	3.173	3.167	3.169
285.0	3.293	3.252	3.211	3.182	3.166	3.162	3.166
300.0	3.250	3.216	3.184	3.164	3.157	3.162	3.172
315.0	3.197	3.174	3.157	3.153	3.162	3.183	3.202
330.0	3.157	3.150	3.154	3.171	3.201	3.241	3.271
345.0	3.154	3.167	3.195	3.235	3.287	3.350	3.394

TORQUE EQUILIBRIUM
CAPSULE BOW WAVE-ROTOR DISK INTERSECTION HAS NOT BEEN CALCULATED

BLADE PITCH(TH75) = -4.408 THRUST = 21824.996 TORQUE = -3.888

POINTS OF INTERSECTION OF BOW SHOCK WAVE AND REACTOR DISK

AZIMUTH	RADIUS
0.0	0.0
15.0	0.0
30.0	0.0
45.0	0.0
60.0	0.0
75.0	0.0
90.0	0.0
105.0	16.648
120.0	15.039
135.0	13.879
150.0	13.098
165.0	12.646
180.0	12.492
195.0	12.646
210.0	13.098
225.0	13.879
240.0	15.039
255.0	16.648
270.0	0.0
285.0	0.0
300.0	0.0
315.0	0.0
330.0	0.0
345.0	0.0

DENSITY DISTRIBUTION

	RADIAL STATION,FT						
	6.6670	8.3330	10.4160	12.5000	14.5830	16.6670	17.9200
PSI							
0.0	0.0191	0.0187	0.0181	0.0174	0.0167	0.0159	0.0154
15.0	0.0180	0.0174	0.0166	0.0158	0.0150	0.0142	0.0137
30.0	0.0166	0.0160	0.0151	0.0143	0.0135	0.0127	0.0123
45.0	0.0154	0.0147	0.0139	0.0131	0.0123	0.0116	0.0111
60.0	0.0144	0.0138	0.0130	0.0122	0.0115	0.0108	0.0104
75.0	0.0139	0.0133	0.0125	0.0117	0.0110	0.0103	0.0099
90.0	0.0138	0.0132	0.0124	0.0116	0.0109	0.0103	0.0099
105.0	0.0142	0.0135	0.0127	0.0120	0.0112	0.0168	0.0168
120.0	0.0150	0.0143	0.0135	0.0127	0.0119	0.0168	0.0168
135.0	0.0163	0.0156	0.0147	0.0138	0.0168	0.0168	0.0168
150.0	0.0178	0.0171	0.0162	0.0154	0.0168	0.0168	0.0168
165.0	0.0195	0.0188	0.0180	0.0172	0.0168	0.0168	0.0168
180.0	0.0209	0.0204	0.0197	0.0168	0.0168	0.0168	0.0168
195.0	0.0216	0.0214	0.0210	0.0204	0.0168	0.0168	0.0168
210.0	0.0217	0.0217	0.0216	0.0213	0.0168	0.0168	0.0168
225.0	0.0211	0.0213	0.0215	0.0215	0.0168	0.0168	0.0168
240.0	0.0203	0.0207	0.0210	0.0213	0.0213	0.0169	0.0168
255.0	0.0195	0.0200	0.0205	0.0208	0.0210	0.0168	0.0168
270.0	0.0190	0.0195	0.0201	0.0205	0.0207	0.0208	0.0208
285.0	0.0189	0.0194	0.0199	0.0203	0.0205	0.0205	0.0205
300.0	0.0192	0.0196	0.0200	0.0202	0.0203	0.0202	0.0201
315.0	0.0195	0.0198	0.0200	0.0201	0.0200	0.0197	0.0195
330.0	0.0198	0.0199	0.0199	0.0197	0.0193	0.0188	0.0185
345.0	0.0198	0.0196	0.0192	0.0188	0.0182	0.0175	0.0171

ADVANCE RATIO

	RADIAL STATION,FT						
	6.6670	8.3330	10.4160	12.5000	14.5830	16.6670	17.9200
PSI							
0.0	0.6940	0.6940	0.6940	0.6940	0.6940	0.6940	0.6940
15.0	0.6940	0.6940	0.6940	0.6940	0.6940	0.6940	0.6940
30.0	0.6940	0.6940	0.6940	0.6940	0.6940	0.6940	0.6940
45.0	0.6940	0.6940	0.6940	0.6940	0.6940	0.6940	0.6940
60.0	0.6940	0.6940	0.6940	0.6940	0.6940	0.6940	0.6940
75.0	0.6940	0.6940	0.6940	0.6940	0.6940	0.6940	0.6940
90.0	0.6940	0.6940	0.6940	0.6940	0.6940	0.6940	0.6940
105.0	0.6940	0.6940	0.6940	0.6940	0.6940	0.8937	0.8937
120.0	0.6940	0.6940	0.6940	0.6940	0.6940	0.8937	0.8937
135.0	0.6940	0.6940	0.6940	0.6940	0.8937	0.8937	0.8937
150.0	0.6940	0.6940	0.6940	0.6940	0.8937	0.8937	0.8937
165.0	0.6940	0.6940	0.6940	0.6940	0.8937	0.8937	0.8937
180.0	0.6940	0.6940	0.6940	0.8937	0.8937	0.8937	0.8937
195.0	0.6940	0.6940	0.6940	0.6940	0.8937	0.8937	0.8937
210.0	0.6940	0.6940	0.6940	0.6940	0.8937	0.8937	0.8937
225.0	0.6940	0.6940	0.6940	0.6940	0.8937	0.8937	0.8937
240.0	0.6940	0.6940	0.6940	0.6940	0.6940	0.8937	0.8937
255.0	0.6940	0.6940	0.6940	0.6940	0.6940	0.8937	0.8937
270.0	0.6940	0.6940	0.6940	0.6940	0.6940	0.6940	0.6940
285.0	0.6940	0.6940	0.6940	0.6940	0.6940	0.6940	0.6940
300.0	0.6940	0.6940	0.6940	0.6940	0.6940	0.6940	0.6940
315.0	0.6940	0.6940	0.6940	0.6940	0.6940	0.6940	0.6940
330.0	0.6940	0.6940	0.6940	0.6940	0.6940	0.6940	0.6940
345.0	0.6940	0.6940	0.6940	0.6940	0.6940	0.6940	0.6940

INFLOW DISTRIBUTION

	RADIAL STATION,FT						
	6.6670	9.3330	10.4160	12.5000	14.5830	16.6670	17.9200
PSI							
0.0	1.3620	1.3620	1.3620	1.3620	1.3620	1.3620	1.3620
15.0	1.3620	1.3620	1.3620	1.3620	1.3620	1.3620	1.3620
30.0	1.3620	1.3620	1.3620	1.3620	1.3620	1.3620	1.3620
45.0	1.3620	1.3620	1.3620	1.3620	1.3620	1.3620	1.3620
60.0	1.3620	1.3620	1.3620	1.3620	1.3620	1.3620	1.3620
75.0	1.3620	1.3620	1.3620	1.3620	1.3620	1.3620	1.3620
90.0	1.3620	1.3620	1.3620	1.3620	1.3620	1.3620	1.3620
105.0	1.3620	1.3620	1.3620	1.3620	1.3620	1.7540	1.7540
120.0	1.3620	1.3620	1.3620	1.3620	1.3620	1.7540	1.7540
135.0	1.3620	1.3620	1.3620	1.3620	1.7540	1.7540	1.7540
150.0	1.3620	1.3620	1.3620	1.3620	1.7540	1.7540	1.7540
165.0	1.3620	1.3620	1.3620	1.3620	1.7540	1.7540	1.7540
180.0	1.3620	1.3620	1.3620	1.7540	1.7540	1.7540	1.7540
195.0	1.3620	1.3620	1.3620	1.3620	1.7540	1.7540	1.7540
210.0	1.3620	1.3620	1.3620	1.3620	1.7540	1.7540	1.7540
225.0	1.3620	1.3620	1.3620	1.3620	1.7540	1.7540	1.7540
240.0	1.3620	1.3620	1.3620	1.3620	1.3620	1.7540	1.7540
255.0	1.3620	1.3620	1.3620	1.3620	1.3620	1.7540	1.7540
270.0	1.3620	1.3620	1.3620	1.3620	1.3620	1.3620	1.3620
285.0	1.3620	1.3620	1.3620	1.3620	1.3620	1.3620	1.3620
300.0	1.3620	1.3620	1.3620	1.3620	1.3620	1.3620	1.3620
315.0	1.3620	1.3620	1.3620	1.3620	1.3620	1.3620	1.3620
330.0	1.3620	1.3620	1.3620	1.3620	1.3620	1.3620	1.3620
345.0	1.3620	1.3620	1.3620	1.3620	1.3620	1.3620	1.3620

TIME HISTORY

CYCLE NO. = 1

PSI	T	TP	Z	ZP	B	BP
0.0	1.000E 00	0.0	0.0	0.0	0.0	0.0
15.0	2.145E-01	-6.001E 00	-4.138E-04	-3.161E-03	-1.658E-04	-1.267E-03
30.0	-8.408E-01	-2.061E 00	-1.337E-03	-3.893E-03	-8.868E-04	-4.242E-03
45.0	-4.831E-01	4.793E 00	-1.850E-03	-2.147E-05	-1.904E-03	-3.532E-03
60.0	6.084E-01	3.546E 00	-1.527E-03	2.484E-03	-2.318E-03	3.744E-04
75.0	6.544E-01	-3.155E 00	-1.133E-03	5.292E-04	-2.015E-03	1.939E-03
90.0	-3.364E-01	-4.374E 00	-1.324E-03	-1.991E-03	-1.790E-03	-2.260E-04
105.0	-7.224E-01	1.426E 00	-1.685E-03	-7.655E-04	-2.012E-03	-1.462E-03
120.0	5.230E-02	4.493E 00	-1.468E-03	2.426E-03	-2.010E-03	1.476E-03
135.0	6.735E-01	2.523E-01	-8.540E-04	2.262E-03	-1.167E-03	4.962E-03
150.0	1.871E-01	-3.968E 00	-7.500E-04	-1.467E-03	4.125E-05	4.267E-03
165.0	-5.400E-01	-1.586E 00	-1.312E-03	-2.826E-03	7.851E-04	1.416E-03
180.0	-3.529E-01	3.015E 00	-1.615E-03	5.140E-04	1.058E-03	6.686E-04
195.0	3.632E-01	2.455E 00	-1.146E-03	3.067E-03	1.375E-03	1.754E-03
210.0	4.400E-01	-1.868E 00	-6.412E-04	7.876E-04	1.886E-03	2.149E-03
225.0	-1.778E-01	-2.852E 00	-8.388E-04	-2.297E-03	2.331E-03	1.248E-03
240.0	-4.556E-01	7.298E-01	-1.323E-03	-1.403E-03	2.496E-03	1.334E-05
255.0	1.366E-02	2.855E 00	-1.327E-03	1.371E-03	2.378E-03	-9.124E-04
270.0	4.234E-01	2.747E-01	-9.412E-04	1.579E-03	2.061E-03	-1.509E-03
285.0	1.262E-01	-2.545E 00	-8.147E-04	-6.122E-04	1.595E-03	-2.055E-03
300.0	-3.501E-01	-1.093E 00	-1.093E-03	-1.514E-03	9.703E-04	-2.713E-03
315.0	-2.346E-01	1.575E 00	-1.250E-03	3.164E-04	2.240E-04	-2.988E-03
330.0	2.414E-01	1.660E 00	-9.672E-04	1.842E-03	-4.818E-04	-2.404E-03
345.0	2.969E-01	-1.237E 00	-6.494E-04	5.857E-04	-1.038E-03	-1.844E-03
360.0	-1.179E-01	-1.932E 00	-7.329E-04	-1.224E-03	-1.566E-03	-2.194E-03

MAXIMUM ABSOLUTE RESPONSE

PSI	T	TP	Z	ZP	B	BP
0.0	1.00CE 00					
15.0		6.C01E 0C				
45.0			1.850E-03			
30.0				3.893E-03		
240.0					2.496E-03	
135.0						4.962E-03

TIME HISTORY

CYCLE NO. = 5

PSI	T	TP	Z	ZP	B	BP
0.0	-6.056E-04	-7.475E-02	-2.571E-04	-1.710E-05	-1.427E-03	2.062E-03
15.0	-1.117E-02	-5.926E-03	-2.622E-04	-2.186E-05	-8.439E-04	2.389E-03
30.0	-3.281E-03	6.616E-02	-2.610E-04	3.098E-05	-1.953E-04	2.566E-03
45.0	9.064E-03	2.814E-02	-2.503E-04	5.122E-05	4.755E-04	2.559E-03
60.0	6.049E-03	-5.117E-02	-2.414E-04	1.686E-05	1.112E-03	2.307E-03
75.0	-6.348E-03	-4.354E-02	-2.404E-04	-9.893E-06	1.654E-03	1.833E-03
90.0	-7.821E-03	3.228E-02	-2.404E-04	1.001E-05	2.096E-03	1.235E-03
105.0	3.091E-03	5.108E-02	-2.335E-04	4.301E-05	2.294E-03	5.843E-04
120.0	8.219E-03	-1.190E-02	-2.236E-04	3.287E-05	2.355E-03	-1.195E-04
135.0	1.111E-04	-5.004E-02	-2.206E-04	-1.058E-05	2.226E-03	-8.654E-04
150.0	-7.258E-03	-6.248E-03	-2.240E-04	-1.526E-05	1.910E-03	-1.552E-03
165.0	-2.465E-03	4.286E-02	-2.224E-04	2.778E-05	1.435E-03	-2.073E-03
180.0	5.800E-03	2.029E-02	-2.127E-04	4.653E-05	8.491E-04	-2.406E-03
195.0	4.320E-03	-3.160E-02	-2.052E-04	1.075E-05	1.988E-04	-2.562E-03
210.0	-3.628E-03	-2.912E-02	-2.064E-04	-2.001E-05	-4.676E-04	-2.529E-03
225.0	-5.015E-03	1.853E-02	-2.087E-04	2.127E-06	-1.098E-03	-2.290E-03
240.0	1.681E-03	3.262E-02	-2.137E-04	3.629E-05	-1.641E-03	-1.857E-03
255.0	5.151E-03	-6.114E-03	-1.951E-04	2.945E-05	-2.051E-03	-1.271E-03
270.0	1.585E-04	-3.203E-02	-1.912E-04	7.281E-08	-2.294E-03	-5.848E-04
285.0	-4.673E-03	-4.881E-03	-1.917E-04	-4.039E-06	-2.351E-03	1.465E-04
300.0	-1.663E-03	2.797E-02	-1.856E-04	2.055E-05	-2.218E-03	8.678E-04
315.0	3.775E-03	1.367E-02	-1.827E-04	3.229E-05	-1.905E-03	1.523E-03
330.0	2.820E-03	-2.056E-02	-1.769E-04	1.150E-05	-1.437E-03	2.051E-03
345.0	-2.501E-03	-1.968E-02	-1.763E-04	-6.969E-06	-8.542E-04	2.404E-03
360.0	-3.476E-03	1.223E-02	-1.766E-04	5.275E-06	-2.038E-04	2.565E-03

MAXIMUM ABSOLUTE RESPONSE

PSI	T	TP	Z	ZP	B	BP
15.0	1.117E-02					
0.0		7.475E-02				
15.0			2.622E-04			
45.0				5.122E-05		
120.0					2.355E-03	
30.0						2.566E-03

TEST CASE ALTITUDE=56000 FT

BLADE PARAMETERS

R= 18.75 FT. E= 2.1650 FT. II= 931.83984SLUG-FT.SQ. NO BLADES= 4.

CONDITION

MU = 0.7217 LAMBCA(STEADY)= 1.4165

THETA 0(STEADY)= -4.41 THETA 1(COS)= 0.0 THETA 1(SIN)= 0.0

```
CP FACTOR=  1.0000          CH FACTOR=  1.0000

    AERODYNAMIC PARAMETERS
TIP SPEED= 1096.69FT/SEC     DENSITY RATIO= 0.017

SPRING RATES (FT LBS/RAD)
    FEATHERING=       0.0
           LAG=       0.0
      FLAPPING=       0.0

DAMPING RATES (FT LBS/RAD/SEC)
    FEATHERING=       0.0
           LAG= 164599.9
      FLAPPING=       0.0

CONTROL SPRING RATES (FT LBS/RAD)
    FEATHERING=  58000.0
```

ITERATION COUNT= 8

AZIMUTH STA	BETA	THETA	LAG ANGLE
0.0	-0.0021	-0.0711	0.0006
15.0	-0.0018	-0.0687	0.0006
30.0	-0.0007	-0.0658	0.0006
45.0	0.0012	-0.0643	0.0006
60.0	0.0036	-0.0641	0.0006
75.0	0.0062	-0.0639	0.0006
90.0	0.0090	-0.0631	0.0005
105.0	0.0117	-0.0612	0.0005
120.0	0.0142	-0.0584	0.0004
135.0	0.0164	-0.0556	0.0004
150.0	0.0182	-0.0638	0.0003
165.0	0.0195	-0.0678	0.0003
180.0	0.0202	-0.0696	0.0003
195.0	0.0202	-0.0716	0.0003
210.0	0.0195	-0.0745	0.0003
225.0	0.0181	-0.0772	0.0003
240.0	0.0160	-0.0773	0.0004
255.0	0.0134	-0.0759	0.0004
270.0	0.0105	-0.0755	0.0004
285.0	0.0075	-0.0766	0.0005
300.0	0.0045	-0.0769	0.0005
315.0	0.0015	-0.0755	0.0005
330.0	-0.0002	-0.0736	0.0006
345.0	-0.0016	-0.0724	0.0006

BLADE ANGLE OF ATTACK DISTRIBUTION

			RADIAL STA.				
PSI	6.667	8.333	10.416	12.500	14.583	16.667	17.920
0.0	71.293	67.857	63.745	59.858	56.215	52.816	50.891
15.0	64.606	61.439	57.693	54.191	50.936	47.918	46.216
30.0	58.912	56.028	52.645	49.502	46.556	43.912	42.399
45.0	54.404	51.770	48.654	45.847	43.220	40.797	39.431
60.0	51.169	48.723	45.872	43.238	40.810	38.571	37.309
75.0	49.274	46.943	44.228	41.722	39.412	37.281	36.080
90.0	48.718	46.426	43.758	41.295	39.025	36.930	35.749
105.0	49.503	47.174	44.462	41.958	39.645	41.447	40.364
120.0	51.602	49.160	46.313	43.683	41.257	43.146	42.008
135.0	54.851	52.225	49.154	46.312	47.885	45.733	44.502
150.0	59.227	56.355	52.982	45.847	51.584	49.209	47.848
165.0	64.839	61.689	57.960	54.469	56.407	53.758	52.235
180.0	71.509	68.096	64.007	65.376	62.292	59.346	57.644
195.0	78.618	75.012	70.627	66.416	68.768	65.548	63.674
210.0	85.381	81.685	77.118	72.658	75.159	71.732	69.718
225.0	91.210	87.517	82.885	78.291	80.876	77.328	75.224
240.0	95.733	92.092	87.473	82.834	78.240	81.854	79.705
255.0	98.620	95.031	90.446	85.805	81.173	84.819	82.654
270.0	99.597	96.026	91.454	86.813	82.169	77.577	74.865
285.0	98.608	95.009	90.413	85.761	81.118	76.539	73.842
300.0	95.791	92.131	87.491	82.831	78.217	73.704	71.060
315.0	91.321	87.602	82.941	78.319	73.801	69.431	66.894
330.0	85.406	81.681	77.081	72.593	68.271	64.147	61.775
345.0	78.485	74.851	70.436	66.201	62.182	58.397	56.238

