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A STABILITY AND CONTROL PREDICTION METHOD FOR HELICOPTERS AND STOPPABLE ROTOR AIRCRAFT

VOLUME IV
APPENDICES

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Bell Helicopter Company
A Textron Company

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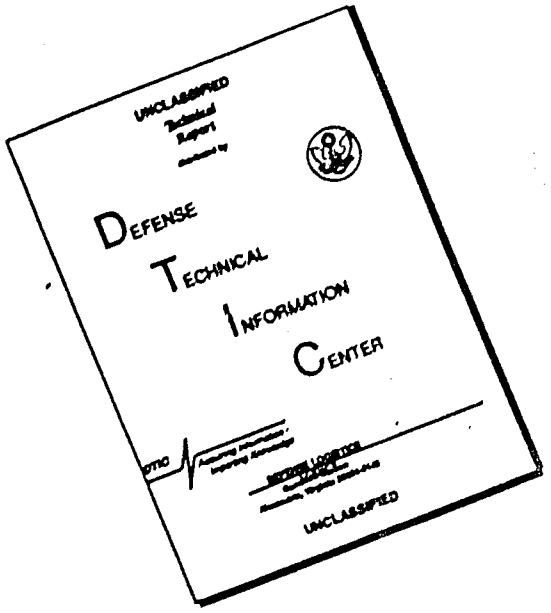

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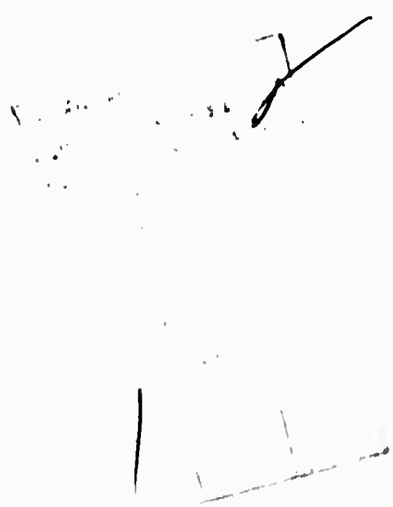

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A STABILITY AND CONTROL PREDICTION METHOD FOR HELICOPTERS AND STOPPABLE ROTOR AIRCRAFT

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FOREWORD

This report represents the results of the efforts expended in performance of Contract F33615-69-C-1121, "Development of Stability and Control Prediction Methods for Stoppable Rotor Aircraft." The work was performed by Bell Helicopter Company under Project No. 8219. It was sponsored by the Air Force Flight Dynamics Laboratory, Air Force Systems Command, from December 1968 through February 1970. Mr. Charles L. Livingston was the Bell Helicopter Company Project Engineer. Mr. Robert Nicholson was the Air Force Project Engineer.

This final report is presented in four volumes. The first describes the mathematical model and the methods used to calculate stability characteristics. They are of sufficient complexity that a digital computer is necessary for the solution of the equations. The second volume presents the results of sample computations and discusses input and output formats and good user techniques. The third volume describes the computer program while the fourth volume contains Appendices which are computer generated documentation of the program.

The author gratefully acknowledges the assistance of Messrs. B. L. Blankenship and Tyce McLarty of the Bell Helicopter Company Aeromechanics Group and Mr. C. L. Livingston of the Stability and Control Group in the development of the mathematical model.

This technical report has been reviewed and is approved.

C. B. Westbrook
Chief, Control Criteria Branch
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ABSTRACT

This report describes a mathematical model of rotorcraft that may be used to determine characteristics of performance, stability, response, and rotor blade loads. The complexity of the equations used requires the use of a digital computer for efficient solution. This four volume report describes the computer program in detail and illustrates the method of computing rotorcraft characteristics by specific example.

This volume contains the Appendices. Volume III describes the contents and use of these appendices in detail. The first and second volumes contain a discussion of the mathematical model and detailed instructions for the users of the program.

These appendices, which originate from card images for easy updating, are necessary tools for any programmer working on this program.

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APPENDIX A

VARIABLE DEFINITIONS

A	(71) ARRAY NAME FOR FORCES AND MOMENTS
B	(2) BM AND BTR
D	(21) MAIN ROTOR BLADE WEIGHT DISTRIBUTION
F	(79) TRIM VALUES OF A AND OTHER FORCES
Q	1/2 RHO
R	(2) RM AND RTR
T	MANEUVER TIME
V	VELOCITY - AIR SPEED
W	GROSS WEIGHT
X	(10) COMPUTED CORRECTIONS IN TRIM
AH	(3) UPPER SCALE LIMITS FOR PPLOT
AL	(3) LOWER SCALE LIMITS FOR PPLOT
AP	PITCH ANGLE OF ATTACK OF FUSELAGE
AY	SIDESLIP (NEW VALUE)
BH	(2) .5 * B
BM	MAIN ROTOR NUMBER OF BLADES
C3	CD BEFORE RESOLUTION THROUGH INDUCED ANGLE OF ATTACK
C4	CL BEFORE RESOLUTION THROUGH INDUCED ANGLE OF ATTACK
DT	(21) TAIL ROTOR BLADE WEIGHT DISTRIBUTION
ER	(2) ERM AND ERTR
HL	(2) MAST LENGTHS
IX	FUSELAGE MOMENT OF INERTIA ABOUT X-AXIS (ROLL)
IY	FUSELAGE MOMENT OF INERTIA ABOUT Y-AXIS (PITCH)
IZ	FUSELAGE MOMENT OF INERTIA ABOUT Z-AXIS (YAW)
OR	(2) ORM AND ORTR
PI	3.141593
QL	TOTAL ROLL MOMENT (X-COMPONENT - BODY REFERENCE)
QM	TOTAL PITCHING MOMENT (Y-COMPONENT - BODY REFERENCE)
QN	TOTAL YAW MOMENT (Z-COMPONENT - BODY REFERENCE)
RM	MAIN ROTOR RADIUS
RW	1. / W
T1	(2) T1MT AND T1TT
T2	(2) T2MT AND T2TT
VH	GROUND SPEED
XB	(2) 1. / NXR
XF	TOTAL X-FORCE (BODY REFRENCE)
XK	INTERMEDIATE VARIABLE
XX	GROUND REFERENCE X-COMPONENT OF DISTANCE FLOWN
YF	TOTAL Y-FORCE (BODY REFRENCE)
YY	GROUND REFERENCE Y-COMPONENT OF DISTANCE FLOWN
ZF	TOTAL Z-FORCE (BODY REFRENCE)
ZZ	GROUND REFERENCE Z-COMPONENT OF DISTANCE FLOWN
AGW	GEOMETRIC ANGLE OF ATTACK OF WING RELATIVE TO FUSELAGE CENTERLINE
AIB	(2) ROTOR BLADE INERTIAS
ALT	ALTITUDE
AOR	(2) (EXH / R) **2
APD	FUSELAGE PITCH RATE
APE	PITCH (FIXED - FUSELAGE)
ARD	FUSELAGE ROLL RATE
ARE	ROLL (FIXED - FUSELAGE)
AYD	FUSELAGE YAW RATE
AYE	YAW (FIXED - FUSELAGE)
AY1	SIDESLIP (PREVIOUS VALUE)
A1M	A1 MAIN ROTOR (FORE/AFT FLAPPING)