MACH NUMBER DISTRIBUTION

			RADIAL STA.				
PSI	6.667	8.333	10.416	12.500	14.583	16.667	17.920
0.0	2.542	2.588	2.657	2.735	2.833	2.937	3.005
15.0	2.641	2.703	2.792	2.893	3.009	3.122	3.198
30.0	2.763	2.840	2.945	3.059	3.182	3.313	3.395
45.0	2.889	2.978	3.093	3.218	3.350	3.489	3.575
60.0	2.997	3.091	3.216	3.348	3.487	3.631	3.720
75.0	3.071	3.169	3.298	3.434	3.576	3.724	3.815
90.0	3.098	3.197	3.328	3.466	3.609	3.757	3.849
105.0	3.075	3.173	3.302	3.438	3.580	4.466	4.551
120.0	3.006	3.100	3.224	3.356	3.494	4.359	4.442
135.0	2.902	2.988	3.104	3.229	4.066	4.193	4.272
150.0	2.779	2.855	2.959	3.073	3.873	3.990	4.063
165.0	2.660	2.721	2.810	2.909	3.672	3.775	3.840
180.0	2.563	2.607	2.675	2.813	3.489	3.574	3.629
195.0	2.502	2.527	2.573	2.633	3.345	3.410	3.454
210.0	2.480	2.486	2.509	2.548	3.251	3.295	3.326
225.0	2.488	2.478	2.481	2.500	3.203	3.227	3.248
240.0	2.510	2.488	2.475	2.479	2.458	3.196	3.207
255.0	2.530	2.501	2.478	2.472	2.482	3.185	3.190
270.0	2.537	2.505	2.479	2.469	2.475	2.498	2.519
285.0	2.524	2.495	2.473	2.466	2.476	2.502	2.525
300.0	2.498	2.477	2.464	2.468	2.488	2.524	2.552
315.0	2.471	2.462	2.466	2.485	2.520	2.571	2.608
330.0	2.460	2.469	2.491	2.531	2.585	2.654	2.701
345.0	2.481	2.507	2.554	2.615	2.690	2.777	2.835

ITER COUNT ON TH75= 1 NEW TH75= -4.1 OLD TH75= -4.4 THRUST= 15291.8 TORQUE= -1653.9

TEST CASE ALTITUDE=6000 FT

ITERATION COUNT=16

AZIMUTH STA	BETA	THETA	LAG ANGLE
0.0	-0.0022	-0.0654	0.0004
15.0	-0.0018	-0.0630	0.0004
30.0	-0.0006	-0.0602	0.0004
45.0	0.0013	-0.0586	0.0004
60.0	0.0037	-0.0584	0.0003
75.0	0.0064	-0.0581	0.0003
90.0	0.0092	-0.0573	0.0003
105.0	0.0119	-0.0555	0.0002
120.0	0.0144	-0.0533	0.0002
135.0	0.0166	-0.0540	0.0001
150.0	0.0184	-0.0582	0.0001
165.0	0.0196	-0.0622	0.0000
180.0	0.0202	-0.0643	0.0000
195.0	0.0203	-0.0661	0.0000
210.0	0.0196	-0.0690	0.0000
225.0	0.0181	-0.0715	0.0001
240.0	0.0160	-0.0717	0.0001
255.0	0.0133	-0.0703	0.0001
270.0	0.0104	-0.0699	0.0003
285.0	0.0074	-0.0709	0.0002
300.0	0.0044	-0.0712	0.0002
315.0	0.0018	-0.0699	0.0003
330.0	-0.0003	-0.0680	0.0003
345.0	-0.0016	-0.0668	0.0003

BLADE ANGLE OF ATTACK DISTRIBUTION

PSI	RADIAL STA. 6.667	8.333	10.416	12.500	14.583	16.667	17.920
0.0	71.626	68.189	64.076	60.189	56.544	53.145	51.219
15.0	64.938	61.770	58.024	54.521	51.265	48.247	46.543
30.0	59.241	56.357	52.972	49.829	46.922	44.237	42.723
45.0	54.732	52.097	49.020	46.172	43.545	41.121	39.755
60.0	51.499	49.052	46.201	43.566	41.138	38.898	37.636
75.0	49.606	47.274	44.559	42.053	39.743	37.611	36.410
90.0	49.048	46.756	44.088	41.625	39.355	37.260	36.079
105.0	49.829	47.500	44.787	42.283	39.975	41.772	40.689
120.0	51.921	49.479	46.633	44.002	41.577	43.466	42.328
135.0	55.168	52.541	49.472	46.630	48.202	46.051	44.820
150.0	59.545	56.674	53.301	50.167	51.903	49.529	48.168
165.0	65.157	62.007	58.279	54.789	56.727	54.078	52.555
180.0	71.823	68.410	64.322	65.690	62.607	59.662	57.960
195.0	78.927	75.321	70.937	66.727	69.079	65.860	63.986
210.0	85.692	81.996	77.429	72.970	75.471	72.044	70.031
225.0	91.527	87.834	83.202	78.609	81.193	77.645	75.542
240.0	96.054	92.412	87.794	83.155	78.561	82.175	80.027
255.0	98.942	95.352	90.768	86.127	81.495	85.141	82.976
270.0	99.921	96.350	91.778	87.138	82.494	77.902	75.190
285.0	98.936	95.337	90.741	86.090	81.447	76.869	74.172
300.0	96.122	92.483	87.822	83.162	78.545	74.035	71.392
315.0	91.650	87.932	83.270	78.649	74.130	69.760	67.223
330.0	85.733	82.008	77.408	72.920	68.997	64.473	62.101
345.0	78.814	75.180	70.764	66.529	62.905	58.723	56.564

MACH NUMBER DISTRIBUTION

PSI	RADIAL STA. 6.667	8.333	10.416	12.500	14.583	16.667	17.920
0.0	2.542	2.587	2.657	2.739	2.832	2.937	3.005
15.0	2.641	2.703	2.792	2.892	3.002	3.122	3.197
30.0	2.763	2.839	2.944	3.059	3.182	3.312	3.394
45.0	2.889	2.976	3.092	3.217	3.350	3.489	3.575
60.0	2.997	3.091	3.216	3.348	3.486	3.631	3.720
75.0	3.071	3.169	3.298	3.434	3.576	3.724	3.815
90.0	3.098	3.197	3.328	3.466	3.609	3.757	3.849
105.0	3.076	3.173	3.302	3.438	3.580	4.466	4.551
120.0	3.006	3.100	3.224	3.356	3.495	4.359	4.442
135.0	2.902	2.988	3.105	3.229	4.066	4.194	4.273
150.0	2.780	2.855	2.960	3.074	3.874	3.990	4.064
165.0	2.660	2.722	2.810	2.909	3.672	3.775	3.841
180.0	2.563	2.608	2.676	3.414	3.489	3.574	3.630
195.0	2.502	2.528	2.573	2.633	3.345	3.410	3.454
210.0	2.480	2.487	2.510	2.548	3.251	3.295	3.327
225.0	2.485	2.478	2.481	2.500	3.203	3.228	3.248
240.0	2.510	2.488	2.475	2.479	2.468	3.196	3.207
255.0	2.530	2.501	2.478	2.472	2.482	3.185	3.190
270.0	2.537	2.503	2.479	2.469	2.476	2.498	2.519
285.0	2.524	2.493	2.473	2.466	2.476	2.503	2.526
300.0	2.499	2.477	2.464	2.468	2.488	2.524	2.552
315.0	2.472	2.462	2.466	2.485	2.520	2.571	2.608
330.0	2.460	2.468	2.491	2.531	2.585	2.654	2.701
345.0	2.481	2.507	2.554	2.615	2.690	2.777	2.835

ITER COUNT ON TH75= 2 NEW TH75= -3.8 OLD TH75= -4.1 THRUST= 15325.4 TORQUE= -766.0

TEST CASE ALTITUDE=96000 FT

ITERATION COUNT=16

AZIMUTH STA	BETA	THETA	LAG ANGLE
0.0	-0.0022	-0.0603	0.0001
15.0	-0.0018	-0.0579	0.0001
30.0	-0.0005	-0.0551	0.0001
45.0	0.0014	-0.0536	0.0001
60.0	0.0038	-0.0533	0.0001
75.0	0.0065	-0.0530	0.0000
90.0	0.0093	-0.0521	0.0000
105.0	0.0120	-0.0504	-0.0000
120.0	0.0145	-0.0483	-0.0001
135.0	0.0167	-0.0491	-0.0001
150.0	0.0185	-0.0531	-0.0002
165.0	0.0197	-0.0571	-0.0002
180.0	0.0204	-0.0593	-0.0002
195.0	0.0203	-0.0611	-0.0002
210.0	0.0195	-0.0639	-0.0002
225.0	0.0180	-0.0663	-0.0002
240.0	0.0159	-0.0665	-0.0002
255.0	0.0133	-0.0651	-0.0001
270.0	0.0102	-0.0648	-0.0001
285.0	0.0072	-0.0657	-0.0001
300.0	0.0043	-0.0660	-0.0000
315.0	0.0017	-0.0647	-0.0000
330.0	-0.0004	-0.0625	0.0000
345.0	-0.0017	-0.0617	0.0001

BLADE ANGLE OF ATTACK DISTRIBUTION

	RADIAL STA.						
PSI	6.667	8.333	10.416	12.500	14.583	16.667	17.920
0.0	71.925	68.488	64.374	60.486	56.841	53.441	51.515
15.0	65.236	62.068	58.321	54.817	51.560	48.542	46.838
30.0	59.535	56.650	53.265	50.121	47.214	44.528	43.014
45.0	55.023	52.388	49.310	46.462	43.834	41.410	40.044
60.0	51.792	49.345	46.453	43.858	41.429	39.189	37.927
75.0	49.901	47.569	44.854	42.347	40.037	37.906	36.704
90.0	49.343	47.051	44.382	41.919	39.649	37.554	36.373
105.0	50.118	47.7[illegible]	45.077	42.573	40.265	42.062	40.979
120.0	52.204	49.[illegible]	46.916	44.266	41.861	43.750	42.612
135.0	55.450	52.[illegible]	49.755	46.914	48.486	46.335	45.105
150.0	59.833	5[illegible]	53.590	50.456	52.192	49.818	48.457
165.0	65.445	6[illegible]296	58.568	55.079	57.017	54.369	52.846
180.0	72.106	68.694	64.606	65.575	62.893	59.948	58.246
195.0	79.207	75.602	71.218	67.008	69.360	66.142	64.268
210.0	8[illegible]977	82.281	77.714	73.256	75.756	72.330	70.318
225.0	91.819	88.126	83.495	78.901	81.485	77.938	75.835
240.0	96.348	92.706	88.088	83.450	78.856	82.469	80.321
255.0	99.234	95.644	91.060	86.419	81.787	85.433	83.268
270.0	100.214	96.642	92.070	87.430	82.786	78.194	75.483
285.0	99.233	95.635	91.039	86.387	81.744	77.166	74.469
300.0	96.423	92.764	88.123	83.464	78.850	74.337	71.693
315.0	91.950	88.232	83.571	78.949	74.430	70.060	67.523
330.0	86.031	82.306	77.705	73.217	68.894	64.769	62.397
345.0	79.112	75.477	71.061	66.825	62.805	59.018	56.858

MACH NUMBER DISTRIBUTION

	RADIAL STA.						
PSI	6.667	8.333	10.416	12.500	14.583	16.667	17.920
0.0	2.542	2.587	2.656	2.738	2.832	2.937	3.004
15.0	2.641	2.703	2.792	2.892	3.002	3.121	3.197
30.0	2.763	2.839	2.944	3.059	3.181	3.312	3.394
45.0	2.889	2.975	3.092	3.217	3.349	3.488	3.575
60.0	2.997	3.091	3.215	3.348	3.486	3.630	3.720
75.0	3.071	3.169	3.298	3.434	3.576	3.723	3.815
90.0	3.098	3.197	3.328	3.466	3.609	3.757	3.849
105.0	3.076	3.173	3.303	3.439	3.581	4.466	4.551
120.0	3.007	3.100	3.225	3.356	3.495	4.359	4.442
135.0	2.902	2.989	3.105	3.230	4.067	4.194	4.273
150.0	2.780	2.856	2.960	3.074	3.874	3.991	4.064
165.0	2.660	2.722	2.810	2.910	3.673	3.776	3.841
180.0	2.563	2.608	2.676	3.414	3.490	3.575	3.630
195.0	2.502	2.528	2.573	2.634	3.346	3.410	3.454
210.0	2.480	2.487	2.510	2.548	3.252	3.295	3.327
225.0	2.488	2.478	2.481	2.500	3.204	3.228	3.248
240.0	2.510	2.488	2.475	2.479	2.498	3.196	3.208
255.0	2.530	2.501	2.478	2.472	2.482	3.185	3.190
270.0	2.537	2.505	2.479	2.469	2.476	2.498	2.519
285.0	2.524	2.495	2.473	2.466	2.476	2.502	2.526
300.0	2.499	2.477	2.464	2.468	2.488	2.524	2.552
315.0	2.472	2.462	2.466	2.485	2.520	2.571	2.608
330.0	2.460	2.468	2.491	2.531	2.585	2.653	2.701
345.0	2.481	2.507	2.554	2.615	2.689	2.777	2.835

ITER COUNT ON TH75= 3 NEW TH75= -3.8 OLD TH75= -3.8 THRUST= 15354.3 TORQUE= 40.2

TEST CASE ALTITUDE=96000 FT

ITERATION COUNT=17

AZIMUTH STA	BETA	THETA	LAG ANGLE
0.0	-0.0022	-0.0604	0.0001
15.0	-0.0018	-0.0580	0.0001
30.0	-0.0005	-0.0532	0.0001
45.0	0.0014	-0.0537	0.0001
60.0	0.0038	-0.0534	0.0001
75.0	0.0065	-0.0531	0.0000
90.0	0.0093	-0.0523	0.0000
105.0	0.0120	-0.0505	-0.0000
120.0	0.0145	-0.0485	-0.0001
135.0	0.0167	-0.0492	-0.0001
150.0	0.0185	-0.0532	-0.0002
165.0	0.0197	-0.0572	-0.0002
180.0	0.0204	-0.0594	-0.0002
195.0	0.0203	-0.0612	-0.0002
210.0	0.0195	-0.0640	-0.0002
225.0	0.0180	-0.0665	-0.0002
240.0	0.0159	-0.0666	-0.0002
255.0	0.0132	-0.0653	-0.0001
270.0	0.0102	-0.0645	-0.0001
285.0	0.0072	-0.0658	-0.0001
300.0	0.0042	-0.0662	-0.0000
315.0	0.0017	-0.0649	0.0000
330.0	-0.0004	-0.0631	0.0000
345.0	-0.0017	-0.0618	0.0001

BLADE AAGLE OF ATTACK DISTRIBUTICN

RADIAL STA.

PSI	6.667	8.333	10.416	12.500	14.583	16.667	17.920
0.0	71.918	68.481	64.367	60.479	56.834	53.434	51.507
15.0	65.229	62.061	58.313	54.810	51.553	48.534	46.831
30.0	59.527	56.643	53.258	50.114	47.207	44.521	43.007
45.0	55.016	52.381	49.373	46.455	43.827	41.403	40.037
60.0	51.785	49.338	46.486	43.851	41.422	39.182	37.920
75.0	49.894	47.562	44.847	42.340	40.030	37.898	36.697
90.0	49.336	47.044	44.375	41.912	39.642	37.547	36.366
105.0	50.111	47.782	45.070	42.566	40.258	42.055	40.972
120.0	52.197	49.756	46.909	44.279	41.854	43.743	42.605
135.0	55.443	52.818	49.748	46.967	48.479	46.328	45.398
150.0	59.826	56.954	53.583	50.449	52.185	49.811	48.450
165.0	65.438	62.289	58.561	55.072	57.010	54.361	52.839
180.0	72.099	68.687	64.600	65.968	62.888	59.941	58.240
195.0	79.200	75.595	71.211	67.002	69.353	66.135	64.261
210.0	85.970	82.274	77.708	73.249	75.749	72.323	70.311
225.0	91.812	88.119	83.488	78.854	81.478	77.931	75.828
240.0	96.341	92.699	88.081	83.442	78.849	82.462	80.314
255.0	99.227	95.637	91.053	86.412	81.780	85.426	83.261
270.0	100.207	96.635	92.063	87.423	82.779	78.187	75.476
285.0	99.226	95.627	91.032	86.380	81.737	77.159	74.462
300.0	96.416	92.757	88.116	83.457	78.843	74.329	71.686
315.0	91.943	88.225	83.563	78.942	74.423	70.053	67.516
330.0	86.023	82.299	77.698	73.210	68.886	64.762	62.389
345.0	79.104	75.470	71.054	66.818	62.798	59.011	56.851

MACH NUMBER DISTRIBUTICN

RADIAL STA.

PSI	6.667	8.333	10.416	12.500	14.583	16.667	17.920
0.0	2.542	2.587	2.656	2.738	2.832	2.937	3.004
15.0	2.641	2.703	2.792	2.892	3.002	3.121	3.197
30.0	2.763	2.839	2.944	3.059	3.181	3.312	3.394
45.0	2.889	2.975	3.092	3.217	3.349	3.488	3.575
60.0	2.997	3.091	3.215	3.348	3.486	3.630	3.720
75.0	3.071	3.169	3.298	3.434	3.576	3.724	3.815
90.0	3.098	3.197	3.328	3.466	3.609	3.757	3.849
105.0	3.076	3.173	3.303	3.439	3.581	4.466	4.551
120.0	3.007	3.100	3.225	3.356	3.495	4.359	4.442
135.0	2.902	2.989	3.105	3.230	4.067	4.194	4.273
150.0	2.780	2.856	2.960	3.074	3.874	3.991	4.064
165.0	2.660	2.722	2.810	2.910	3.673	3.776	3.841
180.0	2.563	2.608	2.676	3.414	3.490	3.575	3.630
195.0	2.502	2.528	2.573	2.634	3.346	3.410	3.454
210.0	2.480	2.487	2.510	2.548	3.252	3.295	3.327
225.0	2.488	2.478	2.481	2.500	3.204	3.228	3.248
240.0	2.510	2.488	2.475	2.479	2.498	3.196	3.208
255.0	2.530	2.501	2.478	2.472	2.482	3.185	3.190
270.0	2.537	2.505	2.479	2.469	2.476	2.498	2.519
285.0	2.524	2.495	2.473	2.466	2.476	2.502	2.526
300.0	2.499	2.477	2.464	2.468	2.488	2.524	2.552
315.0	2.472	2.462	2.466	2.485	2.520	2.571	2.608
330.0	2.460	2.468	2.491	2.531	2.585	2.653	2.701
345.0	2.481	2.507	2.554	2.615	2.689	2.777	2.835

ITER COUNT ON TH75= 4 NEW TH75= -3.8 OLD TH75= -3.8 THRUST= 15353.6 TORQUE= 20.4

TEST CASE ALTITUDE=96000 FT

ITERATION COUNT=14

AZIMUTH STA	BETA	THETA	LAG ANGLE
0.0	-0.0022	-0.0605	0.0001
15.0	-0.0018	-0.0580	0.0001
30.0	-0.0005	-0.0553	0.0001
45.0	0.0014	-0.0538	0.0001
60.0	0.0038	-0.0535	0.0001
75.0	0.0065	-0.0532	0.0000
90.0	0.0093	-0.0523	0.0000
105.0	0.0120	-0.0506	-0.0000
120.0	0.0145	-0.0485	-0.0001
135.0	0.0167	-0.0493	-0.0001
150.0	0.0185	-0.0533	-0.0002
165.0	0.0197	-0.0573	-0.0002
180.0	0.0204	-0.0595	-0.0002
195.0	0.0203	-0.0613	-0.0002
210.0	0.0195	-0.0641	-0.0002
225.0	0.0180	-0.0665	-0.0002
240.0	0.0159	-0.0667	-0.0002
255.0	0.0133	-0.0653	-0.0001
270.0	0.0103	-0.0650	-0.0001
285.0	0.0073	-0.0659	-0.0001
300.0	0.0043	-0.0662	-0.0000
315.0	0.0017	-0.0649	0.0000
330.0	-0.0004	-0.0631	0.0000
345.0	-0.0017	-0.0619	0.0001

BLADE ANGLE OF ATTACK DISTRIBUTION

	RADIAL STA.						
PSI	6.667	8.333	10.416	12.500	14.583	16.667	17.920
0.0	71.914	66.477	64.363	60.475	56.830	53.430	51.504
15.0	65.225	62.057	58.310	54.806	51.549	48.531	46.827
30.0	59.524	56.639	53.254	50.111	47.203	44.517	43.003
45.0	55.013	52.378	49.300	46.452	43.824	41.399	40.033
60.0	51.781	49.334	46.482	43.847	41.419	39.178	37.916
75.0	49.890	47.558	44.843	42.337	40.026	37.895	36.694
90.0	49.332	47.040	44.371	41.908	39.638	37.543	36.362
105.0	50.108	47.779	45.066	42.562	40.254	42.051	40.968
120.0	52.194	49.752	46.906	44.276	41.850	43.740	42.602
135.0	55.440	52.814	49.745	46.903	48.475	46.325	45.094
150.0	59.822	56.951	53.579	50.445	52.182	49.807	48.447
165.0	65.435	62.286	58.558	55.069	57.006	54.358	52.836
180.0	72.095	68.683	64.596	65.964	62.882	59.937	58.236
195.0	79.196	75.591	71.207	66.998	69.350	66.131	64.257
210.0	85.966	82.271	77.704	73.246	75.746	72.319	70.307
225.0	91.808	88.115	83.488	78.891	81.475	77.927	75.825
240.0	96.337	92.696	88.077	83.439	78.645	82.458	80.310
255.0	99.223	95.639	91.049	86.408	81.776	85.422	83.257
270.0	100.203	96.631	92.059	87.419	82.775	78.183	75.472
285.0	99.222	95.623	91.028	86.376	81.733	77.155	74.458
300.0	96.412	92.753	88.112	83.453	78.839	74.325	71.682
315.0	91.939	88.221	83.559	78.938	74.419	70.049	67.512
330.0	86.019	82.295	77.694	73.206	68.682	64.758	62.385
345.0	79.100	75.466	71.050	66.814	62.794	59.007	56.847

MACH NUMBER DISTRIBUTION

	RADIAL STA.						
PSI	6.667	8.333	10.416	12.500	14.583	16.667	17.920
0.0	2.542	2.587	2.656	2.738	2.832	2.937	3.004
15.0	2.641	2.703	2.792	2.892	3.002	3.121	3.197
30.0	2.763	2.839	2.944	3.059	3.181	3.312	3.394
45.0	2.889	2.975	3.092	3.217	3.345	3.488	3.575
60.0	2.997	3.091	3.215	3.348	3.486	3.630	3.720
75.0	3.071	3.169	3.298	3.434	3.576	3.724	3.815
90.0	3.098	3.197	3.328	3.466	3.609	3.757	3.849
105.0	3.076	3.173	3.303	3.439	3.581	4.466	4.551
120.0	3.007	3.100	3.225	3.356	3.495	4.359	4.442
135.0	2.902	2.989	3.105	3.229	4.067	4.194	4.273
150.0	2.780	2.856	2.960	3.074	3.874	3.991	4.064
165.0	2.660	2.722	2.810	2.910	3.673	3.776	3.841
180.0	2.563	2.608	2.676	3.414	3.490	3.575	3.630
195.0	2.502	2.528	2.573	2.634	3.346	3.410	3.454
210.0	2.480	2.487	2.510	2.548	3.252	3.295	3.327
225.0	2.488	2.478	2.481	2.500	3.204	3.228	3.248
240.0	2.510	2.498	2.475	2.479	2.498	3.196	3.208
255.0	2.530	2.501	2.478	2.472	2.482	3.185	3.190
270.0	2.537	2.505	2.479	2.469	2.476	2.498	2.519
285.0	2.524	2.495	2.473	2.466	2.476	2.502	2.526
300.0	2.499	2.477	2.464	2.468	2.488	2.524	2.552
315.0	2.472	2.462	2.466	2.485	2.520	2.571	2.608
330.0	2.460	2.468	2.491	2.531	2.585	2.653	2.701
345.0	2.481	2.507	2.554	2.615	2.689	2.777	2.835

ITER COUNT ON TH75= 5 NEW TH75= -3.8 OLD TH75= -3.8 THRUST= 15353.3 TORQUE= 17.2

TEST CASE ALTITUDE=96000 FT

ITERATION COUNT=13

AZIMUTH STA	BETA	THETA	LAG ANGLE
0.0	-0.0022	-0.0606	0.0001
15.0	-0.0018	-0.0581	0.0001
30.0	-0.0005	-0.0554	0.0001
45.0	0.0014	-0.0538	0.0001
60.0	0.0038	-0.0535	0.0001
75.0	0.0065	-0.0532	0.0000
90.0	0.0093	-0.0524	0.0000
105.0	0.0120	-0.0507	-0.0000
120.0	0.0145	-0.0486	-0.0001
135.0	0.0167	-0.0493	-0.0001
150.0	0.0185	-0.0533	-0.0002
165.0	0.0197	-0.0573	-0.0002
180.0	0.0204	-0.0595	-0.0002
195.0	0.0202	-0.0613	-0.0002
210.0	0.0195	-0.0641	-0.0002
225.0	0.0180	-0.0666	-0.0002
240.0	0.0155	-0.0667	-0.0002
255.0	0.0132	-0.0654	-0.0001
270.0	0.0103	-0.0650	-0.0001
285.0	0.0073	-0.0660	-0.0001
300.0	0.0043	-0.0663	-0.0000
315.0	0.0017	-0.0650	0.0000
330.0	-0.0004	-0.0632	0.0000
345.0	-0.0017	-0.0619	0.0001

BLADE ANGLE OF ATTACK DISTRIBUTION

	RADIAL STA.						
PSI	6.667	8.333	10.416	12.500	14.583	16.667	17.920
0.0	71.911	68.474	64.360	60.472	56.827	53.427	51.500
15.0	65.222	62.054	58.306	54.803	51.546	48.527	46.824
30.0	59.521	56.636	53.251	50.107	47.200	44.514	43.000
45.0	55.009	52.374	49.296	46.448	43.822	41.396	40.030
60.0	51.778	49.331	46.479	43.844	41.415	39.175	37.913
75.0	49.887	47.559	44.840	42.323	40.023	37.891	36.690
90.0	49.329	47.037	44.368	41.905	39.635	37.540	36.359
105.0	50.104	47.775	45.163	42.559	40.251	42.048	40.965
120.0	52.190	49.749	46.903	44.273	41.847	43.736	42.599
135.0	55.437	52.811	49.742	46.900	48.472	46.322	45.091
150.0	59.819	56.948	53.576	50.442	52.178	49.804	48.443
165.0	65.432	62.283	58.555	55.066	57.003	54.355	52.832
180.0	72.092	68.680	64.593	60.951	62.875	59.934	58.233
195.0	79.193	75.588	71.204	66.995	69.347	66.128	64.255
210.0	85.963	82.268	77.701	73.243	75.743	72.317	70.304
225.0	91.805	88.112	83.481	78.888	81.472	77.924	75.822
240.0	96.334	92.693	88.074	83.436	78.642	82.455	80.307
255.0	99.220	95.630	91.046	86.405	81.773	85.419	83.254
270.0	100.200	96.628	92.056	87.416	82.772	78.180	75.469
285.0	99.219	95.620	91.325	86.373	81.730	77.152	74.455
300.0	96.409	92.750	88.109	83.450	78.636	74.322	71.679
315.0	91.936	88.218	83.556	78.935	74.416	70.046	67.509
330.0	86.016	82.292	77.691	73.203	68.880	64.755	62.382
345.0	79.097	75.463	71.047	66.811	62.791	59.004	56.844

MACH NUMBER DISTRIBUTION

	RADIAL STA.						
PSI	6.667	8.333	10.416	12.500	14.583	16.667	17.920
0.0	2.542	2.587	2.656	2.738	2.832	2.937	3.004
15.0	2.641	2.693	2.792	2.892	3.002	3.121	3.197
30.0	2.763	2.839	2.944	3.059	3.181	3.312	3.394
45.0	2.889	2.975	3.092	3.217	3.349	3.488	3.575
60.0	2.997	3.091	3.215	3.348	3.486	3.630	3.720
75.0	3.071	3.169	3.298	3.434	3.576	3.724	3.815
90.0	3.098	3.197	3.328	3.466	3.609	3.757	3.849
105.0	3.076	3.173	3.303	3.439	3.581	4.466	4.551
120.0	3.007	3.100	3.225	3.356	3.495	4.359	4.442
135.0	2.902	2.989	3.105	3.229	4.067	4.194	4.273
150.0	2.780	2.856	2.960	3.074	3.874	3.991	4.064
165.0	2.660	2.722	2.810	2.910	3.673	3.776	3.841
180.0	2.563	2.608	2.676	3.414	3.490	3.575	3.630
195.0	2.502	2.528	2.573	2.634	3.346	3.410	3.454
210.0	2.480	2.487	2.510	2.548	3.252	3.295	3.327
225.0	2.488	2.478	2.481	2.500	3.204	3.228	3.248
240.0	2.510	2.488	2.475	2.479	2.468	3.196	3.208
255.0	2.530	2.501	2.478	2.472	2.482	3.185	3.190
270.0	2.537	2.505	2.479	2.469	2.476	2.498	2.519
285.0	2.524	2.495	2.473	2.466	2.476	2.502	2.526
300.0	2.499	2.477	2.464	2.468	2.488	2.524	2.552
315.0	2.472	2.462	2.466	2.485	2.526	2.571	2.608
330.0	2.460	2.468	2.491	2.531	2.585	2.653	2.701
345.0	2.481	2.537	2.554	2.615	2.689	2.777	2.835

TORQUE EQUILIBRIUM

CASE NO= 1

					BLADE ANGLE		CF ATTACK DISTRIBUTION RADIAL STA.
PSI	6.6670	8.3330	10.4160	12.5000	14.5830	16.6670	17.9200
0.0	71.9108	68.4727	64.3601	60.4747	56.9269	53.4269	51.5005
15.0	65.2219	62.0538	58.3065	54.8027	51.5461	48.5275	46.8237
30.0	59.5205	56.6360	53.2509	50.1072	47.1997	44.5136	43.0001
45.0	55.0094	52.3745	49.2963	46.4482	43.8204	41.3658	40.0301
60.0	51.7778	49.3307	46.4786	43.8441	41.4155	39.1751	37.9130
75.0	49.8871	47.5550	44.8358	42.3332	40.0229	37.8914	36.6962
90.0	49.3289	47.0366	44.3681	41.9050	39.6347	37.5398	36.3590
105.0	50.1042	47.7752	45.0632	42.5551	40.2508	42.0480	40.9652
120.0	52.1903	49.7490	46.9027	44.2726	41.8472	43.7364	42.5987
135.0	55.4367	52.8108	49.7416	46.9001	48.4722	46.3215	45.0910
150.0	59.8188	56.9478	53.5758	50.4419	52.1785	49.8040	48.4435
165.0	65.4317	62.2827	58.5547	55.0656	57.0032	54.3547	52.8324
180.0	72.0923	68.6802	64.5929	60.5605	62.8790	59.9343	58.2328
195.0	79.1935	75.5883	71.2043	66.9950	69.3469	66.1282	64.2545
210.0	85.9632	82.2678	77.7010	73.2427	75.7427	72.3165	70.3040
225.0	91.8053	88.1124	83.4810	78.8875	81.4717	77.9243	75.8215
240.0	96.3340	92.6526	88.0741	83.4357	78.8418	82.4552	80.3071
255.0	99.2200	95.6302	91.0458	86.4052	81.7731	85.4192	83.2541
270.0	100.1999	96.6281	92.0363	87.4162	82.7723	78.1802	75.4691
285.0	99.2193	95.6204	91.0246	86.3728	81.7302	77.1521	74.4550
300.0	96.4089	92.7497	88.1091	83.4456	78.8362	74.3225	71.6790
315.0	91.9362	88.2181	83.5564	78.9350	74.4161	70.0461	67.5088
330.0	86.0165	82.2918	77.6909	73.2026	68.8795	64.7547	62.3825
345.0	79.0974	75.4632	71.0471	66.8109	62.7910	59.0038	56.8445

OUT-OF-SHAFT BLADE AIR LOADING, LB./FT.

	RADIAL STATION						
PSI	6.6670	8.3330	10.4160	12.5000	14.5830	16.6670	17.9200
0.0	244.5888	248.9625	256.0293	264.5159	261.1636	256.2266	253.3030
15.0	250.4385	256.1846	257.8513	252.3483	247.1013	241.9474	238.8369
30.0	255.6674	250.7670	245.0178	239.5830	234.2499	228.8992	225.6287
45.0	244.8006	240.1069	234.5090	229.0610	223.6317	218.1049	214.6997
60.0	237.2901	232.7032	227.1592	221.6768	216.1438	207.4572	199.0959
75.0	233.7933	229.2506	223.6955	218.1521	212.5197	158.7766	190.2655
90.0	234.6432	230.0667	224.4557	218.8930	211.8016	197.7967	189.1793
105.0	239.9169	235.2351	229.5202	223.8286	218.0551	463.0273	466.6575
120.0	249.4485	244.5703	238.6853	232.8921	227.0690	459.7063	463.6741
135.0	262.4934	257.3049	251.1566	245.2162	444.6323	491.7927	456.0481
150.0	278.3152	272.6780	266.1353	259.5663	433.0627	439.8491	444.0833
165.0	275.1299	280.8445	283.0459	276.5435	421.5552	427.0908	430.8018
180.0	271.1794	275.2495	282.1326	376.4546	355.3044	416.9509	413.5266
195.0	268.6484	270.4514	274.9607	281.6958	360.1331	379.5339	386.3987
210.0	267.6731	267.1772	269.0066	273.3643	339.8938	348.8311	355.8650
225.0	267.6882	265.1174	264.4004	266.4767	322.2739	335.5386	339.1921
240.0	267.4067	263.4976	260.8308	260.9119	263.7620	331.4685	332.4744
255.0	265.6592	261.2112	257.4567	256.3376	257.5073	331.5449	330.8667
270.0	261.3657	257.4976	253.5629	252.1557	253.4594	257.4761	261.0615
285.0	256.7854	252.6257	249.2484	248.4508	250.3419	254.8833	258.7463
300.0	250.8778	247.4787	245.4675	246.0811	249.3415	255.0447	259.5710
315.0	245.2955	243.4706	243.5226	246.1830	251.2566	258.5408	263.8931
330.0	241.7149	241.9569	244.5552	249.4491	256.4719	265.3391	271.3911
345.0	241.3998	243.8695	248.8817	255.9015	264.5588	270.4504	267.7297

IN-SHAFT PLANE AIR LOADING, LB./FT.

	RADIAL STATION						
PSI	6.6670	8.3340	10.4160	12.5000	14.5830	16.6670	17.9200
0.0	9.5398	9.0850	8.1768	6.7461	4.4377	-3.1716	-5.4631
15.0	7.5367	6.4755	2.8233	-2.2420	-6.2403	-9.3169	-10.7717
30.0	4.0980	-0.2567	-4.6786	-8.1156	-10.6583	-12.5366	-13.3203
45.0	-2.4991	-5.5399	-8.5274	-10.7040	-12.1705	-13.0111	-13.2435
60.0	-5.7574	-7.8586	-9.7643	-10.9655	-11.5446	-13.0501	-14.9759
75.0	-7.0744	-8.5269	-9.6812	-10.1845	-10.1111	-13.1059	-14.5126
90.0	-7.3107	-8.4448	-9.2148	-9.3462	-9.5759	-12.2324	-13.2897
105.0	-6.7707	-7.9308	-8.7030	-8.8085	-8.3223	-37.5558	-38.6578
120.0	-5.1052	-6.5815	-7.8946	-8.3686	-8.1905	-35.1175	-36.6038
135.0	-1.0516	-3.5184	-5.7045	-7.0218	-25.5589	-29.5401	-31.6073
150.0	6.5858	2.6513	-1.1453	-3.6763	-15.1740	-20.3394	-23.1271
165.0	9.6544	9.0855	6.1134	1.2471	-2.0813	-8.8463	-12.5700
180.0	10.7467	10.3965	9.6329	9.0732	7.4152	4.9748	0.0554
195.0	10.9528	10.3407	9.5655	8.5326	6.2789	6.6410	5.4338
210.0	11.6889	10.3008	8.5572	7.7472	7.9498	6.2741	5.2040
225.0	13.3964	10.9759	8.6738	6.9132	7.9859	5.7507	4.5575
240.0	15.3524	12.0468	8.8179	6.3901	4.4922	5.8259	4.3150
255.0	16.9025	13.1522	9.3989	6.5813	4.4524	6.7664	5.0731
270.0	17.7221	14.0440	10.3462	7.6086	5.6028	4.0617	3.2213
285.0	17.5756	14.3569	11.2497	9.0526	7.5228	8.3311	5.7629
300.0	16.1861	13.7716	11.6286	10.2406	9.3512	8.6617	8.2216
315.0	13.9751	12.5431	11.4192	10.7926	10.3734	9.8719	9.4332
330.0	11.9705	11.3579	10.9538	10.6674	10.2352	9.4370	8.7048
345.0	10.6915	10.4579	10.1231	9.5399	8.5094	5.7201	2.3161

MOMENT ABOUT FEATHERING AXIS FT LB/FT

	RADIAL STATION						
PSI	6.6670	8.3230	10.4160	12.5000	14.5830	16.6670	17.9200
0.0	3.8961	8.4194	14.8519	21.9659	27.4705	32.9432	36.3621
15.0	13.2024	18.6168	24.7677	29.9485	35.3809	41.0433	44.5381
30.0	22.7504	26.6656	31.8327	37.2155	42.7938	48.5299	52.0339
45.0	28.7076	32.8065	38.1206	43.6337	49.2807	55.0298	58.5168
60.0	33.5441	37.7616	43.1588	48.7837	54.4698	57.8510	57.4858
75.0	36.7826	41.0796	46.5956	52.2366	57.9572	57.4480	57.0149
90.0	38.1093	42.4559	48.0284	53.7196	58.4372	57.8222	57.3655
105.0	37.3395	41.7061	47.3122	53.0469	58.8646	128.4243	138.8047
120.0	34.5238	38.8731	44.4809	50.2435	56.1144	114.8761	124.4952
135.0	30.0803	34.3773	39.9530	45.7206	83.1427	96.2927	104.8371
150.0	24.3366	28.5309	34.0105	39.7388	64.6543	75.8301	83.1264
165.0	14.1926	20.0314	26.8186	32.3834	46.6273	55.7810	61.7768
180.0	4.1948	9.0327	16.0803	19.9007	26.4376	38.0448	42.8627
195.0	-3.7398	-0.1458	5.3673	11.5264	12.0906	19.4787	24.4457
210.0	-8.1372	-6.0072	-2.3493	2.6475	0.9629	6.3832	10.1294
225.0	-9.9778	-8.9361	-6.6938	-3.4375	-5.8072	-1.9304	0.8445
240.0	-10.1147	-9.9285	-8.7637	-6.5609	-3.3455	-6.7118	-4.6366
255.0	-9.6275	-9.9275	-9.4406	-7.9433	-5.6200	-9.0478	-7.3927
270.0	-9.6934	-9.7122	-9.4537	-8.2038	-5.9391	-2.6806	-0.0257
285.0	-9.3043	-9.5934	-9.1148	-7.6527	-5.1867	-1.7233	1.0841
300.0	-9.4805	-9.2964	-8.2540	-6.1187	-3.0595	1.2117	4.4312
315.0	-9.1069	-8.1626	-6.0997	-3.0760	1.0875	6.5597	10.3667
330.0	-7.2580	-5.3121	-2.0540	2.4364	8.1069	14.7535	19.1532
345.0	-3.1112	-0.0237	5.0244	11.0744	17.9699	24.8728	28.1373

OUT-OF-SHAFT PLANE AIR LOADING, LB./FT.