BTR	TAIL ROTOR - NUMBER OF BLADES
B1M	B1 MAIN ROTOR (LATERAL FLAPPING)
CLP	SEE USERS GUIDE TO INPUT FORMAT, WING GROUP
CLR	SEE USERS GUIDE TO INPUT FORMAT, WING GROUP
DCD	DERIVATIVE OF CD WITH RESPECT TO ALPHA
DQL	SEE USERS GUIDE TO INPUT FORMAT, WING GROUP
DQN	SEE USERS GUIDE TO INPUT FORMAT, WING GROUP
DTR	DEGREES TO RADIANS CONVERSION FACTOR
DT1	(2) F/A SWASHPLATE INPUT FROM FLAT TRACKER
DT2	(2) LAT SWASHPLATE INPUT FROM FLAT TRACKER
EPD	PARTIAL DERIVATIVE INCREMENT FOR TRIM
ERM	MAIN ROTOR ALLOWABLE FLAPPING MOMENT ERROR FOR TRIM
ERR	(10) INPUT ALLOWABLE ERRORS ON TRIM FORCES AND MOMENTS
ERX	(2) ERXM AND ERXTR
EXH	(2) HUB EXTENTS
GOV	FLAG ON ENGINE TORSIONAL SYSTEM -NORMALLY=0
HMR	MAIN ROTOR H-FORCE
HTR	TAIL ROTOR H -FORCE
IND	FLAG OR SWITCH TYPE VARIABLE
ITM	ITERATION LIMIT TO BALANCE ROTOR FLAPPING MOMENTS IN ITROT
IXZ	FUSELAGE PRODUCT OF INERTIA
KMI	NUMBER OF EQUATIONS IN SYSTEM
LMR	X-COMPONENT OF MOMENT DUE TO MAIN ROTOR FORCES
LTR	X-COMPONENT OF MOMENT DUE TO TAIL ROTOR FORCES
MMR	Y-COMPONENT OF MOMENT DUE TO MAIN ROTOR FORCES
MTR	Y-COMPONENT OF MOMENT DUE TO TAIL ROTOR FORCES
NMR	Z-COMPONENT OF MOMENT DUE TO MAIN ROTOR FORCE
NTR	Z-COMPONENT OF MOMENT DUE TO TAIL ROTOR FORCE
OPM	MAIN ROTOR TIP SPEED
PED	INTERMEDIATE VARIABLE IN PEDAL CALCULATION
PSD	MAIN ROTOR PSI DOT =OMEGA
QMR	TORQUE REQUIRED TO MAINTAIN CONSTANT RPM ON MAIN ROTOR
QMX	MAIN ROTOR TORQUE
QPC	PROP-ROTOR COLLECTIVE GOVERNOR FLAG - 0 OR 10
QQQ	COEFFICIENT FOR CALCULATING ENGINE TORQUE AVAILABLE
QTR	TAIL ROTOR TORQUE
QWS	Q* 1/2 AREA OF WING
RHO	AIR DENSITY AT ALTITUDE
RIY	1. / IY
RTR	TAIL ROTOR RADIUS
R12	1. / 12.
SPD	(6,6,3) RATE DERIVATIVES IN STAB
SWC	(2) SIDEWASH COEFFICIENTS
TMR	MAIN ROTOR THRUST
TTR	TAIL ROTOR THRUST
TZM	MAIN ROTOR ROOT COLLECTIVE PITCH FROM CONTROLS
TZP	(2) TZMT AND TZTT
TZT	TAIL ROTOR ROOT COLLECTIVE PITCH FROM CONTROLS
T1M	MAIN ROTOR F/A CYCLIC PITCH FROM CONTROLS
T1T	TAIL ROTOR F/A CYCLIC PITCH FROM CONTROLS
T2M	MAIN ROTOR LATERAL CYCLIC PITCH FROM CONTROLS
T2T	TAIL ROTOR LATERAL CYCLIC PITCH FROM CONTROLS
VIR	(2) VIMR AND VITR
VIW	DOWNWARD VELOCITY ON WING FROM ON M.R. INDUCED VELOCITY

```
VI2     .5 * VROT **2
VI4     VI2 **2
VXB     FUSELAGE X VELOCITY
VXS     X-COMPONENT OF VROT IN SWASHPLATE REFERENCE
VYB     FUSELAGE Y VELOCITY
VYS     Y-COMPONENT OF VROT IN SWASHPLATE REFERENCE
VZB     FUSELAGE Z VELOCITY
VZS     Z-COMPONENT OF VROT IN SWASHPLATE REFERENCE
XAR     (2)  X MOMENT ARM OF ROTOR HUB
XBW     (21)  BODYWEIGHT GROUP INPUTS
XFL     (14)  ELEVATOR GROUP INPUTS
XFR     (7)  ALLOWABLE ERROR GROUP INPUTS
XFC     (28)  FLIGHT CONSTANTS GROUP INPUTS
XFN     (7)  FIN / RUDDER GROUP INPUTS
XFS     (35)  FUSELAGE GROUP INPUTS
XFW     X-FORCE DUE TO WEIGHT
XGN     (7)  WEAPONS GROUP INPUTS
XIT     (21)  ITERATION LIMITS GROUP INPUTS
XMA     (2)  XMA1 AND XMA1T
XMB     (2)  XMB1 AND XMB1T
XMR     (49)  MAIN ROTOR GROUP INPUTS
XTR     (49)  TAIL ROTOR GROUP INPUTS
XWG     (21)  WING GROUP INPUTS
XXD     X COMPONENT OF VELOCITY  - FIXED AXES
YAR     (2)  Y MOMENT ARM OF ROTOR HUB
YFL     (21)  INPUT CLCD CONSTANTS FOR ELEVATOR
YFN     (21)  INPUT CLCD CONSTANTS FOR FIN
YFS     (14)  COEFFICIENTS FOR CALCULATING FUSELAGE FORCES AND MOMENTS
YFW     Y-FORCE DUE TO WEIGHT
YMR     (21)  INPUT CLCD CONSTANTS FOR MAIN ROTOR
YTR     (21)  INPUT CLCD CONSTANTS FOR TAIL ROTOR
YWG     (21)  INPUT CLCD CONSTANTS FOR WING
YYD     Y COMPONENT OF VELOCITY  - FIXED AXES
YYD     VELOCITY OF SHIP CG DUE EAST IN FIXED REFERENCE
ZAR     (2)  Z MOMENT ARM OF ROTOR HUB
ZFW     Z-FORCE DUE TO WEIGHT
ZZD     RATE OF DESCENT
A1BP    (2)  A1BPM AND A1BPT
A1BR    (2)  A1BRM AND A1BRT
ALEI    TOTAL ANGLE OF ATTACK OF ELEVATOR
ALGF    FIN GEOMETRIC ANGLE
AP3G    E.A. PITCH FUSELAGE - GUN
APDR    (2)  APTD AND APTTD
APFP    E.A. PITCH FIXED - FLIGHT PATH
APTD    MAIN ROTOR INSTANTANEOUS PITCH VELOCITY OF TIP PATH PLA
ARBG    CONSTANT, = 0.
ARDR    (2)  ARTD AND ARTTD
ARTD    MAIN ROTOR INSTANTANEOUS ROLL  VELOCITY OF TIP PATH PLANE
ASEP    YAW PILOT VARIABLE
AYBG    E.A. YAW FUSELAGE - GUN
AYFP    E.A. YAW FIXED - FLIGHT PATH
A1TP    A1 TAIL ROTOR
BAIB    (2)  B * A1B
BLCG    BUTTLINE LOCATION OF C.G.
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BWTC	COEFFICIENT OF X DOT IN BODWEIGHT EQUATION
BWTK	COEFFICIENT OF X IN BODWEIGHT EQUATION
BWTM	CONSTANT MULTIPLIER OF (G - G PRELOAD) IN BODWEIGHT EQUATION
B1TR	B1 TAIL ROTOR
CDHB	(2) CD FOR HUB SEGMENTS
CGWL	CURRENT WATERLINE LOCATION OF CENTER OF GRAVITY
CLBD	SEE USERS GUIDE TO INPUT FORMAT, WING GROUP
CMBD	SEE USERS GUIDE TO INPUT FORMAT, WING GROUP
COLL	(6) INTERMEDIATE VARIABLES IN COLLECTIVE LINKAGES
CYCF	(3) INTERMEDIATE VARIABLES IN F/A CYCLIC LINKAGES
CYCL	(3) INTERMEDIATE VARIABLES IN LAT CYCLIC LINKAGES
CZET	COSINE OF ZETA
DAMP	MAXIMUM ERROR FOR XLIMIT HALVING IN TRIM
DEPD	(10) INCREMENTS USED FOR CALCULATING PD IN TRIM
DIST	DISTANCE FLOWN
DPIX	IX / (IX * IZ - IXZ **2)
DPIZ	IZ / (IX * IZ - IXZ **2)
DPSI	(2) CHANGE IN PSI BETWEEN AZIMUTH POSITIONS
DTRR	RADIANS TO DEGREES CONVERSION FACTOR
EPDS	PARTIAL DERIVATIVE INCREMENT FOR STAB
EPDX	(10) UNIT CONVERSION FACTOR IN APPLYING CORRECTIONS IN RATE
ERTR	TAIL ROTOR ALLOWABLE FLAPPING MOMENT ERROR FOR TRIM
ERXM	MAXIMUM ERROR FOR HALVING XLMAXM
ERXT	MAXIMUM ERROR FOR HALVING LMAXT
ETAQ	CORRECTION TO DYNAMIC PRESSURE AT ELEVATOR DUE TO WING WAKE
EXIT	ERROR INDICATOR -NOT ZERO INDICATES ERROR AND TERMINATES JOB
FHPT	(2) FLAPPING HINGE POINTS
GFWD	G-LEVEL IN FUSELAGE X-DIRECTION
GLAT	G-LEVEL IN FUSELAGE Y-DIRECTION
ICOM	(49) COMMENTS
IPSN	PROBLEM SERIAL NUMBER
KCIT	(20) VALUES OF J ON MANEUVER
LELE	X-COMPONENT OF MOMENT DUE TO ELEVATOR
LFIN	X-COMPONENT OF MOMENT DUE TO FIN
LFUS	X-COMPONENT OF MOMENT DUE TO FUSELAGE
LGUN	X-COMPONENT OF MOMENT DUE TO GUN
LINK	SEGMENT INDICATOR TRIM=2 STAB=3 MANEUVER=4
LLWG	X-COMPONENT OF MOMENT DUE TO LEFT WING
LQMR	MAIN ROTOR TORQUE - X COMPONENT
LQTR	TAIL ROTOR TORQUE - X COMPONENT
LROT	(2) COUNTERS FOR ROTORS, USED IN WAG
LRWG	X-COMPONENT OF MOMENT DUE TO RIGHT WING
MASS	TOTAL MASS
MELE	Y-COMPONENT OF MOMENT DUE TO ELEVATOR
MFIN	Y-COMPONENT OF MOMENT DUE TO FIN
MFUS	Y-COMPONENT OF MOMENT DUE TO FUSELAGE
MGUN	Y-COMPONENT OF MOMENT DUE TO GUN
MLWG	Y-COMPONENT OF MOMENT DUE TO LEFT WING
MQMR	Y-COMPONENT OF MOMENT DUE TO MAIN ROTOR TORQUE
MQTR	Y-COMPONENT OF MOMENT DUE TO TAIL ROTOR TORQUE
MRWG	Y-COMPONENT OF MOMENT DUE TO RIGHT WING
NELE	Z-COMPONENT OF MOMENT DUE TO ELEVATOR
NFIN	Z-COMPONENT OF MOMENT DUE TO FIN
NFUS	Z-COMPONENT OF MOMENT DUE TO FUSELAGE

NGUN	Z-COMPONENT OF MOMENT DUE TO GUN
NJET	NUMBER OF JETS
NLWG	Z-COMPONENT OF MOMENT DUE TO LEFT WING
NPSI	(2) NUMBER OF AZIMUTH STATIONS
NQMR	Z-COMPONENT OF MOMENT DUE TO MAIN ROTOR TORQUE
NQTR	Z-COMPONENT OF MOMENT DUE TO TAIL ROTOR TORQUE
NRWG	Z-COMPONENT OF MOMENT DUE TO RIGHT WING
NWAG	INDICATOR- 1=USE WAGNER-BUETTIKER FUNCTIONS 0=DON'T
ORTR	TAIL ROTOR TIP SPEED
PEDA	(3) INTERMEDIATE VARIABLES IN PEDAL LINKAGE
PMOM	(2) PMOMM AND PMOMT
PSDD	PSI DOUBLE DOT
PSDT	TAIL ROTOR ANGULAR SPEED -PSI DOT
PSID	(2) PSD AND PSDT
QELE	Q* AREA OF ELEVATOR
QFIN	Q* AREA OF FIN
QMAX	MAXIMUM ENGINE TORQUE AVAILABLE
QMRS	ENGINE TORQUE SUPPLIED - TOTAL
QSV1	TORQUE AT TRIM POINT
RAIB	(2) 1. / AIB
RMOM	(2) RMOMM AND RMOMT
ROTJ	SIGN CHANGER, +1. = MAIN ROTOR, -1. = TAIL ROTOR
RTRP	(2) 1. / (TWOPI * RHO * R **2)
R550	1. / 550
SZET	SINE OF ZETA
TAXL	AUXILIARY THRUST LEFT
TAXR	AUXILIARY THRUST RIGHT OR CENTER
TIME	T - .05 * TDELT USED IN COMPARISONS INSTEAD OF T
TMAX	STOP TIME FOR TDELT CURRENTLY IN USE
TZMS	MAIN ROTOR COLLECTIVE IF LOCKED
TZMT	MAIN ROTOR TOTAL ROOT COLLECTIVE
TZTT	TAIL ROTOR TOTAL ROOT COLLECTIVE
T1MS	MAIN ROTOR F/A CYCLIC IF LOCKED
T1MT	MAIN ROTOR TOTAL F/A CYCLIC
T1TS	TAIL ROTOR F/A CYCLIC IF LOCKED
T1TT	TAIL ROTOR TOTAL F/A CYCLIC
T2MS	MAIN ROTOR LAT CYCLIC IF LOCKED
T2MT	MAIN ROTOR TOTAL LAT CYCLIC
T2TS	TAIL ROTOR LAT CYCLIC IF LOCKED
T2TT	TAIL ROTOR TOTAL LAT CYCLIC
VIER	DOWNWARD VELOCITY ON ELEVATOR FROM ON M.R. INDUCED VELOCITY
VIMR	MAIN ROTOR INDUCED VELOCITY
VITR	TAIL ROTOR INDUCED VELOCITY
VROT	VELOCITY OF THE ROTOR HUB
VSND	RECIPROCAL OF THE SPEED OF SOUND
WLCG	WATERLINE LOCATION OF CENTER OF GRAVITY
XAWG	X ARM OF THE WING
XCON	(63) CONTROLS GROUP INPUTS
XFMR	X-FORCE DUE TO MAIN ROTOR
XFTR	X-FORCE DUE TO TAIL ROTOR
XJET	(14) JET GROUP INPUTS
XK43	INTERMEDIATE VARIABLE
XLNK	(14) CONTROL LINKAGE RATIOS
XMA1	MAIN ROTOR LATERAL FLAPPING MOMENT

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XMB1     MAIN ROTOR  F/A FLAPPING MOMENT
XMIN     LOWER LIMIT ON VALUES OF XLIMIT
YFIN     (2)  SAVED VALUES OF FIN LIFT -FOR DAMPING ON UNSTEADY AERODYNAMICS
YFMR     Y-FORCE DUE TO MAIN ROTOR
YFTR     Y-FORCE DUE TO TAIL ROTOR
YMRF     MAIN ROTOR Y-FORCE
YTRF     TAIL ROTOR Y -FORCE
ZAWG     Z  ARM OF THE WING
ZFTA     MAIN ROTOR MAST TILT ANGLE
ZFEL     (2)  SAVED VALUES OF ELEVATOR LIFT - FOR UNSTEADY AERODYNAMICS
ZFMR     Z-FORCE DUE TO MAIN  ROTOR
ZFTR     Z-FORCE DUE TO TAIL  ROTOR
ZZTR     TAIL ROTOR ALTITUDE
AIBPM    MAIN ROTOR LAT FLAPPING MOMENT DESIRED
AIBPT    TAIL ROTOR LAT FLAPPING MOMENT DESIRED
AIBRM    MAIN ROTOR F/A FLAPPING MOMENT DESIRED
AIBRT    TAIL ROTOR F/A FLAPPING MOMENT DESIRED
ALCYP    ANGLE FOR AILERON EFFECT
ALERT    OFF/ON INDICATOR ON YAW PILOT
ALFIN    TOTAL ANGLE OF ATTACK OF THE FIN
ALGE2    COEFFICIENT USED IN COMPUTNG ELEVATOR ANGLE OF ATTACK
ALGE1    COEFFICIENT USED IN COMPUTNG ELEVATOR ANGLE OF ATTACK
ALGE2    COEFFICIENT USED IN COMPUTNG ELEVATOR ANGLE OF ATTACK
ALLWG    TOTAL ANGLE OF ATTACK  ON THE LEFT WING
ALRWG    TOTAL ANGLE OF ATTACK  ON THE RIGHT  WING
APTTD    TAIL ROTOR INSTANTANEOUS PITCH VELOCITY OF TIP PATH PLANE
ARTTD    TAIL ROTOR INSTANTANEOUS ROLL  VELOCITY OF TIP PATH PLANE
AYOMX    MAXIMUM YAW RATE
AYEFP    SIDESLIP INDICATOR
A1BAL    A1 AFTER MOMENT BALANCE IN STAB
BETA7    (2)  PRECONES
BNPSI    = NUMBER OF BLADES / NUMBER OF AZIMUTH STA.
B1BAL    B1 AFTER MOMENT BALANCE IN STAB
CDELE    CD ON ELEVATOR
CDFIN    CD ON FIN