RADIAL STATION = 6.667

HARMONIC COMPONENT	CCSINE	SINE
1	-13.786794	-7.402849
2	6.091696	1.166416
3	0.359786	7.727537
4	-1.401536	-0.089419

STEADY COMPONENT= 254.674805

RADIAL STATION = 8.333

HARMONIC COMPONENT	CCSINE	SINE
1	-13.482778	-8.263203
2	10.170277	1.097607
3	0.260281	7.066202
4	0.848862	-0.109534

STEADY COMPONENT= 252.844238

RADIAL STATION =10.416

HARMONIC COMPONENT	CCSINE	SINE
1	-13.224935	-10.694092
2	14.766672	1.007717
3	0.081421	5.072140
4	3.039327	-0.142952

STEADY COMPONENT= 251.303864

RADIAL STATION =12.500

HARMONIC COMPONENT	CCSINE	SINE
1	-20.075241	-15.033528
2	25.336609	1.018835
3	-7.157696	1.764219
4	11.641092	-0.049844

STEADY COMPONENT= 254.002441

RADIAL STATION =14.583

HARMONIC COMPONENT	CCSINE	SINE
1	-72.419583	-5.875090
2	54.320496	-22.940399
3	-6.406754	21.548004
4	-10.329969	-14.422922

STEADY COMPONENT= 284.405273

RADIAL STATION =16.667

HARMONIC COMPONENT	CCSINE	SINE
1	-97.360565	14.153656
2	24.195831	-46.097076
3	35.288483	10.906097
4	-10.184221	11.251251

STEADY COMPONENT= 312.177002

RADIAL STATION =17.920

HARMONIC COMPONENT	COSINE	SINE
1	-100.956207	10.622812
2	25.877563	-48.904877
3	35.160919	10.462966
4	-11.792999	13.616445

STEADY COMPONENT= 313.290283

IN-SHAFT PLANE AIR LOADING, LB./FT.

RADIAL STATION = 6.667

HARMONIC COMPONENT	COSINE	SINE
1	-0.485909	-11.493509
2	2.705995	-0.592422
3	-0.227611	1.768834
4	0.756852	-0.156102
STEADY COMPONENT= 7.942711		

RADIAL STATION = 8.333

HARMONIC COMPONENT	COSINE	SINE
1	-0.434431	-11.161092
2	3.515501	-0.983269
3	-0.310889	0.631281
4	1.388323	-0.143653
STEADY COMPONENT= 5.095201		

RADIAL STATION =10.416

HARMONIC COMPONENT	COSINE	SINE
1	-0.395981	-10.848969
2	3.760422	-1.478809
3	-0.405143	-0.870974
4	1.671616	-0.134543
STEADY COMPONENT= 3.022158		

RADIAL STATION =12.500

HARMONIC COMPONENT	COSINE	SINE
1	-0.401496	-10.561731
2	3.318238	-1.959785
3	-0.520808	-2.291933
4	1.991732	-0.098194
STEADY COMPONENT= 1.312488		

RADIAL STATION =14.583

HARMONIC COMPONENT	COSINE	SINE
1	0.698514	-11.818288
2	2.076139	0.096713
3	-1.655161	-5.399369
4	2.675309	0.784683
STEADY COMPONENT= -1.083366		

RADIAL STATION =16.667

HARMONIC COMPONENT	COSINE	SINE
1	2.770060	-17.136185
2	3.812592	3.809885
3	-5.464468	-4.154707
4	2.020690	-2.806402
STEADY COMPONENT= -5.311560		

RADIAL STATION =17.920

HARMONIC COMPONENT		COSINE	SINE
	1	3.361565	-17.391266
	2	3.004430	4.040148
	3	-5.499975	-4.348154
	4	1.432653	-2.161797
STEADY COMPONENT=	-6.910592		

MOMENT ABOUT FEATHERING AXIS FT LB/FT

RADIAL STATION = 6.667

HARMONIC COMPONENT	COSINE	SINE
1	-0.197795	25.727615
2	-4.904603	-0.582229
3	0.032234	2.[illegible]
4	-0.455708	-0.1[illegible]

STEADY COMPONENT= 9.666500

RADIAL STATION = 8.333

HARMONIC COMPONENT	COSINE	SINE
1	-0.312163	28.076508
2	-3.626867	-0.608148
3	-0.023724	2.423188
4	0.026951	-0.098339

STEADY COMPONENT= 12.636306

RADIAL STATION =10.416

HARMONIC COMPONENT	COSINE	SINE
1	-0.535315	30.565079
2	-1.995167	-0.627697
3	-0.080974	2.218919
4	0.060775	-0.093589

STEADY COMPONENT= 16.841370

RADIAL STATION =12.500

HARMONIC COMPONENT	COSINE	SINE
1	-0.443870	32.444214
2	-0.796495	-0.620566
3	0.197349	1.672939
4	0.055921	-0.064514

STEADY COMPONENT= 21.402130

RADIAL STATION =14.583

HARMONIC COMPONENT	COSINE	SINE
1	-3.234823	37.365494
2	1.220587	-6.390027
3	1.345082	6.467008
4	-1.[illegible]	-3.107475

STEADY COMPONENT= 28.128693

RADIAL STATION =16.667

HARMONIC COMPONENT	COSINE	SINE
1	-1.[illegible]93228	47.809464
2	-2.033457	-15.508962
3	0.[illegible]	3.708679
4	-2.337242	6.311008

STEADY COMPONENT= 37.961685

RADIAL STATION =17.920

HARMONIC COMPONENT		COSINE	SINE
	1	-9.388592	48.736328
	2	-1.107991	-17.672256
	3	9.576694	4.261292
	4	-3.075567	7.599240
STEADY COMPONENT=	41.906433		

HARMONIC ANALYSIS ON BLADE FLAPPING ANGLE(RADIANS)

	COS COMPONENT	SIN COMPONENT
1	0.011229	0.000539
2	0.000360	-0.000257
3	0.000040	0.000047
4	-0.000007	0.000002
STEADY COMPONENT=	0.009457	

HARMONIC ANALYSIS ON BLADE FEATHERING ANGLE(RADIANS)

	COS COMPONENT	SIN COMPONENT
1	0.000701	-0.008115
2	0.000509	0.001203
3	-0.000560	-0.001018
4	0.000350	-0.000308
STEADY COMPONENT=	-0.059050	

ANGLE OF ATTACK DATA AT EACH AZIMUTH POSITION

AZIMUTH = 0.0
MINIMUM ANGLE OF ATTACK= 50.2 BLADE STA=1.000
MAXIMUM ANGLE OF ATTACK= 71.9 BLADE STA=0.355

TIP ANGLE OF ATTACK= 50.2 BLADE INBOARD END ANGLE OF ATTACK= 71.9

ANGLE OF ATTACK	NONDIMENSIONAL RADIUS
60.0	0.681
70.0	0.405

AZIMUTH = 15.0
MINIMUM ANGLE OF ATTACK= 45.7 BLADE STA=1.000
MAXIMUM ANGLE OF ATTACK= 65.2 BLADE STA=0.355

TIP ANGLE OF ATTACK= 45.7 BLADE INBOARD END ANGLE OF ATTACK= 65.2

ANGLE OF ATTACK	NONDIMENSIONAL RADIUS
50.0	0.835
60.0	0.505

AZIMUTH = 30.0
MINIMUM ANGLE OF ATTACK= 42.0 BLADE STA=1.000
MAXIMUM ANGLE OF ATTACK= 59.5 BLADE STA=0.355

TIP ANGLE OF ATTACK= 42.0 BLADE INBOARD END ANGLE OF ATTACK= 59.5

ANGLE OF ATTACK	NONDIMENSIONAL RADIUS
50.0	0.671

AZIMUTH = 45.0
MINIMUM ANGLE OF ATTACK= 39.1 BLADE STA=1.000
MAXIMUM ANGLE OF ATTACK= 55.0 BLADE STA=0.355

TIP ANGLE OF ATTACK= 39.1 BLADE INBOARD END ANGLE OF ATTACK= 55.0

ANGLE OF ATTACK	NONDIMENSIONAL RADIUS

50.0	0.530

AZIMUTH = 60.0
MINIMUM ANGLE OF ATTACK= 37.1 BLADE STA=1.000
MAXIMUM ANGLE OF ATTACK= 51.8 BLADE STA=0.355

TIP ANGLE OF ATTACK= 37.1 BLADE INBOARD END ANGLE OF ATTACK= 51.8

ANGLE OF ATTACK	NONDIMENSIONAL RADIUS
40.0	0.848
50.0	0.420

AZIMUTH = 75.0
MINIMUM ANGLE OF ATTACK= 35.9 BLADE STA=1.000
MAXIMUM ANGLE OF ATTACK= 49.9 BLADE STA=0.355

TIP ANGLE OF ATTACK= 35.9 BLADE INBOARD END ANGLE OF ATTACK= 49.9

ANGLE OF ATTACK	NONDIMENSIONAL RADIUS
40.0	0.779

AZIMUTH = 90.0
MINIMUM ANGLE OF ATTACK= 35.6 BLADE STA=1.000
MAXIMUM ANGLE OF ATTACK= 49.3 BLADE STA=0.355

TIP ANGLE OF ATTACK= 35.6 BLADE INBOARD END ANGLE OF ATTACK= 49.3

ANGLE OF ATTACK	NONDIMENSIONAL RADIUS
40.0	0.760

AZIMUTH = 105.0
MINIMUM ANGLE OF ATTACK= 40.2 BLADE STA=1.000
MAXIMUM ANGLE OF ATTACK= 50.1 BLADE STA=0.355

TIP ANGLE OF ATTACK= 40.2 BLADE INBOARD END ANGLE OF ATTACK= 50.1

ANGLE OF ATTACK	NONDIMENSIONAL RADIUS

50.0 0.360

AZIMUTH = 120.0
MINIMUM ANGLE OF ATTACK= 41.8 BLADE STA=1.000
MAXIMUM ANGLE OF ATTACK= 52.2 BLADE STA=0.355

TIP ANGLE OF ATTACK= 41.8 BLADE INBOARD END ANGLE OF ATTACK= 52.2

ANGLE OF ATTACK	NONDIMENSIONAL RADIUS
50.0	0.435

AZIMUTH = 135.0
MINIMUM ANGLE OF ATTACK= 44.3 BLADE STA=1.000
MAXIMUM ANGLE OF ATTACK= 55.4 BLADE STA=0.355

TIP ANGLE OF ATTACK= 44.3 BLADE INBOARD END ANGLE OF ATTACK= 55.4

ANGLE OF ATTACK	NONDIMENSIONAL RADIUS
50.0	0.546

AZIMUTH = 150.0
MINIMUM ANGLE OF ATTACK= 47.5 BLADE STA=1.000
MAXIMUM ANGLE OF ATTACK= 59.8 BLADE STA=0.355

TIP ANGLE OF ATTACK= 47.5 BLADE INBOARD END ANGLE OF ATTACK= 59.8

ANGLE OF ATTACK	NONDIMENSIONAL RADIUS
50.0	0.880

AZIMUTH = 165.0
MINIMUM ANGLE OF ATTACK= 51.8 BLADE STA=1.000
MAXIMUM ANGLE OF ATTACK= 65.4 BLADE STA=0.355

TIP ANGLE OF ATTACK= 51.8 BLADE INBOARD END ANGLE OF ATTACK= 65.4

ANGLE OF ATTACK	NONDIMENSIONAL RADIUS
60.0	0.512

AZIMUTH = 180.0
MINIMUM ANGLE OF ATTACK= 57.1 BLADE STA=1.000
MAXIMUM ANGLE OF ATTACK= 72.1 BLADE STA=0.355

TIP ANGLE OF ATTACK= 57.1 BLADE INBOARD END ANGLE OF ATTACK= 72.1

ANGLE OF ATTACK	NONDIMENSIONAL RADIUS
60.0	0.886
70.0	0.410

AZIMUTH = 195.0
MINIMUM ANGLE OF ATTACK= 63.0 BLADE STA=1.000
MAXIMUM ANGLE OF ATTACK= 79.2 BLADE STA=0.355

TIP ANGLE OF ATTACK= 63.0 BLADE INBOARD END ANGLE OF ATTACK= 79.2

ANGLE OF ATTACK	NONDIMENSIONAL RADIUS
70.0	0.587

AZIMUTH = 210.0
MINIMUM ANGLE OF ATTACK= 69.0 BLADE STA=1.000
MAXIMUM ANGLE OF ATTACK= 86.0 BLADE STA=0.355

TIP ANGLE OF ATTACK= 69.0 BLADE INBOARD END ANGLE OF ATTACK= 86.0

ANGLE OF ATTACK	NONDIMENSIONAL RADIUS
80.0	0.500

AZIMUTH = 225.0
MINIMUM ANGLE OF ATTACK= 74.4 BLADE STA=1.000
MAXIMUM ANGLE OF ATTACK= 91.8 BLADE STA=0.355

TIP ANGLE OF ATTACK= 74.4 BLADE INBOARD END ANGLE OF ATTACK= 91.8

ANGLE OF ATTACK	NONDIMENSIONAL RADIUS
80.0	0.640
80.0	0.774
80.0	0.824

90.0	C.399

AZIMUTH = 240.0
MINIMUM ANGLE OF ATTACK= 78.8 BLADE STA=C.778
MAXIMUM ANGLE OF ATTACK= 96.3 BLADE STA=0.355

TIP ANGLE OF ATTACK= 78.9 BLADE INBOARC END ANGLE OF ATTACK= 96.3

ANGLE OF ATTACK	NONDIMENSIONAL RADIUS
80.0	C.750
80.0	0.813
90.0	0.509

AZIMUTH = 255.0
MINIMUM ANGLE OF ATTACK= 81.8 BLADE STA=0.778
MAXIMUM ANGLE OF ATTACK= 99.2 BLADE STA=C.355

TIP ANGLE OF ATTACK= 81.8 BLADE INBOARD END ANGLE OF ATTACK= 99.2

ANGLE OF ATTACK	NONDIMENSIONAL RADIUS
90.0	C.581

AZIMUTH = 270.0
MINIMUM ANGLE OF ATTACK= 73.7 BLADE STA=1.00C
MAXIMUM ANGLE OF ATTACK= 100.2 BLADE STA=0.355

TIP ANGLE OF ATTACK= 73.7 BLADE INBOARC END ANGLE OF ATTACK= 100.2

ANGLE OF ATTACK	NONDIMENSIONAL RADIUS
80.0	0.845
90.0	0.605
100.0	0.361

AZIMUTH = 285.0
MINIMUM ANGLE OF ATTACK= 72.7 BLADE STA=1.00C
MAXIMUM ANGLE OF ATTACK= 99.2 BLADE STA=0.355

TIP ANGLE OF ATTACK= 72.7 BLADE INBOARD END ANGLE OF ATTACK= 99.2

ANGLE OF ATTACK	NONDIMENSIONAL RADIUS
80.0	0.820
90.0	0.580

AZIMUTH = 300.0
MINIMUM ANGLE OF ATTACK= 69.9 BLADE STA=1.000
MAXIMUM ANGLE OF ATTACK= 96.4 BLADE STA=0.355

TIP ANGLE OF ATTACK= 69.9 BLADE INBOARD END ANGLE OF ATTACK= 96.4

ANGLE OF ATTACK	NONDIMENSIONAL RADIUS
80.0	0.750
90.0	0.510

AZIMUTH = 315.0
MINIMUM ANGLE OF ATTACK= 65.8 BLADE STA=1.000
MAXIMUM ANGLE OF ATTACK= 92.0 BLADE STA=0.355

TIP ANGLE OF ATTACK= 65.8 BLADE INBOARD END ANGLE OF ATTACK= 92.0

ANGLE OF ATTACK	NONDIMENSIONAL RADIUS
70.0	0.890
80.0	0.647
90.0	0.4[illegible]

AZIMUTH = 330.0
MINIMUM ANGLE OF ATTACK= 60.8 BLADE STA=1.000
MAXIMUM ANGLE OF ATTACK= 86.0 BLADE STA=0.355

TIP ANGLE OF ATTACK= 60.8 BLADE INBOARD END ANGLE OF ATTACK= 86.0

ANGLE OF ATTACK	NONDIMENSIONAL RADIUS
70.0	0.749
80.0	0.500

AZIMUTH = 345.0
MINIMUM ANGLE OF ATTACK= 55.4 BLADE STA=1.000
MAXIMUM ANGLE OF ATTACK= 79.1 BLADE STA=0.355

TIP ANGLE OF ATTACK= 55.4 BLADE INBOARD END ANGLE OF ATTACK= 79.1

ANGLE OF ATTACK	NONDIMENSIONAL RADIUS
60.0	0.860
70.0	0.583

(FORCE ALONG FLIGHT PATH)CALC= 13976. (FORCE NORMAL TO FLIGHT PATH)CALC= 6388. ALFAR= 62.001(DEG)