CDLWG    CD ON LEFT WING
CDRWG    CD ON RIGHT WING
CGSTA    CURRENT STATION LINE LOCATION OF CENTER OF GRAVITY
CLBCL    SEE USERS GUIDE TO INPUT FORMAT, WING GROUP
CLELE    CL ON ELEVATOR
CLFIN    CL ON FIN
CLLWG    CL ON LEFT WING
CLOCK    COLLECTIVE LOCK INDICATOR  0=OFF / 1=ON
CLRWG    CL ON RIGHT WING
CNBCL    SEE USERS GUIDE TO INPUT FORMAT, WING GROUP
CNPCD    SEE USERS GUIDE TO INPUT FORMAT, WING GROUP
CNPCL    SEE USERS GUIDE TO INPUT FORMAT, WING GROUP
CNRCD    SEE USERS GUIDE TO INPUT FORMAT, WING GROUP
CNRCL    SEE USERS GUIDE TO INPUT FORMAT, WING GROUP
COLKS    SAVED VALUE OF COLSTK
COND1    CONDITIONAL OUTPUT INDICATOR
COND2    CONDITIONAL OUTPUT INDICATOR
CPWIC    COLLECTIVE PITCH WING INCIDENCE COUPLING FACTOR
CWING    WING CHORD -MEAN AERODYNAMIC CHORD = SQRT(AREA/AR)
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CYCR1	INTERMEDIATE VARIABLE BETWEEN F/A CYCLIC STICK AND ROTOR
CYCR2	INTERMEDIATE VARIABLE BETWEEN LATERAL CYCLIC STICK AND ROTOR
CZET4	INTERMEDIATE VARIABLE IN CONTROL LINKAGES
CZET6	INTERMEDIATE VARIABLE IN CONTROL LINKAGES
CZET9	INTERMEDIATE VARIABLE IN CONTROL LINKAGES
DCAFR	(2) TIP VORTEX EFFECT COEFFICIENTS
DELT2	DELTA TIME FOR RUNGE-KUTTA
DIXIZ	IX - IZ
DIYIX	IY - IX
DIZIY	IZ - IY
DPIXZ	IXZ / (IX * IZ - IXZ **2)
DTBWT	CHANGE IN COLLECTIVE PITCH DUE TO BOBWEIGHT
DTZMT	COLLECTIVE PITCH INPUT BY PROP ROTOR COLLECTIVE GOVERNOR
DTZM1	CHANGE IN COLLECTIVE PITCH DUE TO PITCH CONE COUPLING MAIN ROTOR
DTZT1	CHANGE IN COLLECTIVE PITCH DUE TO PITCH CONE COUPLING TAIL ROTOR
D3ELE	COLLECTIVE STICK -ELEVATOR INCIDENCE COUPLING FACTOR
FLOCK	F/A CYCLIC LOCK INDICATOR
FNSWC	FIN SIDE-WASH COEFFICIENT
FTKTS	FT/SEC TO KNOTS CONVERSION FACTOR
FVIND	INDUCED VELOCITY CHANGE LIMITER
GMAXV	TOTAL GUST VELOCITY = GMAXV1 +GMAXV2
GUESS	INPUT CONTROL FOR FLIGHT CONSTANTS GUESSES
GVERT	G-LEVEL IN FUSELAGE Z-DIRECTION
HDELT	.5 * TDELT
HGUST	FUSELAGE X-COMPONENT OF GUST VELOCITY
HLTR1	TAIL ROTOR MAST LENGTH IF SIDE-BY-SIDE, = 0. OTHERWISE
HLTR2	OPPOSITE OF HLTR1
HUBKP	MAIN ROTOR F/A HUB SPRING RATE PER BLADE
HUBKR	MAIN ROTOR LATERAL HUB SPRING RATE PER BLADE
ITORS	INERTIA OF TORSIONAL SYSTEM
KREAD	NUMBER OF MANEUVER CARDS FOR THIS RUN
KTCTR	POINTER TO WHICH TIME INCREMENT IS BEING USED IN MANEUVER
LLJET	X-COMPONENT OF MOMENT DUE TO LEFT OR CENTER JET THRUST
LRJET	X-COMPONENT OF MOMENT DUE TO RIGHT JET THRUST
LWING	COUNTER ON UNSTEADY AERODYNAMIC EFFECTS -WAGNER FUNCTION
MLJET	Y-COMPONENT OF MOMENT DUE TO LEFT OR CENTER JET THRUST
MRJET	Y-COMPONENT OF MOMENT DUE TO RIGHT JET THRUST
NLJET	Z-COMPONENT OF MOMENT DUE TO LEFT OR CENTER JET THRUST
NOPSI	NUMBER OF AZIMUTH STATIONS
NPART	PRIMARY PATH CONTROL VARIABLE
NPASS	TRIM ITERATION COUNTER
NRJET	Z-COMPONENT OF MOMENT DUE TO RIGHT JET THRUST
NVARA	SECONDARY PATH CONTROL VARIABLE OR PLOT CODE NUMBER
NVARB	SECONDARY PATH CONTROL VARIABLE OR PLOT CODE NUMBER
NVARC	SECONDARY PATH CONTROL VARIABLE OR PLOT CODE NUMBER
OMEGM	MAIN ROTOR SPEED IN RAD/SEC TARGET OR TRIM VALUE
PCDEL	CHANGE IN COLLECTIVE TO ADD TO M.R. AT THIS TIME INCREMENT PCG
PEDAL	PEDAL POSITION IN PERCENT
PIU30	RADIANS/SEC TO RPM CONVERSION FACTOR, 30. / PI
PMOMM	MAIN ROTOR F/A HUBSPRING MOMENT, PER BLADE
PMOMT	TAIL ROTOR F/A HUBSPRING MOMENT, PER BLADE
PMREL	INPUT COEFFICIENT OF M.R. INDUCED VELOCITY ON ELEVATOR
PMRWG	INPUT COEFFICIENT OF M.R. INDUCED VELOCITY ON WING
PTRFN	INPUT COEFFICIENT OF T.R. INDUCED VELOCITY ON FIN

QMRSA	MAXIMUM ENGINE TORQUE SUPPLIED -LIMITED BY THROTTLE
RANGE	COLLECTIVE PITCH RANGE
RATE1	RAMP GUST =GMAXV1 / LNGTH1
RATE2	RAMP GUST =GMAXV2 / LNGTH2
RMASS	1. / MASS
RMOMM	MAIN ROTOR LAT HUBSPRING MOMENT, PER BLADE
RMOMT	TAIL ROTOR LAT HUBSPRING MOMENT, PER BLADE
RPIST	INTERMEDIATE VARIABLE IN WING WAKE CALCULATIONS
STACG	STATION LOCATIN OF CENTER OF GRAVITY
STOP2	END DISTANCE FOR 2ND RAMP OR HUMP =START2 +LNGTH2
SWING	WING SPAN
SWKR1	(2) F/A SPRING RATES FOR FOCUSSED PYLON EFFECT
SWKR2	(2) LAT SPRING RATES FOR FOCUSSED PYLON EFFECT
SZET5	INTERMEDIATE VARIABLE IN CONTROL LINKAGES
SZET7	INTERMEDIATE VARIABLE IN CONTROL LINKAGES
SZET8	INTERMEDIATE VARIABLE IN CONTROL LINKAGES
TDELT	TIME INCREMENT FOR MANEUVER SECTION
THROT	(2) PREVIOUS VALUE OF ROTOR THRUST
TIP38	(2) TIP LOSS FACTORS
TRALT	TAIL ROTOR ALTITUDE
TWOPI	6.283185
TZERO	START TIME FOR MANEUVER
VGUST	FUSELAGE Z-COMPONENT OF GUST VELOCITY
VMAXE	VELOCITY AT WHICH ELEVATOR IS COMPLETELY SUBMERGED IN MR WAKE
WGCOL	WING ANGLE OF ATTACK DUE TO COLLECTIVE COUPLING
XAELE	X ARM OF THE ELEVATOR
XAFIN	X ARM OF THE FIN
XAFUS	X ARM OF THE FUSELAGE
XAGUN	X ARM OF THE GUN
XAJET	X ARM OF THE JETS
XAPYL	X ARM OF THE PYLON
XARSP	(2) X ARM OF THE ROTOR SHAFT PIVOT POINT
XFELE	X-FORCE DUE TO ELEVATOR
XFFIN	X-FORCE DUE TO FIN
XFFUS	X-FORCE DUE TO FUSELAGE
XFGUN	X-FORCE DUE TO GUN
XFLWG	X-FORCE DUE TO LEFT WING
XFRWG	X-FORCE DUE TO RIGHT WING
XGUST	DISTANCE TO BEGINNING OF GUST AT TZERO
XLOCK	LATERAL CYCLIC LOCK INDICATOR
XMA1T	TAIL ROTOR LATERAL FLAPPING MOMENT
XMB1T	TAIL ROTOR F/A FLAPPING MOMENT
XSTAH	(2) XSTAHM AND XSTAHT
YAELE	Y ARM OF THE ELEVATOR
YAFIN	Y ARM OF THE FIN
YAFUS	Y ARM OF THE FUSELAGE
YAGUN	Y ARM OF THE GUN
YALWG	Y ARM OF THE LEFT WING
YARWG	Y ARM OF THE RIGHT WING
YFFIN	Y-FORCE DUE TO FIN
YFFUS	Y-FORCE DUE TO FUSELAGE
YFGUN	Y-FORCE DUE TO GUN
YGUST	FUSELAGE Y-COMPONENT OF GUST VELOCITY
YSTAH	(2) YSTAHM AND YSTAHT

ZAELE	Z ARM OF THE ELEVATOR
ZAFIN	. ARM OF THE FIN
ZAFUS	Z ARM OF THE FUSELAGE
ZAGUN	Z ARM OF THE GUN
ZAJET	Z ARM OF THE JETS
ZAPYL	Z ARM OF THE PYLON - INTERMEDIATE VARIABLE
ZARSP	(2) Z ARM OF THE ROTOR SHAFT PIVOT POINT
ZETAR	(2) ZETA AND ZETATR
ZFELE	Z-FORCE DUE TO ELEVATOR
ZFFUS	Z-FORCE DUE TO FUSELAGE
ZFGUN	Z-FORCE DUE TO GUN
ZFLWG	Z-FORCE DUE TO LEFT WING
ZFRWG	Z-FORCE DUE TO RIGHT WING
ZMAX2	STOP TIME FOR SECOND TIME INCREMENT
ZMAX3	STOP TIME FOR THIRD TIME INCREMENT
ALECR1	WING ANGLE OF ATTACK FOR AILERON EFFECT
ALGFPD	RUDDER ANGLE OF ATTACK FROM PEDAL
APBJET	E.A. PITCH, FUSELAGE TO JET
ARBJET	CONSTANT, = 0.
ASECOL	YAW PILOT VARIABLE
AYBJET	E.A. YAW, FUSELAGE TO JET
BOTTOM	LOWER LIMIT OF COLLECTIVE PITCH
CNPCD1	INTERMEDIATE VARIABLE, FUNCTION OF CNPCD
CNPCD2	INTERMEDIATE VARIABLE, FUNCTION OF CNPCD
COLJET	COLLECTIVE STICK - JET THRUST COUPLING FACTOR
COLSTK	COLLECTIVE STICK POSITION IN PERCENT
CYPWIC	LATERAL CYCLIC STICK WING INCIDENCE COUPLING FACTOR (AILERON EFF)
CYSTK1	FORE/AFT CYCLIC STICK POSITION IN PERCENT
CYSTK2	LATERAL CYCLIC STICK POSITION IN PERCENT
CZET11	INTERMEDIATE VARIABLE IN CONTROL LINKAGES
CZET12	INTERMEDIATE VARIABLE IN CONTROL LINKAGES
CZET13	INTERMEDIATE VARIABLE IN CONTROL LINKAGES
DCAFXK	DCAFR * XK
DELT2R	1. / DELT2
DQDCOL	D TORQUE / D COLLECTIVE FROM TRIM SECTION
DTRRSQ	RADIANS **2 TO DEGREES **2 CONVERSION FACTOR, DTRR **2
EIMAST	COUPLING COEFFICIENT MAST TILT TO ELEVATOR INCIDENCE
EIZETA	ELEVATOR ANGLE OF ATTACK FROM MAST TILT
ENGRPM	ENGINE RPM
ETAQMX	REFERENCE VALUE OF ETAQ -AT CENTERLINE OF WING WAKE
GEARAT	GEAR RATIO TAIL ROTOR /MAIN ROTOR
GMAXV1	FIRST MAXIMUM GUST VELOCITY
GMAXV2	SECOND MAXIMUM CHANGE IN GUST VELOCITY
GMAXV3	INTERMEDIATE VARIABLE = GMAXV1 -START2 *RATE2
GPRELD	G PRELOAD FOR BOBWEIGHT
GUSTYP	TYPE OF GUST =9,10,11,OR 12 AS J VALUE FOR GIVEN CASE
HALFPI	1.570796, .5 * PI
HFORCE	HMR AND HTR
HGUSTE	HORIZONTAL GUST VELOCITY AT ELEVATOR
HGUSTF	HORIZONTAL GUST VELOCITY AT FIN
HGUSTW	HORIZONTAL GUST VELOCITY AT WING
HLPYLD	DISTANCE FROM M.R. PIVOT POINT TO FLAT PLATE DRAG C.P. ON MAST
HNPSIR	2. /NOPSI
HUBKPR	HUBKP AND HUBKTP

HUBKPS	SPRING RATE PER BLADE -MAIN ROTOR PITCH (F/A)
HUBKRP	HUBKR AND HUBKTR
HUBKRS	SPRING RATE PER BLADE -MAIN ROTOR ROLL
HUBKTP	TAIL ROTOR F/A HUB SPRING RATE PER BLADE
HUBKTR	TAIL ROTOR LATERAL HUB SPRING RATE PER BLADE
HUBTPS	SPRING RATE PER BLADE -TAIL ROTOR PITCH
HUBTRS	SPRING RATE PER BLADE -TAIL ROTOR ROLL
IPRINT	BLADE ELEMENT DATA PRINT INDICATOR
KONFIG	CONFIGURATION NUMBER, = 1. + TRIND + TRIND1
LAMBDA	VELOCITY *SIN(ALFA) -INDUCED VELOCITY (NOT DIVIDED BY OMEGA *R)
LNGTH1	LENGTH OF FIRST RAMP OR BASE OF HUMP FOR SIN**2 GUST
MXPASS	MAXIMUM NUMBER OF ITERATION ALLOWED IN TRIM (INPUT)
NORADL	NUMBER OF RADIAL STATIONS
NSCALE	SCALE FACTOR FOR PLOTS
OMEGMD	RATE OF CHANGE OF MAIN ROTOR SPEED (TARGET) RAD/SEC**2
PCGDED	PCG DEAD BAND
PCGMAX	MAXIMUM VALUE OF PCRATE
PCRATE	RATE OF CHANGE OF PCDEL
PILGH1	INTERMEDIATE GUST VARIABLE = PI / LNGTH1
PILGH2	INTERMEDIATE GUST VARIABLE = PI / LNGTH2
PSD30P	MAIN ROTOR TO ENGINE GEAR RATIO
PSD550	PSD / 550.
PWGWK1	COEFFICIENT FOR DEFLECTION OF WING WAKE CENTERLINE
PI1DTR	.0001745329, .01 * DTR
RCWING	1. / CWING
RDELT1	1. / TDELT
RDELT2	1. / HDELT
RITORS	1. / ITORS
RUDIND	RUDDER INDICATOR 1=WITH 0= WITHOUT
START2	START DISTANCE FOR 2ND RAMP OR HUMP FROM END OF 1ST GUST
SWINGH	.5 * SWING
SZET1C	INTERMEDIATE VARIABLE IN CONTROL LINKAGES
TCLOCK	TAIL ROTOR COLLECTIVE LOCK
VENTER	VELOCITY AT WHICH ELEVATOR ENTERS M.R. WAKE
VGUSTE	VERTICAL GUST VELOCITY ON ELEVATOR
VGUSTW	VERTICAL GUST VELOCITY ON WING
VXMVER	INTERMEDIATE VARIABLE = 1. / (VMAXE-VENTER)
WROTOR	WEIGHT OF HUB ASSEMBLY AND BLADES
XAPYLD	X ARM OF THE PYLON DRAG
XFLJET	X FORCE DUE TO LEFT OR CENTER JET
XFRJET	X FORCE DUE TO RIGHT JET
XLIMIT	MAXIMUM AMOUNT TRIM VARIABLES CAN CHANGE
XLMAXM	MAXIMUM VALUE OF XLIM FOR MAIN ROTOR
XLMAXT	MAXIMUM VALUE OF XLIM FOR TAIL ROTOR
XLMINM	MINIMUM VALUE OF XLIM FOR MAIN ROTOR
XLMINT	MINIMUM VALUE OF XLIM FOR TAIL ROTOR
XSTAHT	TAIL ROTOR NORTH-SOUTH DISTANCE FROM START OF GUST TO HUB
YALJET	Y ARM OF LEFT OR CENTER JET
YARJET	Y ARM OF RIGHT JET
YFLJET	Y FORCE DUE TO LEFT OR CENTER JET
YFRJET	Y FORCE DUE TO RIGHT JET
YGUSTF	LATERAL GUST VELOCITY ON THE FIN
YGUSTW	LATERAL GUST VELOCITY AT THE WING STATION LINE
YSTAHM	MAIN ROTOR EAST-WEST DISTANCE FROM START OF GUST TO HUB

YSTAHT	TAIL ROTOR EAST-WEST DISTANCE FROM START OF GUST TO HUB
ZAPYLD	Z ARM OF THE PYLON DRAG
ZDELT1	FIRST AND THIRD TIME INCREMENT FOR RUNGE-KUTTA INTEGRATION
ZDELT2	SECOND TIME INCREMENT FOR RUNGE-KUTTA INTEGRATION
ZETATR	TAIL ROTOR MAST TILT ANGLE
ZFLJET	Z FORCE DUE TO LEFT JET