CONTROL INPUT
FEATHERING (DEG)
STEADY = -3.766
CYCLIC(COS)= 0.0
CYCLIC(SIN)= 0.0

THRUST= 15353.0 HFORCE= 653.6
HP= 0.2 VFORCE= 23.7

CT= 0.28967 CH= 0.01233
CP= 0.00000 CY= 0.00045

MOMENT ABOUT Y AXIS = 16295.91 FT LB
MOMENT ABOUT X AXIS = -937.39 FT LB

TIME HISTORY

T(SEC)	U(FT/SEC) THETA(RAD)	V(FT/SEC) PHI(RAD)	W(FT/SEC) PSI(RAD)	P(RAD/SEC) X(FT)	Q(RAD/SEC) Y(FT)	R(RAD/SEC) Z(FT)	OMEGA(RAD/SEC)
0.0	-9.8011E 02 1.1345E 00	0.0 0.0	-1.9236E 03 0.0	0.0 0.0	0.0 0.0	0.0 9.6000E 04	5.8490E 01

MOMENTS ADDED TO BRING VEHICLE INTO TRIM AT T=0

MX= -1016.11 FT-LB
MY= 8459.67 FT-LB
MZ= 12.35 FT-LB

0.100	-9.7606E 02 1.1345E 00	6.8417E-03 8.4049E-08	-1.9155E 03 2.9663E-08	1.7091E-06 -2.1532E 02	1.3804E-04 3.4702E-04	3.7472E-07 9.6007E 04	5.8490E 01

TIME HISTORY

CYCLE NO. = 1

PSI	T	TP	Z	ZP	B	BP
0.0	1.000E 00	0.0	0.0	0.0	0.0	0.0
15.0	2.144E-01	-6.002E 00	-4.120E-04	-3.147E-03	-1.663E-04	-1.270E-03
30.0	-8.411E-01	-2.061E 00	-1.332E-03	-3.878E-03	-8.878E-04	-4.242E-03
45.0	-4.832E-01	4.795E 00	-1.842E-03	-2.224E-05	-1.905E-03	-3.527E-03
60.0	6.088E-01	3.548E 00	-1.521E-03	2.475E-03	-2.317E-03	3.802E-04
75.0	6.547E-01	-2.157E 00	-1.128E-03	5.277E-04	-2.013E-03	1.941E-03
90.0	-3.368E-01	-4.377E 00	-1.218E-03	-1.975E-03	-1.789E-03	-2.296E-04
105.0	-7.229E-01	1.427E 00	-1.668E-03	-7.025E-04	-2.012E-03	-1.476E-03
120.0	5.255E-02	4.467E 00	-1.434E-03	2.492E-03	-2.014E-03	1.458E-03
135.0	6.741E-01	2.517E-01	-8.083E-04	2.286E-03	-1.176E-03	4.945E-03
150.0	1.870E-01	-3.973E 00	-6.589E-04	-1.450E-03	2.730E-05	4.247E-03
165.0	-5.400E-01	-1.587E 00	-1.257E-03	-2.814E-03	7.665E-04	1.400E-03
180.0	-3.531E-01	3.020E 00	-1.559E-03	5.113E-04	1.037E-03	6.642E-04
195.0	3.639E-01	2.458E 00	-1.092E-03	3.057E-03	1.354E-03	1.759E-03
210.0	4.406E-01	-1.872E 00	-5.890E-04	7.932E-04	1.866E-03	2.157E-03
225.0	-1.785E-01	-2.857E 00	-7.668E-04	-2.294E-03	2.314E-03	1.259E-03
240.0	-4.566E-01	1.326E-01	-1.271E-03	-1.404E-03	2.482E-03	3.052E-05
255.0	1.393E-02	2.862E 00	-1.278E-03	1.365E-03	2.370E-03	-8.905E-04
270.0	4.245E-01	2.745E-01	-8.914E-04	1.573E-03	2.059E-03	-1.486E-03
285.0	1.263E-01	-2.552E 00	-7.659E-04	-6.140E-04	1.598E-03	-2.033E-03
300.0	-3.512E-01	-1.055E 00	-1.045E-03	-1.515E-03	9.794E-04	-2.693E-03
315.0	-2.352E-01	1.982E 00	-1.202E-03	3.121E-04	2.381E-04	-2.970E-03
330.0	2.422E-01	1.665E 00	-9.208E-04	1.836E-03	-4.635E-04	-2.390E-03
345.0	2.976E-01	-1.241E 00	-6.043E-04	5.821E-04	-1.017E-03	-1.838E-03
360.0	-1.186E-01	-1.938E 00	-6.685E-04	-1.225E-03	-1.545E-03	-2.197E-03

MAXIMUM ABSOLUTE RESPONSE

PSI	T	TP	Z	ZP	B	BP
0.0	1.00CE 00					
15.0		6.002E 00				
45.0			1.842E-03			
30.0				3.878E-03		
240.0					2.482E-03	
135.0						4.945E-03

TIME HISTORY

CYCLE NO. = 5

PSI	T	TP	Z	ZP	B	BP
0.0	-6.030E-04	-7.573E-02	-2.475E-04	-1.799E-05	-1.431E-03	2.041E-03
15.0	-1.131E-02	-6.072E-03	-2.528E-04	-2.289E-05	-8.539E-04	2.369E-03
30.0	-3.332E-03	6.703E-02	-2.519E-04	3.040E-05	-2.095E-04	2.550E-03
45.0	9.182E-03	2.857E-02	-2.412E-04	5.089E-05	4.590E-04	2.549E-03
60.0	6.138E-03	-5.182E-02	-2.224E-04	1.626E-05	1.093E-03	2.303E-03
75.0	-6.427E-03	-4.417E-02	-2.117E-04	-1.076E-05	1.635E-03	1.835E-03
90.0	-7.932E-03	3.268E-02	-2.319E-04	9.504E-06	2.037E-03	1.242E-03
105.0	3.126E-03	5.180E-02	-2.250E-04	4.273E-05	2.278E-03	5.974E-04
120.0	8.333E-03	-1.202E-02	-2.152E-04	3.233E-05	2.343E-03	-1.015E-04
135.0	1.177E-04	-5.075E-02	-2.125E-04	-1.142E-05	2.219E-03	-8.449E-04
150.0	-7.360E-03	-6.380E-03	-2.161E-04	-1.614E-05	1.908E-03	-1.530E-03
165.0	-2.507E-03	4.346E-02	-2.146E-04	2.734E-05	1.440E-03	-2.052E-03
180.0	5.881E-03	2.062E-02	-2.050E-04	4.636E-05	8.586E-04	-2.386E-03
195.0	4.386E-03	-3.203E-02	-1.975E-04	1.027E-05	2.129E-04	-2.546E-03
210.0	-3.679E-03	-2.958E-02	-1.989E-04	-2.085E-05	-4.501E-04	-2.519E-03
225.0	-5.092E-03	1.878E-02	-2.015E-04	1.467E-06	-1.079E-03	-2.285E-03
240.0	1.703E-03	3.312E-02	-1.966E-04	3.598E-05	-1.621E-03	-1.859E-03
255.0	5.228E-03	-6.190E-03	-1.880E-04	2.917E-05	-2.032E-03	-1.279E-03
270.0	1.611E-04	-3.252E-02	-1.843E-04	-5.224E-07	-2.278E-03	-5.978E-04
285.0	-4.747E-03	-4.976E-03	-1.850E-04	-4.705E-06	-2.339E-03	1.291E-04
300.0	-1.693E-03	2.831E-02	-1.830E-04	2.016E-05	-2.211E-03	8.474E-04
315.0	3.837E-03	1.393E-02	-1.761E-04	3.298E-05	-1.904E-03	1.501E-03
330.0	2.878E-03	-2.126E-02	-1.705E-04	1.109E-05	-1.441E-03	2.030E-03
345.0	-2.529E-03	-2.004E-02	-1.700E-04	-7.641E-06	-8.636E-04	2.385E-03
360.0	-3.534E-03	1.236E-02	-1.704E-04	4.689E-06	-2.177E-04	2.550E-03

MAXIMUM ABSOLUTE RESPONSE

PSI	T	TP	Z	ZP	B	BP
15.0	1.131E-02					
0.0		7.573E-02				
15.0			2.528E-04			
45.0				5.089E-05		
120.0					2.343E-03	
30.0						2.550E-03

TEST CASE ALTITUDE=36000 FT

ITERATION COUNT=15

AZIMUTH STA	BETA	THETA	LAG ANGLE
0.0	-0.0021	-0.0606	0.0001
15.0	-0.0017	-0.0561	0.0001
30.0	-0.0005	-0.0554	0.0001
45.0	0.0014	-0.0538	0.0001
60.0	0.0038	-0.0535	0.0001
75.0	0.0065	-0.0532	0.0000
90.0	0.0093	-0.0524	0.0000
105.0	0.0120	-0.0507	-0.0000
120.0	0.0145	-0.0486	-0.0001
135.0	0.0166	-0.0493	-0.0001
150.0	0.0184	-0.0534	-0.0002
165.0	0.0196	-0.0574	-0.0002
180.0	0.0202	-0.0595	-0.0002
195.0	0.0202	-0.0613	-0.0002
210.0	0.0194	-0.0641	-0.0002
225.0	0.0179	-0.0666	-0.0002
240.0	0.0158	-0.0667	-0.0002
255.0	0.0131	-0.0654	-0.0001
270.0	0.0102	-0.0650	-0.0001
285.0	0.0072	-0.0660	-0.0001
300.0	0.0042	-0.0663	-0.0000
315.0	0.0017	-0.0650	0.0000
330.0	-0.0004	-0.0632	0.0000
345.0	-0.0017	-0.0619	0.0001

BLADE ANGLE OF ATTACK DISTRIBUTION

PSI	RADIAL STA. 6.667	8.333	10.416	12.500	14.583	16.667	17.920
0.0	71.834	68.405	64.279	60.380	56.727	53.320	51.391
15.0	65.169	61.991	58.233	54.721	51.457	48.434	46.727
30.0	59.426	56.535	53.144	49.996	47.086	44.398	42.884
45.0	54.906	52.267	49.185	46.335	43.706	41.281	39.915
60.0	51.669	49.219	46.365	43.729	41.300	39.060	37.799
75.0	49.775	47.441	44.724	42.217	39.907	37.777	36.576
90.0	49.216	46.922	44.252	41.789	39.519	37.425	36.245
105.0	49.993	47.662	44.949	42.444	40.136	41.933	40.950
120.0	52.084	49.639	46.791	44.160	41.734	43.623	42.485
135.0	55.335	52.705	49.632	46.768	48.361	46.209	44.978
150.0	59.724	56.847	53.469	50.331	52.670	49.692	48.330
165.0	65.352	62.194	58.457	54.961	56.902	54.249	52.724
180.0	72.036	68.612	64.512	65.885	62.794	59.842	58.136
195.0	79.166	75.547	71.147	66.924	69.283	66.054	64.175
210.0	85.962	82.252	77.667	73.192	75.702	72.263	70.244
225.0	91.827	88.120	83.469	78.838	81.452	77.891	75.780
240.0	96.374	92.718	88.082	83.424	78.812	82.440	80.283
255.0	99.272	95.669	91.066	86.407	81.757	85.417	83.243
270.0	100.255	96.670	92.081	87.422	82.760	78.150	75.428
285.0	99.269	95.657	91.044	86.373	81.712	77.116	74.409
300.0	96.448	92.775	88.116	83.428	78.866	74.276	71.623
315.0	91.959	88.227	83.546	78.907	74.579	69.985	67.439
330.0	86.016	82.277	77.658	73.153	68.917	64.597	62.298
345.0	79.068	75.420	70.988	66.738	62.790	58.910	56.745

MACH NUMBER DISTRIBUTION

PSI	RADIAL STA. 6.667	8.333	10.416	12.500	14.583	16.667	17.920
0.0	2.533	2.598	2.647	2.729	2.824	2.928	2.996
15.0	2.631	2.694	2.783	2.883	2.994	3.113	3.188
30.0	2.754	2.831	2.936	3.051	3.174	3.305	3.387
45.0	2.880	2.967	3.084	3.210	3.342	3.481	3.568
60.0	2.989	3.083	3.208	3.340	3.479	3.624	3.713
75.0	3.063	3.161	3.290	3.427	3.569	3.717	3.808
90.0	3.091	3.190	3.321	3.459	3.602	3.751	3.843
105.0	3.068	3.166	3.295	3.432	3.574	4.457	4.543
120.0	2.999	3.092	3.217	3.349	3.488	4.350	4.433
135.0	2.894	2.981	3.097	3.222	4.057	4.184	4.264
150.0	2.771	2.847	2.952	3.066	3.864	3.981	4.054
165.0	2.651	2.713	2.801	2.901	3.662	3.769	3.830
180.0	2.554	2.598	2.667	3.402	3.478	3.563	3.619
195.0	2.492	2.518	2.564	2.624	3.333	3.398	3.443
210.0	2.470	2.477	2.500	2.539	3.239	3.283	3.315
225.0	2.478	2.468	2.471	2.490	3.191	3.215	3.235
240.0	2.500	2.479	2.466	2.465	2.488	3.184	3.195
255.0	2.521	2.491	2.469	2.462	2.472	3.172	3.178
270.0	2.527	2.493	2.469	2.459	2.466	2.488	2.510
285.0	2.515	2.485	2.463	2.457	2.466	2.493	2.516
300.0	2.489	2.467	2.455	2.458	2.478	2.514	2.543
315.0	2.462	2.453	2.456	2.475	2.511	2.561	2.599
330.0	2.451	2.458	2.482	2.521	2.576	2.644	2.692
345.0	2.471	2.498	2.544	2.605	2.680	2.768	2.826

(FORCE ALONG FLIGHT PATH)CALC= 13885. (FORCE NORMAL TO FLIGHT PATH)CALC= 6345. ALFAR= 63.001(DEG)

CONTROL INPUT
FEATHERING (DEG)
STEADY = -3.766
CYCLIC(COS)= 0.0
CYCLIC(SIN)= 0.0

```
THRUST= 15252.5              XFORCE=   -9.6
   HP=     1.8               YFORCE=   23.2

   CT= 0.28777                  CH= 0.01226
   CP= 0.00002                  CY= 0.00044


MOMENT ABOUT Y AXIS  =  16187.13 FT LB
MOMENT ABOUT X AXIS  =   -861.26 FT LB
```

TIME HISTORY

T(SEC)	U(FT/SEC) THETA(RAD)	V(FT/SEC) PHI(RAD)	W(FT/SEC) PSI(RAD)	P(RAD/SEC) X(FT)	Q(RAD/SEC) Y(FT)	R(RAD/SEC) Z(FT)	OMEGA(RAD/SEC)
0.100	-9.7606E 02 1.1345E 00	6.8417E-03 8.1049E-08	-1.9159E 03 2.9663E-08	1.7091E-06 -2.1532E 02	1.3804E-04 3.4702E-04	3.7472E-07 9.6907E 04	5.8450E 01
0.200	-9.7210E 02 1.1345E 00	-1.1562E-01 1.2515E-04	-1.9083E 03 5.1152E-05	1.5630E-03 -4.2978E 02	-7.3077E-04 1.3750E-03	4.2953E-04 9.6015E 04	5.8450E 01

TIME HISTORY

CYCLE NO. = 1

PSI	T	TP	Z	ZP	B	BP
0.0	1.000E 00	0.0	0.0	0.0	0.0	0.0
15.0	2.142E-01	-6.003E 00	-4.101E-04	-3.133E-03	-1.669E-04	-1.275E-03
30.0	-8.413E-01	-2.061E 00	-1.226E-03	-3.863E-03	-8.895E-04	-4.245E-03
45.0	-4.832E-01	4.757E 00	-1.835E-03	-2.306E-05	-1.907E-03	-3.525E-03
60.0	6.092E-01	3.549E 00	-1.515E-03	2.465E-03	-2.318E-03	3.8[illegible]E-04
75.0	6.550E-01	-3.200E 00	-1.123E-03	5.262E-04	-2.014E-03	1.94[illegible]E-03
90.0	-3.371E-01	-4.380E 00	-1.312E-03	-1.968E-03	-1.790E-03	-2.316E-04
105.0	-7.234E-01	1.429E 00	-1.661E-03	-7.005E-04	-2.013E-03	-1.474E-03
120.0	5.280E-02	4.500E 00	-1.428E-03	2.483E-03	-2.014E-03	1.465E-03
135.0	6.748E-01	2.511E 01	-8.046E-04	2.279E-03	-1.175E-03	4.950E-03
150.0	1.870E-01	-3.977E 00	-6.553E-04	-1.444E-03	2.917E-05	4.245E-03
165.0	-5.415E-01	-1.[illegible]25E 00	-1.252E-03	-2.806E-03	7.677E-04	1.396E-03
180.0	-3.534E-01	1.025E 00	-1.552E-03	5.090E-04	1.038E-03	6.055E-04
195.0	3.648E-01	2.461E 00	-1.087E-03	3.048E-03	1.355E-03	1.762E-03
210.0	4.413E-01	-1.876E 00	-5.855E-04	7.815E-04	1.868E-03	2.157E-03
225.0	-1.790E-01	-2.863E 00	-7.828E-04	-2.289E-03	2.315E-03	1.255E-03
240.0	-4.575E-01	7.353E-01	-1.266E-03	-1.401E-03	2.483E-03	2.805E-05
255.0	1.423E-02	2.869E 00	-1.[illegible]71E-03	1.361E-03	2.370E-03	-8.916E-04
270.0	4.256E-01	2.743E-01	-8.[illegible]94E-04	1.570E-03	2.059E-03	-1.488E-03
285.0	1.265E-01	-2.559E 00	-7.620E-04	-6.125E-04	1.597E-03	-2.036E-03
300.0	-3.522E-01	-1.098E 00	-1.[illegible]40E-03	-1.513E-03	9.780E-04	-2.695E-03
315.0	-2.356E-01	1.988E 00	-1.[illegible]07E-03	3.110E-04	2.364E-04	-2.970E-03
330.0	2.432E-01	1.670E 00	-9.168E-04	1.833E-03	-4.649E-04	-2.387E-03
345.0	2.986E-01	-1.247E 00	-6.007E-04	5.812E-04	-1.018E-03	-1.837E-03
360.0	-1.191E-01	-1.944E 00	-6.[illegible]49E-04	-1.224E-03	-1.546E-03	-7.200E-03

MAXIMUM ABSOLUTE RESPONSE

PSI	T	TP	Z	ZP	B	BP
0.0	1.00CE 00					
15.0		6.003E 00				
45.0			1.835E-03			
30.0				3.863E-03		
240.0					2.483E-03	
135.0						4.950E-03