ZFLWG1	SAVED VALUES OF LEFT WING LIFT- FOR UNSTEADY AERODYNAMICS
ZFRJET	Z FORCE DUE TO RIGHT OR CENTER JET
ZFRWG1	SAVED VALUES OF RIGHT WING LIFT FOR UNSTEADY AERODYNAMICS

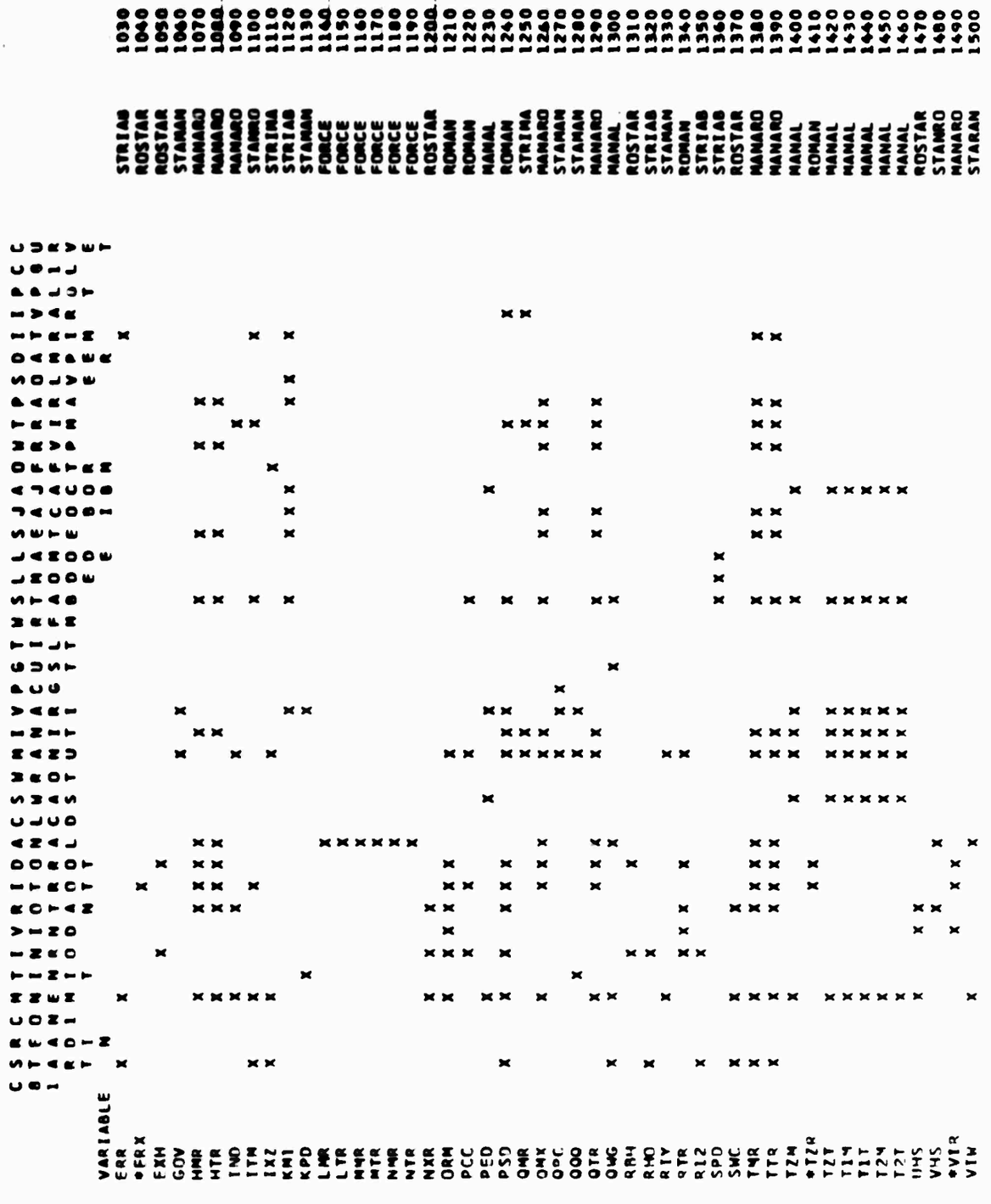
APPENDIX B

SUBROUTINES AND COMMONS CONTAINING EACH COMMON AND VARIABLE

VARIABLE	CB1	START	READIN	COKI	MNEM	TINIT	INRD	VIND	RDTAN	ITROT	DOROT	ANAL	CLCO	SWAS	WRDT	MANU	INIT	VARI	PCG	GUST	TILT	WRFM	STAB	LMODE	LAMODE	SETE	JACOBI	AJACOB	OFFTRM	WRVP	TRIM	PARA	SOLVE	DAMPER	ITRIM	IVAR	PPLOT	CBIL	CURVET		
FORCE					X							X				X	X	X				X	X			X		X			X	X								FORCE	70
STRIAB		X	X		X		X											X					X	X	X	X	X	X	X		X	X	X	X	X					STRIAB	80
STRIMA		X	X	X	X	X										X	X	X					X					X	X		X	X				X				STRIMA	90
ANDOIT									X	X	X																													ANDOIT	100
STAMAN		X			X	X	X									X	X	X		X	X																			STAMAN	110
MANAL		X		X	X							X		X		X	X	X		X	X		X					X			X	X			X					MANAL	120
ROMAN		X			X		X	X	X	X	X					X	X	X		X		X	X					X	X		X	X				X				ROMAN	130
MANARO		X			X			X	X	X	X	X				X	X	X		X			X			X	X	X	X	X	X	X			X					MANARO	140
STANRO		X			X			X	X	X	X	X				X							X	X				X			X				X					STANRO	150
ROSTAR		X			X		X	X	X	X	X																													ROSTAR	160
TOPLOT	X		X		X				X	X	X	X			X	X	X	X					X				X	X			X	X	X		X		X	X	X	TOPLOT	170
STARAN		X			X							X	X																											STARAN	180
A																	X					X				X														FORCE	190
*B		X						X																																STANRO	200
D		X	X				X																																	STRIAB	210
E																							X			X														STRIAB	220
F																											X	X							X					STRIAB	230
I									X	X		X				X		X																						MANARO	240
J									X	X													X					X							X					STANRO	250
O		X			X							X								X			X																	MANAL	260
*R							X	X	X		X																													ROMAN	270
T		X							X							X	X	X																						ROMAN	280
V					X				X			X				X	X						X						X		X									MANARO	290
W		X			X							X											X												X					STANRO	300
X																		X													X		X		X					STRIAB	310
Y					X						X	X				X	X	X											X		X				X						320
AH	X																																				X			TOPLOT	330
AI	X																																				X		X	TOPLOT	340
AM					X		X				X																													ROSTAR	350
AP					X							X					X																							MANAL	360
AY																X	X	X													X									STRIMA	370
A1									X	X																														ANDOIT	380
BH		X										X																												STARAN	390
BM		X			X			X				X											X								X				X					STANRO	400
R1									X	X																														ANDOIT	410
CT					X			X		X																														ROSTAR	420
C3												X	X																											STARAN	430
C4												X	X																											STARAN	440
DL																												X	X		X									STRIAB	450
DM																												X	X		X									STRIAB	460
DN																												X	X		X									STRIAB	470
DT		X	X				X																																	STRIAB	480
DX																												X	X		X									STRIAB	490
DY																												X	X		X									STRIAB	500
DZ																												X	X		X									STRIAB	510
*FR										X																														ROSTAR	520
HL					X	X	X											X			X																			STAMAN	530
IX		X			X																				X															STRIAB	540

VARIABLE	CALL	START	READIN	CON1	MONEM	TINIT	INROD	VIND	ROTAN	ITROTT	DONDT	ANALL	CLACLD	SWASS	WRDST	MANUT	INITT	VARI	PCG	GUST	TILT	WRFM	STAB	LMODDE	LAMDDE	SETF	JACOBI	ADJACOB	DFTRM	WRVP	TRIMA	PARLVE	SDLVE	DAMPER	ITRIM	IVAR	PPLOT	CBIL	CURVET
IY		X			X																			X														
IZ		X			X																				X													
*DR							X	X	X	X	X																											
PD																							X	X	X	X	X	X			X	X			X			
PI		X								X																												
QL												X				X							X					X										
QM												X				X							X					X										
QN												X				X							X					X										
RC					X																X																	
RM					X		X	X	X		X					X																						
RW					X							X																										
*T1									X																												
*T2									X																												
VH						X										X	X															X						
XB							X				X																											
XF					X							X				X							X					X										
XK									X		X																											
XX																X				X																		
XY										X	X																											
YF												X				X							X					X										
YY																X				X																		
ZF												X				X		X					X					X										
ZZ		X			X				X							X																						
AGW		X			X													X										X										
AIB							X				X					X																X						
AIR							X									X																						
ALT					X			X	X																													
AOR							X	X																														
APD					X				X			X				X		X					X						X		X							
APT		X			X				X			X				X		X		X			X				X	X	X		X	X			X			
ARD					X				X			X				X							X						X		X							
ARE		X			X				X			X				X				X			X				X	X	X		X	X			X			
AYD					X				X			X				X							X						X		X							
AYF		X			X				X							X				X			X				X	X	X		X	X			X			
AY1																X		X																				
AIM		X			X				X							X	X	X					X				X	X			X	X			X			
BTR		X			X			X				X											X								X				X			
BIM		X			X				X							X	X	X					X				X	X			X	X			X			
CLP		X										X																										
CLR		X										X																										
DCD												X	X																									
DQL					X							X																										
DQN					X							X																										
DTR		X			X		X																	X														
DT1						X										X		X					X					X										
DT2						X										X		X					X					X										
FPD																											X						X				
FRM		X								X																												

STRIAB	550
STRIAB	560
ROMAN	570
STRIAB	580
ROSTAR	590
FORCE	600
FORCE	610
FORCE	620
STAMAN	630
ROMAN	640
STARAN	650
ROMAN	660
ROMAN	670
STRIMA	680
ROSTAR	690
FORCE	700
ANDOIT	710
STAMAN	720
ANDOIT	730
FORCE	740
STAMAN	750
FORCE	760
ROMAN	770
STRIMA	780
ROMAN	790
ROMAN	800
ROSTAR	810
ROSTAR	820
MANARO	830
MANARO	840
MANARO	850
MANARO	860
MANARO	870
MANARO	880
STAMAN	890
MANARO	900
STANRO	910
MANARO	920
STARAN	930
STARAN	940
STARAN	950
STARAN	960
STARAN	970
STRIAB	980
STRIMA	990
STRIMA	1000
STRIAB	1010
ROSTAR	1020


1030 STRIAB
1040 ROSTAR
1050 ROSTAR
1060 STAMAN
1070 MANARO
1080 MANARO
1090 MANARO
1100 STAMRO
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1120 STRIAB
1130 STAMAN
1140 FORCE
1150 FORCE
1160 FORCE
1170 FORCE
1180 FORCE
1190 FORCE
1200 ROSTAR
1210 ROMAN
1220 ROMAN
1230 MANAL
1240 ROMAN
1250 STRIMA
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1270 STAMAN
1280 STAMAN
1290 MANARO
1300 MANAL
1310 ROSTAR
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1330 STAMAN
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1350 STRIAB
1360 STRIAB
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1390 MANARO
1400 MANAL
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1450 MANAL
1460 MANAL
1470 ROSTAR
1480 STAMRO
1490 MANARO
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QMR
QMX
QPC
QQQ
QTR
QWG
RRH
RMO
RIV
QTR
R12
SPD
SMC
TMR
TTR
TZM
*TZR
TZT
T14
T1T
T24
T2T
UHS
VHS
*VIR
VIM

VARIABLE	CB1	STAART	READIN	CON1	MONEM	TINIT	INROO	VINOD	ROTAAN	ITROOT	DOROOT	ANALOL	CLACDS	SWAOST	WMANUT	INANIT	VARGI	PACGS	GUSTT	TUITT	WIRFM	STABS	LMODOE	LAMDOE	SETOE	JACBOI	AJACOB	OFFTRM	WRVPS	TRIMM	PARAA	SOLVE	DAMPER	ITRIM	IVAIR	PPLOT	CB1L	CURVET		
VI2									X	X																												ANDOIT	1510
VI4									X	X																												ANDOIT	1520
VXB					X				X			X			X							X					X	X		X				X				MANARO	1530
VXS					X		X		X		X					X																						ROMAN	1540
VYB					X				X			X			X							X					X	X		X				X				MANARO	1550
VYS					X		X		X		X					X																						ROMAN	1560
VZB					X				X			X			X							X					X	X		X				X				MANARO	1570
VZS					X		X	X	X	X	X					X																						ROMAN	1580
XAR					X				X			X					X	X																				MANARO	1590
XBW		X	X																																		STRIAB	1600
XEL		X	X																																		STRIAB	1610
XER		X	X																																		STRIAB	1620
XFC		X	X		X																												X				STRIAB	1630
XFN		X	X																																		STRIAB	1640
XFS		X	X																				X														STRIAB	1650
XFW					X							X										X																FORCE	1660
XGN		X	X																																		STRIAB	1670
XIT		X	X																										X								STRIAB	1680
*XMA										X	X																											ROMAN	1690
*XMB										X	X																											ROMAN	1700
XMR		X	X		X																																	STRIAB	1710
XTR		X	X																																			STRIAB	1720
XWG		X	X		X																																	STRIAB	1730
XXD		X			X	X									X							X					X											STRIMA	1740
YAR					X				X			X					X	X																				MANARO	1750
YEL		X	X																				X															STRIAB	1760
YFN		X	X																																			STRIAB	1770
YFS		X			X							X																											STARAN	1780
YFW					X							X										X																FORCE	1790
YMR		X	X																																			STRIAB	1800
YTR		X	X																																			STRIAB	1810
YWG		X	X		X																		X															STRIAB	1820
YYD		X			X	X									X							X					X											STRIMA	1830
ZAR					X				X			X					X	X																				MANARO	1840
ZFW					X							X										X																FORCE	1850
ZZD		X			X	X									X							X					X			X								STRIMA	1860
*AIBP							X			X																												ROMAN	1870
*AIBR							X			X																												ROMAN	1880
ALEL					X							X				X														X								MANAL	1890
ALGF		X															X										X											STRIMA	1900
APBG		X															X																					STAMAN	1910
APDD					X				X						X																								ROMAN	1920
APDM									X		X																												ANDOIT	1930