TIME HISTORY

CYCLE NO. = 5

PSI	T	TP	Z	ZP	B	BP
0.0	-6.104E-04	-7.663E-02	-2.464E-04	-1.832E-05	-1.430E-03	2.042E-03
15.0	-1.145E-02	-6.152E-03	-2.519E-04	-2.328E-05	-6.527E-04	2.370E-03
30.0	-3.371E-03	6.784E-02	-2.520E-04	3.042E-05	-2.086E-04	2.551E-03
45.0	9.296E-03	2.393E-02	-2.403E-04	5.110E-05	4.540E-04	2.550E-03
60.0	6.215E-03	-5.247E-02	-2.315E-04	1.620E-05	1.094E-03	2.303E-03
75.0	-6.507E-03	-4.473E-02	-2.208E-04	-1.105E-05	1.636E-03	1.834E-03
90.0	-8.031E-03	1.309E-02	-2.310E-04	9.375E-06	2.038E-03	1.241E-03
105.0	3.166E-03	5.245E-02	-2.242E-04	4.290E-05	2.279E-03	5.966E-04
120.0	8.439E-03	-1.217E-02	-2.143E-04	3.243E-05	2.344E-03	-1.022E-04
135.0	1.164E-04	-5.140E-02	-2.116E-04	-1.168E-05	2.219E-03	-8.460E-04
150.0	-7.458E-03	-6.461E-03	-2.153E-04	-1.646E-05	1.908E-03	-1.532E-03
165.0	-2.540E-03	4.403E-02	-2.139E-04	2.740E-05	1.439E-03	-2.053E-03
180.0	5.958E-03	2.089E-02	-2.042E-04	4.662E-05	8.578E-04	-2.387E-03
195.0	4.442E-03	-3.247E-02	-1.967E-04	1.022E-05	2.119E-04	-2.547E-03
210.0	-3.733E-03	-2.958E-02	-1.982E-04	-2.120E-05	-4.512E-04	-2.519E-03
225.0	-5.163E-03	1.905E-02	-2.008E-04	1.310E-06	-1.080E-03	-2.285E-03
240.0	1.728E-03	3.359E-02	-1.959E-04	3.616E-05	-1.622E-03	-1.858E-03
255.0	5.305E-03	-6.270E-03	-1.873E-04	2.930E-05	-2.033E-03	-1.278E-03
270.0	1.681E-04	-3.297E-02	-1.835E-04	-6.860E-07	-2.278E-03	-5.969E-04
285.0	-4.809E-03	-5.052E-03	-1.843E-04	-4.940E-06	-2.340E-03	1.302E-04
300.0	-1.714E-03	2.870E-02	-1.823E-04	2.016E-05	-2.211E-03	8.487E-04
315.0	3.891E-03	1.411E-02	-1.754E-04	3.221E-05	-1.904E-03	1.503E-03
330.0	2.916E-03	-2.156E-02	-1.698E-04	1.103E-05	-1.441E-03	2.031E-03
345.0	-2.566E-03	-4.032E-02	-1.694E-04	-7.882E-06	-8.629E-04	2.386E-03
360.0	-3.585E-03	1.253E-02	-1.698E-04	4.557E-06	-2.108E-04	2.550E-03

MAXIMUM ABSOLUTE RESPONSE

PSI	T	TP	Z	ZP	B	BP
15.0	1.145E-02					
0.0		7.663E-02				
15.0			2.519E-04			
45.0				5.110E-05		
120.0					2.344E-03	
30.0						2.551E-03

TEST CASE ALTITUDE=96000 FT

ITERATION COUNT=14

AZIMUTH STA	BETA	THETA	LAG ANGLE
0.0	-0.0025	-0.0606	0.0001
15.0	-0.0020	-0.0581	0.0001
30.0	-0.0007	-0.0554	0.0001
45.0	0.0013	-0.0538	0.0001
60.0	0.0038	-0.0535	0.0001
75.0	0.0067	-0.0533	0.0000
90.0	0.0095	-0.0525	0.0000
105.0	0.0122	-0.0507	-0.0000
120.0	0.0147	-0.0486	-0.0001
135.0	0.0169	-0.0493	-0.0001
150.0	0.0187	-0.0534	-0.0002
165.0	0.0199	-0.0574	-0.0002
180.0	0.0204	-0.0595	-0.0002
195.0	0.0203	-0.0613	-0.0002
210.0	0.0194	-0.0641	-0.0002
225.0	0.0178	-0.0666	-0.0002
240.0	0.0156	-0.0667	-0.0002
255.0	0.0129	-0.0653	-0.0001
270.0	0.0099	-0.0650	-0.0001
285.0	0.0068	-0.0660	-0.0001
300.0	0.0038	-0.0663	-0.0000
315.0	0.0012	-0.0650	-0.0000
330.0	-0.0008	-0.0632	0.0000
345.0	-0.0021	-0.0619	0.0001

BLADE ANGLE OF ATTACK DISTRIBUTION

PSI	RADIAL STA. 6.667	8.333	10.416	12.500	14.583	16.667	17.920
0.0	71.799	68.339	64.200	60.290	56.629	53.216	51.283
15.0	65.092	61.505	58.137	54.617	51.348	48.320	46.612
30.0	59.333	56.436	53.037	49.884	46.970	44.280	42.765
45.0	54.802	52.158	49.071	46.217	43.586	41.160	39.794
60.0	51.558	49.104	46.246	43.609	41.179	38.938	37.677
75.0	49.661	47.323	44.604	42.056	39.785	37.654	36.454
90.0	49.102	46.805	44.133	41.668	39.398	37.305	36.125
105.0	49.882	47.549	44.833	42.327	40.019	41.816	40.733
120.0	51.978	49.531	46.679	44.047	41.620	43.510	42.372
135.0	55.235	52.601	49.525	46.678	48.253	46.099	44.867
150.0	59.633	56.750	53.367	50.225	51.566	49.586	48.223
165.0	65.276	62.110	58.365	54.862	56.807	54.149	52.622
180.0	71.982	68.548	64.437	60.813	62.714	59.755	58.047
195.0	79.139	75.507	71.093	66.857	69.223	65.985	64.101
210.0	85.962	82.237	77.636	73.145	75.662	72.213	70.187
225.0	91.849	88.127	83.459	78.830	81.434	77.860	75.741
240.0	96.413	92.744	88.089	83.414	78.785	82.426	80.261
255.0	99.322	95.706	91.086	86.409	81.740	85.415	83.233
270.0	100.309	96.711	92.104	87.428	82.747	78.120	75.389
285.0	99.319	95.693	91.062	86.374	81.695	77.082	74.365
300.0	96.487	92.800	88.123	83.422	78.778	74.231	71.569
315.0	91.982	88.235	83.536	78.879	74.327	69.927	67.373
330.0	86.016	82.262	77.626	73.105	68.752	64.602	62.317
345.0	79.040	75.379	70.931	66.667	62.624	58.818	56.649

MACH NUMBER DISTRIBUTION

PSI	RADIAL STA. 6.667	8.333	10.416	12.500	14.583	16.667	17.920
0.0	2.524	2.569	2.638	2.721	2.815	2.920	2.988
15.0	2.622	2.685	2.774	2.875	2.985	3.105	3.181
30.0	2.746	2.822	2.928	3.043	3.166	3.297	3.379
45.0	2.872	2.959	3.076	3.202	3.335	3.474	3.561
60.0	2.981	3.075	3.200	3.333	3.472	3.617	3.707
75.0	3.055	3.153	3.283	3.420	3.562	3.710	3.802
90.0	3.083	3.182	3.314	3.452	3.595	3.744	3.836
105.0	3.060	3.158	3.288	3.425	3.567	4.448	4.534
120.0	2.991	3.085	3.210	3.342	3.481	4.341	4.424
135.0	2.886	2.973	3.090	3.215	4.047	4.175	4.255
150.0	2.763	2.839	2.944	3.058	3.854	3.971	4.045
165.0	2.642	2.705	2.793	2.893	3.651	3.755	3.821
180.0	2.545	2.589	2.658	3.351	3.467	3.553	3.609
195.0	2.483	2.509	2.555	2.616	3.322	3.387	3.432
210.0	2.460	2.467	2.491	2.530	3.227	3.271	3.303
225.0	2.468	2.459	2.462	2.481	3.179	3.203	3.224
240.0	2.491	2.469	2.456	2.459	2.479	3.172	3.183
255.0	2.511	2.482	2.459	2.453	2.463	3.160	3.165
270.0	2.518	2.486	2.460	2.450	2.456	2.479	2.500
285.0	2.506	2.476	2.453	2.447	2.457	2.483	2.507
300.0	2.480	2.458	2.445	2.449	2.469	2.505	2.534
315.0	2.453	2.443	2.446	2.466	2.501	2.552	2.590
330.0	2.441	2.445	2.472	2.512	2.567	2.636	2.683
345.0	2.462	2.488	2.535	2.597	2.672	2.759	2.818

(FORCE ALONG FLIGHT PATH)CALC= 13799. (FORCE NORMAL TO FLIGHT PATH)CALC= 6301. ALFAR= 63.01(DEG)

CONTROL INPUT
FEATHERING (DEG)
STEADY = -3.766
CYCLIC(COS)= 0.0
CYCLIC(SIN)= 0.0

```
THRUST= 15155.6          HFORCE=   648.5
   HP=     3.5           VFORCE=    21.1

   CT= 0.28595              CH= 0.01224
   CP= 0.00003              CV= 0.00040


 MOMENT ABOUT Y AXIS  =  16599.29 FT LB
 MOMENT ABOUT X AXIS  =   -478.58 FT LB
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TIME HISTORY

T(SEC)	U(FT/SEC) THETA(RAD)	V(FT/SEC) PHI(RAD)	W(FT/SEC) PSI(RAD)	P(RAD/SEC) X(FT)	Q(RAD/SEC) Y(FT)	R(RAD/SEC) Z(FT)	OMEGA(RAD/SEC)
0.200	-9.7210E 02 1.1345E 00	-1.1582E-01 1.2515E-04	-1.9082E 03 5.1150E-05	1.5630E-03 -4.2978E 02	-7.3077E-04 1.3750E-03	4.2953E-04 9.6015E 04	5.3450E 01
0.300	-9.6751E 02 1.1348E 00	-1.1253E 00 1.1128E-03	-1.9016E 03 4.5626E-04	1.0763E-02 -6.4338E 02	6.7586E-03 2.9654E-03	2.9708E-03 9.6022E 04	5.3451E 01

TIME HISTORY

CYCLE NO. = 1

PSI	T	TP	Z	ZP	B	BP
0.0	1.000E 00	0.0	0.0	0.0	0.0	0.0
15.0	2.142E-01	-6.003E 00	-4.084E-04	-3.120E-03	-1.675E-04	-1.279E-03
30.0	-8.416E-01	-2.062E 00	-1.221E-03	-3.848E-03	-8.910E-04	-4.248E-03
45.0	-4.834E-01	4.798E 00	-1.827E-03	-2.419E-05	-1.908E-03	-3.523E-03
60.0	6.095E-01	3.551E 00	-1.509E-03	2.456E-03	-2.319E-03	3.874E-04
75.0	6.553E-01	-3.201E 00	-1.119E-03	5.251E-04	-2.014E-03	1.942E-03
90.0	-3.374E-01	-4.382E 00	-1.367E-03	-1.961E-03	-1.790E-03	-2.332E-04
105.0	-7.238E-01	1.430E 00	-1.655E-03	-6.991E-04	-2.013E-03	-1.474E-03
120.0	5.289E-02	4.504E 00	-1.423E-03	2.474E-03	-2.014E-03	1.470E-03
135.0	6.754E-01	2.515E-01	-8.013E-04	2.273E-03	-1.173E-03	4.954E-03
150.0	1.871E-01	-3.981E 00	-6.920E-04	-1.438E-03	3.110E-05	4.244E-03
165.0	-5.422E-01	-1.590E 00	-1.247E-03	-2.798E-03	7.689E-04	1.393E-03
180.0	-3.538E-01	3.030E 00	-1.547E-03	5.060E-04	1.038E-03	6.698E-04
195.0	3.654E-01	2.465E 00	-1.082E-03	3.040E-03	1.357E-03	1.765E-03
210.0	4.420E-01	-1.880E 00	-5.823E-04	7.809E-04	1.870E-03	2.156E-03
225.0	-1.795E-01	-2.868E 00	-7.789E-04	-2.283E-03	2.316E-03	1.252E-03
240.0	-4.585E-01	7.367E-01	-1.261E-03	-1.400E-03	2.483E-03	2.564E-05
255.0	1.428E-02	2.875E 00	-1.266E-03	1.358E-03	2.370E-03	-8.930E-04
270.0	4.267E-01	2.755E-01	-8.235E-04	1.568E-03	2.058E-03	-1.489E-03
285.0	1.269E-01	-2.566E 00	-7.582E-04	-6.105E-04	1.596E-03	-2.037E-03
300.0	-3.531E-01	-1.102E 00	-1.036E-03	-1.511E-03	9.764E-04	-2.697E-03
315.0	-2.364E-01	1.953E 00	-1.193E-03	3.087E-04	2.3[illegible]E-04	-2.969E-03
330.0	2.439E-01	1.676E 00	-9.139E-04	1.831E-03	-4.66[illegible]E-04	-2.385E-03
345.0	2.996E-01	-1.250E 00	-5.974E-04	5.819E-04	-1.018E-03	-1.835E-03
360.0	-1.195E-01	-1.952E 00	-6.814E-04	-1.223E-03	-1.547E-03	-2.201E-03

MAXIMUM ABSOLUTE RESPONSE

PSI	T	TP	Z	ZP	B	BP
0.0	1.00CE 00					
15.0		6.003E 0C				
45.0			1.827E-03			
30.0				3.848E-03		
240.0					2.483E-03	
135.0						4.954E-03

TIME HISTORY

CYCLE NO. = 5

PSI	T	TP	Z	ZP	B	BP
0.0	-6.510E-04	-7.791E-02	-2.452E-04	-1.892E-05	-1.429E-03	2.043E-03
15.0	-1.165E-02	-6.083E-03	-2.508E-04	-2.384E-05	-8.517E-04	2.370E-03
30.0	-3.403E-03	6.906E-02	-2.499E-04	3.059E-05	-2.075E-04	2.551E-03
45.0	9.471E-03	2.929E-02	-2.392E-04	5.146E-05	4.601E-04	2.550E-03
60.0	6.305E-03	-5.347E-02	-2.303E-04	1.605E-05	1.095E-03	2.303E-03
75.0	-6.639E-03	-4.541E-02	-2.257E-04	-1.150E-05	1.637E-03	1.833E-03
90.0	-8.160E-03	3.379E-02	-2.300E-04	9.258E-06	2.039E-03	1.239E-03
105.0	3.243E-03	5.333E-02	-2.232E-04	4.321E-05	2.279E-03	5.957E-04
120.0	8.585E-03	-1.251E-02	-2.132E-04	3.254E-05	2.344E-03	-1.028E-04
135.0	9.771E-05	-5.232E-02	-2.106E-04	-1.215E-05	2.219E-03	-8.471E-04
150.0	-7.598E-03	-6.466E-03	-2.144E-04	-1.690E-05	1.908E-03	-1.533E-03
165.0	-2.571E-03	4.487E-02	-2.130E-04	2.761E-05	1.438E-03	-2.054E-03
180.0	6.075E-03	2.118E-02	-2.032E-04	4.703E-05	8.567E-04	-2.388E-03
195.0	4.510E-03	-3.314E-02	-1.957E-04	1.007E-05	2.108E-04	-2.547E-03
210.0	-3.817E-03	-3.047E-02	-1.973E-04	-2.174E-05	-4.523E-04	-2.519E-03
225.0	-5.255E-03	1.949E-02	-1.999E-04	1.145E-06	-1.081E-03	-2.285E-03
240.0	1.774E-03	3.421E-02	-1.950E-04	3.648E-05	-1.623E-03	-1.858E-03
255.0	5.405E-03	-6.472E-03	-1.864E-04	2.947E-05	-2.034E-03	-1.277E-03
270.0	1.522E-04	-3.366E-02	-1.827E-04	-9.797E-07	-2.279E-03	-5.958E-04
285.0	-4.920E-03	-5.094E-03	-1.835E-04	-5.253E-06	-2.340E-03	1.314E-04
300.0	-1.745E-03	2.935E-02	-1.815E-04	2.029E-05	-2.211E-03	8.498E-04
315.0	3.972E-03	1.437E-02	-1.746E-04	3.252E-05	-1.903E-03	1.504E-03
330.0	2.968E-03	-2.209E-02	-1.689E-04	1.093E-05	-1.440E-03	2.032E-03
345.0	-2.634E-03	-2.071E-02	-1.686E-04	-8.287E-06	-8.619E-04	2.386E-03
360.0	-3.655E-03	1.291E-02	-1.691E-04	4.436E-06	-2.157E-04	2.550E-03

MAXIMUM ABSOLUTE RESPONSE

PSI	T	TP	Z	ZP	B	BP
15.0	1.165E-02					
0.0		7.791E-02				
15.0			2.508E-04			
45.0				5.146E-05		
120.0					2.344E-03	
30.0						2.551E-03

TEST CASE ALTITUDE=56000 FT

ITERATION COUNT=11

AZIMUTH STA	BETA	THETA	LAG ANGLE
0.0	-0.0044	-0.0606	0.0001
15.0	-0.0042	-0.0581	0.0001
30.0	-0.0031	-0.0553	0.0001
45.0	-0.0012	-0.0538	0.0001
60.0	0.0015	-0.0535	0.0001
75.0	0.0046	-0.0533	0.0000
90.0	0.0078	-0.0525	-0.0000
105.0	0.0111	-0.0507	-0.0001
120.0	0.0142	-0.0485	-0.0001
135.0	0.0170	-0.0492	-0.0002
150.0	0.0194	-0.0534	-0.0002
165.0	0.0212	-0.0574	-0.0002
180.0	0.0222	-0.0595	-0.0002
195.0	0.0225	-0.0612	-0.0002
210.0	0.0218	-0.0640	-0.0002
225.0	0.0202	-0.0666	-0.0002
240.0	0.0179	-0.0667	-0.0001
255.0	0.0149	-0.0653	-0.0001
270.0	0.0115	-0.0645	-0.0001
285.0	0.0078	-0.0655	-0.0001
300.0	0.0043	-0.0663	-0.0000
315.0	0.0010	-0.0649	-0.0000
330.0	-0.0016	-0.0631	0.0000
345.0	-0.0035	-0.0619	0.0001

BLADE ANGLE OF ATTACK DISTRIBUTION

	RADIAL STA.						
PSI	6.667	8.333	10.416	12.500	14.583	16.667	17.920
0.0	71.764	68.258	64.155	60.243	56.580	53.168	51.236
15.0	65.048	61.856	58.085	54.563	51.294	48.266	46.559
30.0	59.272	56.371	52.971	49.816	46.901	44.212	42.697
45.0	54.727	52.080	48.990	46.134	43.501	41.075	39.709
60.0	51.467	49.009	46.148	43.507	41.074	38.833	37.570
75.0	49.554	47.212	44.488	41.975	39.661	37.528	36.327
90.0	48.984	46.682	44.004	41.534	39.259	37.162	35.981
105.0	49.761	47.420	44.697	42.185	39.871	41.671	40.585
120.0	51.860	49.405	46.545	43.904	41.471	43.365	42.224
135.0	55.128	52.485	49.358	46.542	48.120	45.960	44.725
150.0	59.542	56.649	53.254	50.101	51.646	49.459	48.091
165.0	65.206	62.029	58.272	54.758	56.708	54.041	52.510
180.0	71.939	68.494	64.369	65.749	62.640	59.672	57.958
195.0	79.122	75.479	71.051	66.802	69.176	65.928	64.038
210.0	85.965	82.230	77.615	73.112	75.637	72.177	70.146
225.0	91.869	88.137	83.455	78.813	81.424	77.840	75.716
240.0	96.448	92.767	88.099	83.410	78.768	82.419	80.249
255.0	99.368	95.740	91.105	86.414	81.733	85.417	83.229
270.0	100.360	96.749	92.127	87.436	82.742	78.103	75.367
285.0	99.366	95.728	91.081	86.378	81.686	77.062	74.340
300.0	96.524	92.824	88.132	83.422	78.761	74.206	71.540
315.0	92.003	88.244	83.532	78.863	74.302	69.896	67.340
330.0	86.019	82.254	77.607	73.078	68.720	64.567	62.181
345.0	79.023	75.354	70.899	66.630	62.584	58.777	56.609

MACH NUMBER DISTRIBUTION

	RADIAL STA.						
PSI	6.667	8.333	10.416	12.500	14.583	16.667	17.920
0.0	2.518	2.562	2.633	2.716	2.811	2.917	2.985
15.0	2.616	2.679	2.769	2.870	2.981	3.101	3.177
30.0	2.740	2.817	2.923	3.038	3.162	3.293	3.375
45.0	2.866	2.953	3.071	3.196	3.330	3.469	3.556
60.0	2.974	3.069	3.194	3.327	3.466	3.611	3.701
75.0	3.048	3.146	3.276	3.413	3.555	3.704	3.795
90.0	3.075	3.174	3.306	3.444	3.588	3.737	3.829
105.0	3.052	3.150	3.280	3.416	3.559	4.437	4.523
120.0	2.982	3.076	3.201	3.333	3.472	4.329	4.413
135.0	2.877	2.964	3.081	3.206	4.036	4.163	4.243
150.0	2.754	2.830	2.935	3.050	3.842	3.960	4.033
165.0	2.634	2.696	2.785	2.885	3.640	3.744	3.810
180.0	2.537	2.582	2.650	3.381	3.457	3.542	3.598
195.0	2.476	2.501	2.547	2.608	3.312	3.378	3.422
210.0	2.453	2.460	2.483	2.522	3.218	3.262	3.294
225.0	2.461	2.452	2.455	2.474	3.170	3.194	3.215
240.0	2.483	2.462	2.449	2.452	2.472	3.163	3.174
255.0	2.504	2.474	2.452	2.445	2.456	3.151	3.157
270.0	2.510	2.478	2.452	2.442	2.449	2.473	2.494
285.0	2.497	2.468	2.446	2.440	2.450	2.477	2.501
300.0	2.471	2.450	2.438	2.442	2.463	2.499	2.528
315.0	2.445	2.436	2.440	2.460	2.498	2.547	2.585
330.0	2.434	2.442	2.466	2.506	2.582	2.631	2.679
345.0	2.456	2.482	2.530	2.592	2.667	2.755	2.814

(FORCE ALONG FLIGHT PATH)CALC= 13734. (FORCE NORMAL TO FLIGHT PATH)CALC= 6249. ALFAR= 63.03(DEG)

CONTROL INPUT
FEATHERING (DEG)
STEADY = -3.766
CYCLIC(COS)= 0.0
CYCLIC(SIN)= 0.0

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THRUST= 15074.2          HFORCE=   659.6
   HP=     4.9           VFORCE=    32.4

   CT= 0.28439              CH= 0.01244
   CP= 0.00005              CV= 0.00061


MOMENT ABOUT Y AXIS  =  19400.88 FT LB
MOMENT ABOUT X AXIS  =  -2939.70 FT LB
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TIME HISTORY

T(SEC)	U(FT/SEC) THETA(RAD)	V(FT/SEC) PHI(RAD)	W(FT/SEC) PSI(RAD)	P(RAD/SEC) X(FT)	Q(RAD/SEC) Y(FT)	R(RAD/SEC) Z(FT)	OMEGA(RAD/SEC)
0.300	-9.6751E 02 1.1348E 00	-1.1253E 00 1.1128E-03	-1.9016E 03 4.5626E-04	1.0763E-02 -6.4338E 02	6.7586E-03 2.9654E-03	2.[illegible]E-03 9.6022E 04	5.8491E 01
0.400	-9.5670E 02 1.1383E 00	5.3310E-01 -4.8457E-04	-1.8976E 03 -1.9324E-04	-3.0784E-02 -8.5614E 02	6.4250E-02 4.9607E-03	-8.4381E-03 9.6029E 04	5.8479E 01

TIME HISTORY

CYCLE NO. = 1

PSI	T	TP	Z	ZP	B	BP
0.0	1.000E 00	0.0	0.0	0.0	0.0	0.0
15.0	2.139E-01	-6.005E 00	-4.078E-04	-3.116E-03	-1.675E-04	-1.279E-03
30.0	-8.419E-01	-2.060E 00	-1.319E-03	-3.843E-03	-8.906E-04	-4.245E-03
45.0	-4.829E-01	4.802E 00	-1.825E-03	-2.238E-05	-1.907E-03	-3.517E-03
60.0	6.102E-01	3.549E 00	-1.506E-03	2.453E-03	-2.316E-03	3.937E-04
75.0	6.549E-01	-3.207E 00	-1.117E-03	5.225E-04	-2.010E-03	1.944E-03
90.0	-3.384E-01	-4.381E 00	-1.305E-03	-1.959E-03	-1.786E-03	-2.364E-04
105.0	-7.238E-01	1.437E 00	-1.652E-03	-6.954E-04	-2.010E-03	-1.473E-03
120.0	5.418E-02	4.506E 00	-1.420E-03	2.473E-03	-2.009E-03	1.477E-03
135.0	6.758E-01	2.433E-01	-7.594E-04	2.266E-03	-1.167E-03	4.955E-03
150.0	1.858E-01	-3.986E 00	-6.913E-04	-1.440E-03	3.544E-05	4.234E-03
165.0	-5.432E-01	-1.583E 00	-1.245E-03	-2.791E-03	7.705E-04	1.382E-03
180.0	-3.528E-01	3.038E 00	-1.544E-03	5.115E-04	1.038E-03	6.630E-04
195.0	3.669E-01	2.460E 00	-1.079E-03	3.034E-03	1.356E-03	1.765E-03
210.0	4.415E-01	-1.890E 00	-5.811E-04	7.722E-04	1.869E-03	2.152E-03
225.0	-1.813E-01	-2.868E 00	-7.788E-04	-2.282E-03	2.314E-03	1.245E-03
240.0	-4.587E-01	7.482E-01	-1.260E-03	-1.392E-03	2.479E-03	2.032E-05
255.0	1.603E-02	2.878E 00	-1.264E-03	1.961E-03	2.365E-03	-8.952E-04
270.0	4.274E-01	2.645E-01	-8.811E-04	1.562E-03	2.052E-03	-1.490E-03
285.0	1.253E-01	-2.573E 00	-7.572E-04	-6.159E-04	1.591E-03	-2.038E-03
300.0	-3.546E-01	-1.093E 00	-1.035E-03	-1.508E-03	9.712E-04	-2.695E-03
315.0	-2.353E-01	2.304E 00	-1.191E-03	3.167E-04	2.305E-04	-2.964E-03
330.0	2.457E-01	1.671E 00	-9.100E-04	1.831E-03	-4.685E-04	-2.376E-03
345.0	2.991E-01	-1.262E 00	-5.552E-04	5.734E-04	-1.319E-03	-1.830E-03
360.0	-1.215E-01	-1.951E 00	-6.809E-04	-1.228E-03	-1.547E-03	-2.201E-03

MAXIMUM ABSOLUTE RESPONSE

PSI	T	TP	Z	ZP	B	BP
0.0	1.000E 00					
15.0		6.005E 00				
45.0			1.825E-03			
30.0				3.843E-03		
240.0					2.479E-03	
135.0						4.955E-03

TIME HISTORY

CYCLE NO. = 5

PSI	T	TP	Z	ZP	B	BP
0.0	-9.679E-04	-7.764E-02	-2.451E-04	-1.986E-05	-1.426E-03	2.039E-03
15.0	-1.167E-02	-4.134E-03	-2.507E-04	-2.312E-05	-8.490E-04	2.366E-03
30.0	-3.118E-03	6.949E-02	-2.496E-04	3.155E-05	-2.060E-04	2.547E-03
45.0	9.594E-03	2.762E-02	-2.387E-04	5.120E-05	4.606E-04	2.545E-03
60.0	6.081E-03	-5.446E-02	-2.301E-04	1.521E-05	1.095E-03	2.298E-03
75.0	-6.833E-03	-4.420E-02	-2.256E-04	-1.854E-05	1.635E-03	1.828E-03
90.0	-8.018E-03	3.514E-02	-2.258E-04	9.943E-06	2.036E-03	1.236E-03
105.0	3.475E-03	5.267E-02	-2.228E-04	4.330E-05	2.275E-03	5.940E-04
120.0	8.536E-03	-1.400E-02	-2.130E-04	3.163E-05	2.339E-03	-1.040E-04
135.0	-1.347E-04	-5.224E-02	-2.105E-04	-1.275E-05	2.215E-03	-8.479E-04
150.0	-7.637E-03	-5.073E-03	-2.143E-04	-1.622E-05	1.903E-03	-1.532E-03
165.0	-2.374E-03	4.528E-02	-2.127E-04	2.850E-05	1.434E-03	-2.051E-03
180.0	6.178E-03	2.005E-02	-2.029E-04	4.668E-05	8.537E-04	-2.383E-03
195.0	4.364E-03	-3.391E-02	-1.956E-04	9.054E-06	2.090E-04	-2.542E-03
210.0	-3.964E-03	-2.971E-02	-1.973E-04	-2.180E-05	-4.528E-04	-2.514E-03
225.0	-5.174E-03	2.047E-02	-1.998E-04	2.035E-06	-1.080E-03	-2.280E-03
240.0	1.936E-03	3.385E-02	-1.947E-04	3.686E-05	-1.621E-03	-1.853E-03
255.0	5.384E-03	-7.500E-03	-1.861E-04	2.890E-05	-2.030E-03	-1.273E-03
270.0	-4.860E-07	-2.364E-02	-1.825E-04	-1.459E-06	-2.275E-03	-5.930E-04
285.0	-4.943E-03	-4.124E-03	-1.834E-04	-4.926E-06	-2.335E-03	1.327E-04
300.0	-1.604E-03	2.964E-02	-1.813E-04	2.079E-05	-2.206E-03	8.498E-04
315.0	4.049E-03	1.354E-02	-1.744E-04	3.227E-05	-1.899E-03	1.502E-03
330.0	2.861E-03	-2.262E-02	-1.688E-04	1.025E-05	-1.436E-03	2.029E-03
345.0	-2.727E-03	-2.007E-02	-1.685E-04	-8.348E-06	-8.589E-04	2.382E-03
360.0	-3.574E-03	1.361E-02	-1.690E-04	4.982E-06	-2.139E-04	2.546E-03

MAXIMUM ABSOLUTE RESPONSE

PSI	T	TP	Z	ZP	B	BP
15.0	1.167E-02					
0.0		7.764E-02				
15.0			2.507E-04			
45.0				5.120E-05		
120.0					2.339E-03	
30.0						2.547E-03

TEST CASE ALTITUDE=96000 FT

ITERATION COUNT=13

AZIMUTH STA	BETA	THETA	LAG ANGLE
0.0	0.0050	-0.0606	0.0001
15.0	0.0017	-0.0582	0.0001
30.0	-0.0010	-0.0554	0.0001
45.0	-0.0033	-0.0539	0.0001
60.0	-0.0042	-0.0536	0.0000
75.0	-0.0046	-0.0533	0.0000
90.0	-0.0041	-0.0525	-0.0000
105.0	-0.0029	-0.0507	-0.0001
120.0	-0.0005	-0.0486	-0.0002
135.0	0.0019	-0.0493	-0.0002
150.0	0.0052	-0.0534	-0.0003
165.0	0.0089	-0.0574	-0.0003
180.0	0.0127	-0.0595	-0.0004
195.0	0.0163	-0.0611	-0.0003
210.0	0.0195	-0.0639	-0.0003
225.0	0.0219	-0.0665	-0.0002
240.0	0.0232	-0.0667	-0.0001
255.0	0.0236	-0.0653	-0.0001
270.0	0.0232	-0.0649	-0.0000
285.0	0.0217	-0.0659	0.0000
300.0	0.0192	-0.0662	0.0001
315.0	0.0160	-0.0649	0.0001
330.0	0.0124	-0.0631	0.0001
345.0	0.0087	-0.0619	0.0001

BLADE ANGLE OF ATTACK DISTRIBUTION

	RADIAL STA.						
PSI	6.667	8.333	10.416	12.500	14.583	16.667	17.920
0.0	71.699	68.236	64.103	60.210	56.571	53.187	51.273
15.0	65.043	61.867	58.121	54.630	51.393	48.400	46.714
30.0	59.270	56.396	53.033	49.918	47.044	44.395	42.904
45.0	54.770	52.153	49.103	46.288	43.656	41.308	39.965
60.0	51.530	49.102	46.278	43.675	41.279	39.073	37.831
75.0	49.632	47.285	44.593	42.112	39.829	37.726	36.542
90.0	48.982	46.658	44.044	41.559	39.348	37.274	36.106
105.0	49.688	47.356	44.649	42.152	39.854	41.645	40.567
120.0	51.714	49.259	46.402	43.765	41.238	43.228	42.089
135.0	54.928	52.273	49.174	46.309	47.691	45.724	44.486
150.0	59.323	56.405	52.982	45.805	51.561	49.155	47.777
165.0	65.013	61.800	57.999	54.445	56.413	53.715	52.166
180.0	71.808	68.321	64.144	65.537	62.387	59.377	57.639
195.0	79.064	75.384	70.903	66.597	68.598	65.704	63.787
210.0	85.965	82.203	77.544	72.588	75.241	72.037	69.978
225.0	91.896	88.149	83.437	78.754	81.388	77.768	75.620
240.0	96.484	92.757	88.113	83.351	78.708	82.391	80.201
255.0	99.413	95.781	91.133	86.417	81.701	85.414	83.209
270.0	100.418	96.802	92.164	87.448	82.722	78.044	75.282
285.0	99.436	95.785	91.116	86.385	81.660	77.000	74.255
300.0	96.591	92.870	88.148	83.407	78.714	74.126	71.442
315.0	92.044	88.258	83.514	78.816	74.229	69.800	67.233
330.0	86.015	82.226	77.554	73.006	68.635	64.476	62.089
345.0	78.977	75.293	70.829	66.560	62.520	58.725	56.567

MACH NUMBER DISTRIBUTION

	RADIAL STA.						
PSI	6.667	8.333	10.416	12.500	14.583	16.667	17.920
0.0	2.507	2.555	2.627	2.713	2.810	2.917	2.987
15.0	2.611	2.676	2.768	2.871	2.984	3.107	3.184
30.0	2.740	2.819	2.927	3.045	3.171	3.304	3.388
45.0	2.869	2.958	3.078	3.206	3.341	3.482	3.570
60.0	2.978	3.074	3.207	3.336	3.477	3.624	3.715
75.0	3.050	3.150	3.282	3.420	3.564	3.714	3.806
90.0	3.074	3.175	3.308	3.447	3.592	3.742	3.835
105.0	3.046	3.145	3.276	3.414	3.557	4.434	4.521
120.0	2.971	3.065	3.191	3.324	3.464	4.318	4.402
135.0	2.861	2.948	3.065	3.150	4.015	4.143	4.223
150.0	2.754	2.810	2.914	3.029	3.815	3.932	4.006
165.0	2.612	2.673	2.761	2.860	3.608	3.711	3.776
180.0	2.515	2.558	2.625	3.349	3.423	3.507	3.562
195.0	2.457	2.480	2.524	2.582	3.280	3.343	3.386
210.0	2.438	2.443	2.463	2.499	3.185	3.230	3.261
225.0	2.450	2.438	2.438	2.454	3.145	3.166	3.185
240.0	2.475	2.450	2.434	2.435	2.452	3.138	3.148
255.0	2.495	2.464	2.438	2.429	2.437	3.129	3.133
270.0	2.500	2.466	2.438	2.426	2.431	2.453	2.473
285.0	2.485	2.454	2.430	2.423	2.432	2.458	2.481
300.0	2.456	2.434	2.421	2.425	2.445	2.481	2.510
315.0	2.427	2.418	2.422	2.443	2.480	2.532	2.570
330.0	2.416	2.425	2.451	2.492	2.545	2.620	2.669
345.0	2.440	2.469	2.518	2.582	2.660	2.750	2.810

(FORCE ALONG FLIGHT PATH)CALC= 13605. (FORCE NORMAL TO FLIGHT PATH)CALC= 6213. ALFAR= 63.24(DEG)

CONTROL INPUT
FEATHERING (DEG)
STEADY = -3.766
CYCLIC(COS)= 0.0
CYCLIC(SIN)= 0.0

THRUST= 14945.0 HFORCE= 575.2
HP= 3.8 YFORCE= 119.5

CT= 0.28208 CH= 0.01093
CP= 0.00008 CY= 0.00226

MOMENT ABOUT Y AXIS = 4953.79 FT LB
MOMENT ABOUT X AXIS = -21052.02 FT LB

TIME HISTORY

T(SEC)	U(FT/SEC) THETA(RAD)	V(FT/SEC) PHI(RAD)	W(FT/SEC) PSI(RAD)	P(RAD/SEC) X(FT)	Q(RAD/SEC) Y(FT)	R(RAD/SEC) Z(FT)	OMEGA(RAD/SEC)
0.400	-9.5670E 02 1.1383E 00	5.3310E-01 -4.8457E-04	-1.8970E 03 -1.9324E-04	-3.0784E-02 -8.5614E 02	6.4250E-02 4.9607E-03	-8.4381E-03 9.6029E 04	5.8479E 01
0.500	-9.6011E 02 1.1344E 00	3.9020E 01 -3.7918E-02	-1.8854E 03 -1.5414E-02	-4.3962E-01 -1.0680E 03	-1.3849E-01 1.0638E-02	-1.2145E-01 9.6036E 04	5.8364E 01

TIME HISTORY

CYCLE NO. = 1

PSI	T	TP	Z	ZP	B	BP
0.0	1.000E 00	0.0	0.0	0.0	0.0	0.0
15.0	2.119E-01	-6.020E 00	-4.057E-04	-3.100E-03	-1.700E-04	-1.299E-03
30.0	-8.436E-01	-2.044E 00	-1.211E-03	-3.817E-03	-8.989E-04	-4.269E-03
45.0	-4.788E-01	4.831E 00	-1.811E-03	-1.765E-06	-1.918E-03	-3.517E-03
60.0	6.152E-01	3.527E 00	-1.490E-03	2.451E-03	-2.325E-03	4.055E-04
75.0	6.507E-01	-3.255E 00	-1.104E-03	4.991E-04	-2.020E-03	1.931E-03
90.0	-3.469E-01	-4.366E 00	-1.257E-03	-1.969E-03	-1.802E-03	-2.659E-04
105.0	-7.218E-01	1.502E 00	-1.642E-03	-6.668E-04	-2.028E-03	-1.462E-03
120.0	6.520E-02	4.510E 00	-1.402E-03	2.498E-03	-2.018E-03	1.537E-03
135.0	6.777E-01	1.696E-01	-7.827E-04	2.233E-03	-1.164E-03	4.991E-03
150.0	1.741E-01	-4.017E 00	-6.655E-04	-1.490E-03	4.064E-05	4.208E-03
165.0	-5.497E-01	-1.513E 00	-1.243E-03	-2.772E-03	7.688E-04	1.355E-03
180.0	-3.426E-01	3.095E 00	-1.531E-03	5.736E-04	1.036E-03	6.870E-04
195.0	3.776E-01	2.407E 00	-1.059E-03	3.032E-03	1.363E-03	1.810E-03
210.0	4.348E-01	-1.970E 00	-5.706E-04	7.013E-04	1.884E-03	2.169E-03
225.0	-1.949E-01	-2.841E 00	-7.807E-04	-2.306E-03	2.329E-03	1.233E-03
240.0	-4.567E-01	8.408E-01	-1.257E-03	-1.334E-03	2.491E-03	5.216E-06
255.0	3.078E-02	2.883E 00	-1.249E-03	1.400E-03	2.374E-03	-9.035E-04
270.0	4.306E-01	1.708E-01	-8.660E-04	1.523E-03	2.059E-03	-1.500E-03
285.0	1.112E-01	-2.611E 00	-7.535E-04	-6.637E-04	1.593E-03	-2.057E-03
300.0	-3.628E-01	-1.010E 00	-1.034E-03	-1.481E-03	9.689E-04	-2.714E-03
315.0	-2.240E-01	2.071E 00	-1.178E-03	3.802E-04	2.258E-04	-2.962E-03
330.0	2.580E-01	1.611E 00	-8.855E-04	1.826E-03	-4.714E-04	-2.364E-03
345.0	2.922E-01	-1.350E 00	-5.849E-04	5.013E-04	-1.023E-03	-1.849E-03
360.0	-1.364E-01	-1.924E 00	-6.840E-04	-1.259E-03	-1.559E-03	-2.245E-03

MAXIMUM ABSOLUTE RESPONSE

PSI	T	TP	Z	ZP	B	BP
0.0	1.000E 00					
15.0		6.020E 00				
45.0			1.811E-03			
30.0				3.817E-03		
240.0					2.491E-03	
135.0						4.991E-03

TIME HISTORY

CYCLE NO. = 5

PSI	T	TP	Z	ZP	B	BP
0.0	-3.187E-03	-7.667E-02	-2.448E-04	-2.724E-05	-1.430E-03	2.031E-03
15.0	-1.198E-02	9.482E-03	-2.508E-04	-1.888E-05	-8.550E-04	2.363E-03
30.0	-1.150E-03	7.327E-02	-2.482E-04	3.045E-05	-2.114E-04	2.553E-03
45.0	1.056E-02	1.616E-02	-2.367E-04	4.996E-05	4.568E-04	2.552E-03
60.0	4.561E-03	-6.156E-02	-2.289E-04	9.323E-06	1.092E-03	2.298E-03
75.0	-8.260E-03	-3.599E-02	-2.293E-04	-1.228E-05	1.632E-03	1.827E-03
90.0	-7.076E-03	4.503E-02	-2.290E-04	1.478E-05	2.033E-03	1.243E-03
105.0	5.151E-03	4.838E-02	-2.212E-04	4.457E-05	2.275E-03	6.052E-04
120.0	8.249E-03	-2.471E-02	-2.120E-04	2.547E-05	2.342E-03	-9.937E-05
135.0	-1.786E-03	-5.155E-02	-2.110E-04	-1.763E-05	2.217E-03	-8.508E-04
150.0	-7.947E-03	4.884E-03	-2.149E-04	-1.195E-05	1.905E-03	-1.533E-03
165.0	-9.685E-04	4.843E-02	-2.118E-04	3.522E-05	1.437E-03	-2.045E-03
180.0	6.944E-03	1.202E-02	-2.013E-04	4.477E-05	8.577E-04	-2.378E-03
195.0	3.341E-03	-3.954E-02	-1.953E-04	1.618E-06	2.135E-04	-2.543E-03
210.0	-5.012E-03	-2.428E-02	-1.980E-04	-2.279E-05	-4.489E-04	-2.518E-03
225.0	-4.590E-03	2.751E-02	-1.999E-04	8.262E-06	-1.077E-03	-2.284E-03
240.0	3.096E-03	3.120E-02	-1.936E-04	3.990E-05	-1.619E-03	-1.857E-03
255.0	5.221E-03	-1.457E-02	-1.851E-04	2.502E-05	-2.030E-03	-1.277E-03
270.0	-1.143E-03	-3.366E-02	-1.825E-04	-5.003E-06	-2.275E-03	-5.972E-04
285.0	-5.172E-03	2.881E-03	-1.835E-04	-2.651E-06	-2.336E-03	1.288E-04
300.0	-6.099E-04	3.157E-02	-1.806E-04	2.464E-05	-2.208E-03	8.471E-04
315.0	4.595E-03	7.791E-03	-1.734E-04	3.089E-05	-1.901E-03	1.500E-03
330.0	2.116E-03	-2.673E-02	-1.686E-04	5.454E-06	-1.440E-03	2.027E-03
345.0	-3.496E-03	-1.615E-02	-1.691E-04	-9.174E-06	-8.627E-04	2.380E-03
360.0	-3.156E-03	1.875E-02	-1.692E-04	8.693E-06	-2.178E-04	2.547E-03

MAXIMUM ABSOLUTE RESPONSE

PSI	T	TP	Z	ZP	B	BP
15.0	1.195E-02					
0.0		7.667E-02				
15.0			2.508E-04			
45.0				4.996E-05		
120.0					2.342E-03	
30.0						2.553E-03

TEST CASE ALTITUDE=96000 FT

ITERATION COUNT=11

AZIMUTH STA	BETA	THETA	LAG ANGLE
0.0	0.0898	-0.0602	0.0005
15.0	0.0971	-0.0582	0.0011
30.0	0.0984	-0.0557	0.0015
45.0	0.0937	-0.0541	0.0016
60.0	0.0830	-0.0538	0.0013
75.0	0.0673	-0.0535	0.0008
90.0	0.0475	-0.0528	0.0001
105.0	0.0245	-0.0511	-0.0006
120.0	0.0012	-0.0490	-0.0012
135.0	-0.0218	-0.0458	-0.0014
150.0	-0.0428	-0.0537	-0.0014
165.0	-0.0601	-0.0576	-0.0012
180.0	-0.0726	-0.0596	-0.0007
195.0	-0.0796	-0.0612	-0.0003
210.0	-0.0805	-0.0637	0.0001
225.0	-0.0755	-0.0659	0.0002
240.0	-0.0647	-0.0662	0.0000
255.0	-0.0490	-0.0649	-0.0003
270.0	-0.0294	-0.0644	-0.0007
285.0	-0.0072	-0.0652	-0.0011
300.0	0.0160	-0.0654	-0.0013
315.0	0.0385	-0.0642	-0.0012
330.0	0.0597	-0.0625	-0.0008
345.0	0.0770	-0.0613	-0.0002

BLADE ANGLE OF ATTACK DISTRIBUTION

	RADIAL STA.						
PSI	6.667	8.333	10.416	12.500	14.583	16.667	17.920
0.0	70.791	67.073	62.627	58.435	54.521	50.887	48.837
15.0	63.637	60.289	56.351	52.693	49.316	46.207	44.461
30.0	57.945	54.957	51.564	48.402	45.459	42.836	41.343
45.0	53.736	51.140	48.133	45.372	42.844	40.526	39.226
60.0	50.983	48.649	45.951	43.478	41.214	39.136	37.971
75.0	49.557	47.388	44.881	42.564	40.480	38.549	37.465
90.0	49.317	47.216	44.789	42.566	40.528	38.658	37.607
105.0	50.188	48.062	45.606	43.356	41.256	42.953	41.986
120.0	52.126	49.881	47.287	44.911	42.736	44.482	43.461
135.0	55.047	52.595	49.738	47.129	48.618	46.650	45.529
150.0	59.068	56.296	53.079	50.123	51.758	49.567	48.296
165.0	64.466	61.313	57.627	54.219	56.136	53.561	52.090
180.0	71.208	67.670	63.475	64.889	61.748	58.773	57.065
195.0	78.702	74.871	70.239	65.826	68.294	64.928	62.979
210.0	85.996	82.042	77.152	72.384	75.057	71.394	69.247
225.0	92.244	88.331	83.389	78.457	81.234	77.417	75.148
240.0	96.945	93.157	88.294	83.352	78.405	82.299	79.984
255.0	99.831	96.162	91.405	86.511	81.553	85.463	83.144
270.0	100.759	97.145	92.440	87.574	82.618	77.638	74.666
285.0	99.745	96.099	91.359	86.466	81.490	76.501	73.528
300.0	96.901	93.146	88.298	83.326	78.336	73.370	70.431
315.0	92.301	88.403	83.436	78.431	73.468	68.615	65.777
330.0	86.954	82.060	77.366	72.142	67.360	62.773	60.129
345.0	78.588	74.639	69.813	65.166	60.745	56.591	54.224

MACH NUMBER DISTRIBUTION

	RADIAL STA.						
PSI	6.667	8.333	10.416	12.500	14.583	16.667	17.920
0.0	2.357	2.399	2.465	2.545	2.638	2.742	2.810
15.0	2.468	2.532	2.624	2.727	2.841	2.964	3.041
30.0	2.620	2.701	2.813	2.934	3.063	3.199	3.284
45.0	2.784	2.878	3.004	3.138	3.278	3.424	3.514
60.0	2.932	3.035	3.170	3.313	3.460	3.613	3.707
75.0	3.039	3.148	3.289	3.437	3.585	3.746	3.842
90.0	3.090	3.201	3.345	3.495	3.649	3.808	3.905
105.0	3.075	3.186	3.329	3.479	3.633	4.525	4.618
120.0	2.997	3.104	3.244	3.391	3.542	4.411	4.502
135.0	2.869	2.969	3.101	3.241	4.075	4.217	4.304
150.0	2.710	2.799	2.919	3.048	3.834	3.965	4.047
165.0	2.549	2.623	2.725	2.829	3.575	3.691	3.764
180.0	2.416	2.469	2.549	3.247	3.334	3.430	3.492
195.0	2.333	2.363	2.414	2.480	3.145	3.216	3.263
210.0	2.309	2.314	2.336	2.374	3.026	3.070	3.102
225.0	2.332	2.316	2.310	2.322	2.977	2.994	3.011
240.0	2.379	2.346	2.319	2.309	2.316	2.970	2.974
255.0	2.423	2.379	2.338	2.314	2.307	2.972	2.967
270.0	2.445	2.396	2.349	2.318	2.305	2.309	2.319
285.0	2.434	2.387	2.342	2.314	2.302	2.308	2.321
300.0	2.396	2.356	2.321	2.303	2.302	2.319	2.338
315.0	2.344	2.318	2.301	2.301	2.319	2.354	2.383
330.0	2.304	2.297	2.305	2.331	2.373	2.431	2.473
345.0	2.302	2.319	2.356	2.410	2.478	2.560	2.616

(FORCE ALONG FLIGHT PATH)CALC= 12579. (FORCE NORMAL TO FLIGHT PATH)CALC= 6461. ALPHAR= 62.99(DEG)

CONTROL INPUT
FEATHERING (DEG)
STEADY = -3.766
CYCLIC(COS)= 0.0
CYCLIC(SIN)= 0.0

MOMENT ABOUT X AXIS = 57999.87 FT LB
MOMENT ABOUT Y AXIS =-123845.75 FT LB

THRUST= 15141.2 HFORCE= -44.6
HP= 57.8 VFORCE= -230.3

CT= 0.26796 CH=-0.0065
CP= 0.00055 CY=-0.00436

TIME HISTORY

T(SEC)	U(FT/SEC)	V(FT/SEC)	W(FT/SEC)	P(RAD/SEC)	Q(RAD/SEC)	R(RAD/SEC)	OMEGA(RAD/SEC)
	THETA(RAD)	PHI(RAD)	PSI(RAD)	X(FT)	Y(FT)	Z(FT)	
0.500	-9.6011E 02	3.9020E 01	-1.8854E 03	-4.3962E-01	-1.3849E-01	-1.2145E-01	5.8364E 01
	5.1344E 00	-3.7918E-02	-1.5414E-02	-1.0680E 03	1.0638E-02	9.6036E 04	
0.600	-1.2122E 03	2.4634E 01	-1.7247E 03	6.5332E-01	-2.6689E 00	1.9142E-01	5.8653E 01
	9.9276E-01	-1.3932E-02	1.7796E-04	-1.2791E 03	2.8586E-02	9.6043E 04	

TIME HISTORY

CYCLE NO. = 1

PSI	T	TP	Z	ZP	B	BP
0.0	1.000E 00	0.0	0.0	0.0	0.0	0.0
15.0	2.139E-01	-6.005E 00	-3.537E-04	-2.702E-03	-1.976E-04	-1.510E-03
30.0	-8.460E-01	-2.092E 00	-1.149E-03	-3.372E-03	-9.881E-04	-4.528E-03
45.0	-4.903E-01	4.810E 00	-1.591E-03	-6.628E-06	-2.061E-03	-3.672E-03
60.0	6.127E-01	3.617E 00	-1.304E-03	2.201E-03	-2.501E-03	3.146E-04
75.0	6.683E-01	-3.152E 00	-9.552E-04	4.617E-04	-2.213E-03	1.888E-03
90.0	-3.346E-01	-4.470E 00	-1.131E-03	-1.804E-03	-2.000E-03	-2.635E-04
105.0	-7.388E-01	1.382E 00	-1.453E-03	-6.551E-04	-2.221E-03	-1.429E-03
120.0	4.302E-02	4.591E 00	-1.240E-03	2.280E-03	-2.195E-03	1.630E-03
135.0	6.887E-01	3.417E-01	-6.578E-04	2.168E-03	-1.303E-03	5.183E-03
150.0	2.035E-01	-4.048E 00	-5.402E-04	-1.269E-03	-4.157E-05	4.457E-03
165.0	-5.511E-01	-1.716E 00	-1.055E-03	-2.661E-03	7.488E-04	1.581E-03
180.0	-3.751E-01	3.060E 00	-1.353E-03	3.820E-04	1.071E-03	8.807E-04
195.0	5.677E-01	2.615E 00	-9.262E-04	2.878E-03	1.447E-03	1.991E-03
210.0	4.662E-01	-1.863E 00	-9.391E-04	8.427E-04	2.011E-03	2.317E-03
225.0	-1.736E-01	-3.025E 00	-6.091E-04	-2.141E-03	2.490E-03	1.344E-03
240.0	-4.828E-01	6.527E-01	-1.077E-03	-1.434E-03	2.677E-03	8.447E-05
255.0	-1.175E-02	3.017E 00	-1.106E-03	1.211E-03	2.573E-03	-8.831E-04
270.0	4.471E-01	4.079E-01	-7.457E-04	1.544E-03	2.254E-03	-1.552E-03
285.0	1.512E-01	-2.668E 00	-6.077E-04	-4.900E-04	1.767E-03	-2.169E-03
300.0	-3.657E-01	-1.280E 00	-8.640E-04	-1.469E-03	1.107E-03	-2.871E-03
315.0	-2.663E-01	2.939E 00	-1.035E-03	1.651E-04	3.184E-04	-3.153E-03
330.0	2.464E-01	1.878E 00	-7.900E-04	1.704E-03	-4.298E-04	-2.563E-03
345.0	3.314E-01	-1.229E 00	-4.817E-04	6.511E-04	-1.030E-03	-2.024E-03
360.0	-1.111E-01	-2.151E 00	-5.407E-04	-1.102E-03	-1.614E-03	-2.435E-03

MAXIMUM ABSOLUTE RESPONSE

PSI	T	TP	Z	ZP	B	BP
0.0	1.000E 00					
15.0		6.005E 00				
45.0			1.591E-03			
30.0				3.372E-03		
240.0					2.677E-03	
135.0						5.183E-03

TIME HISTORY

CYCLE NO. = 5

PSI	T	TP	Z	ZP	B	BP
0.0	2.893E-03	-1.050E-01	-2.091E-04	-1.443E-05	-1.578E-03	2.186E-03
15.0	-1.497E-02	-3.147E-02	-2.161E-04	-3.892E-05	-9.598E-04	2.538E-03
30.0	-7.878E-03	8.567E-02	-2.186E-04	1.974E-05	-2.690E-04	2.739E-03
45.0	1.104E-02	5.886E-02	-2.086E-04	5.663E-05	4.514E-04	2.764E-03
60.0	1.106E-02	-5.871E-02	-1.583E-04	2.210E-05	1.143E-03	2.522E-03
75.0	-6.445E-03	-7.504E-02	-1.578E-04	-1.610E-05	1.738E-03	2.017E-03
90.0	-1.257E-02	2.826E-02	-2.003E-04	-1.470E-06	2.181E-03	1.370E-03
105.0	1.475E-03	7.903E-02	-1.546E-04	4.508E-05	2.450E-03	6.837E-04
120.0	1.204E-02	1.661E-03	-1.831E-04	4.289E-05	2.432E-03	-5.086E-05
135.0	2.957E-03	-7.103E-02	-1.793E-04	-1.392E-05	2.414E-03	-8.533E-04
150.0	-9.750E-03	-2.604E-02	-1.855E-04	-3.360E-05	2.098E-03	-1.616E-03
165.0	-5.934E-03	5.520E-02	-1.876E-04	1.770E-05	1.592E-03	-2.198E-03
180.0	6.884E-03	4.272E-02	-1.779E-04	5.449E-05	9.682E-04	-2.565E-03
195.0	7.873E-03	-3.517E-02	-1.679E-04	2.019E-05	2.734E-04	-2.743E-03
210.0	-3.404E-03	-5.058E-02	-1.692E-04	-3.017E-05	-4.427E-04	-2.727E-03
225.0	-8.207E-03	1.429E-02	-1.750E-04	-1.410E-05	-1.126E-03	-2.492E-03
240.0	4.031E-04	5.149E-02	-1.722E-04	3.518E-05	-1.719E-03	-2.043E-03
255.0	7.711E-03	4.339E-03	-1.626E-04	3.856E-05	-2.174E-03	-1.425E-03
270.0	2.224E-03	-4.625E-02	-1.574E-04	5.623E-07	-2.451E-03	-6.943E-04
285.0	-6.401E-03	-1.964E-02	-1.593E-04	-1.492E-05	-2.530E-03	8.959E-05
300.0	-4.217E-03	3.633E-02	-1.595E-04	1.337E-05	-2.405E-03	8.679E-04
315.0	4.531E-03	3.050E-02	-1.529E-04	3.751E-05	-2.084E-03	1.582E-03
330.0	5.497E-03	-2.312E-02	-1.456E-04	1.757E-05	-1.593E-03	2.166E-03
345.0	-2.261E-03	-3.614E-02	-1.450E-04	-1.256E-05	-9.748E-04	2.559E-03
360.0	-5.875E-03	8.535E-03	-1.473E-04	-5.179E-06	-2.804E-04	2.746E-03

MAXIMUM ABSOLUTE RESPONSE

PSI	T	TP	Z	ZP	B	BP
15.0	1.497E-02					
0.0		1.050E-01				
30.0			2.186E-04			
45.0				5.663E-05		
120.0					2.532E-03	
45.0						2.764E-03

TEST CASE ALTITUDE=96000 FT

BETA GREATER THAN 90 DEGREES CONDITION DISCONTINUED