*APDR							X		X																														ROMAN	1940
APDS									X		X																												ANDOIT	1950
APFM									X		X																												ANDOIT	1960
APFP					X	X									X	X												X											STRIMA	1970
APTD							X		X						X	X						X						X		X									ROMAN	1980

VARIABLE	CB1	START	REAIN	CONE1	MNEM	TINIT	INRO	VIND	ROTAN	ITROT	DORT	ANAL	CLCD	SWAS	WROT	MANU	INIT	VAIR	PCG	GUST	TILT	WRFM	STAB	LMODE	LAMDE	SEE	JACOBI	AJACOB	OFTRM	WRVP	TRIM	PAIRA	SOLVE	DAMPER	ITRIM	IVAIR	PPLOT	C81L	CURVET		
ARBG						X												X																					STAMAN	1990
ARDD				X					X							X																						ROMAN	2000
ARDM									X	X																												ANDOIT	2010
*ARDR							X		X																													ROMAN	2020
ARDS									X		X																											ANDOIT	2030
ARFM									X		X																											ANDOIT	2040
ARTD							X		X							X	X						X					X		X							ROMAN	2050
ASEP						X												X																			STAMAN	2060
AYBG		X																X																			STAMAN	2070
AYDD					X				X							X																					ROMAN	2080
AYFP					X	X										X	X												X		X						STRIMA	2090
AYFM									X		X																											ANDOIT	2100
AITR		X			X				X							X	X	X					X				X	X			X	X			X			MANARO	2110
BAIB		X			X							X																										STARAN	2120
BETA					X						X					X		X																				ROMAN	2130
BLCG		X					X																															STRIAB	2140
BWTC		X														X																						STAMAN	2150
BWTK		X														X																						STAMAN	2160
BWTM		X														X																						STAMAN	2170
BITR		X			X				X							X	X	X					X				X	X			X	X			X			MANARO	2180
CDHB							X				X																											ROSTAR	2190
CGBL		X															X				X																	STAMAN	2200
CGWL		X			X												X	X														X						STRIMA	2210
CLBQ		X										X																										STARAN	2220
CNBQ		X										X																										STARAN	2230
COLL				X	X													X					X												X			STRIMA	2240
COSE					X		X				X							X																				STAMAN	2250
CYCF				X	X													X					X					X			X					X		STRIMA	2260
CYCL				X	X													X					X					X			X					X		STRIMA	2270
CZET					X							X		X							X		X															MANAL	2280
DAMP		X			X																														X			STRIAB	2290
DEPD																											X							X				STRIAB	2300
DIST																X	X														X							STRIMA	2310
DPIX					X											X																							STAMAN	2320
DPIZ					X											X																							STAMAN	2330
DPSI					X						X					X	X	X					X								X							ROMAN	2340
DTRR		X					X			X	X						X						X									X				X			ROMAN	2350
EPDS		X			X																		X																STRIAB	2360
EPDX																															X			X	X				STRIAB	2370
ERTR		X								X																													ROSTAR	2380
ERXM		X			X					X																													ROSTAR	2390
ERXT		X			X					X																													ROSTAR	2400
ETAQ					X							X																											STARAN	2410
EXIT	X				X				X	X	X	X				X		X					X				X	X			X	X	X		X			TOPLOT	2420
FHPT							X									X																							STAMAN	2430
GFWD									X			X					X																							MANARO	2440
GLAT									X			X					X																							MANARO	2450
ICOM			X												X																						X			TOPLOT	2460

VARIABLE	C81	START	READIN	CONEM	MINIT	INRIO	VINOO	ROTAAN	ITROTT	DORDOT	ANALL	CLCOS	SWASST	WRONTU	MANITU	INAIRI	VACRG	PCGST	GUSTT	TILTT	WRFMM	STABB	LMODDE	LAMTODE	SETEE	JACOBI	AJACOB	OFTORM	WRVPM	TRIAM	PAIRA	SOLVE	DAMPER	ITRIM	IVAIR	PPLOT	C81L	CURVET
IPSN	X		X											X	X	X																			X	X	
KCIT			X														X																	X			
KVAR		X																							X			X									
LELE											X																										
LFIN											X																										
LFUS											X																										
LGUN											X					X																					
LINK				X				X	X	X				X								X				X		X									
LLWG											X																										
LQMR											X																										
LQTR											X																										
LROT						X		X																													
LRWG											X																										
MASS				X																			X	X			X										
MELE											X																										
MFIN											X																										
MFUS											X																										
MGUN											X					X																					
MLWG											X																										
MQMR											X																										
MQTR											X																										
MRWG											X																										
NELE											X																										
NFIN											X																										
NFUS											X																										
NGUN											X					X																					
NJET		X		X							X																										
NLWG											X																										
NPSI				X		X		X						X	X	X						X						X									
NQMR											X																										
NQTR											X																										
NRWG											X																										
NWAG				X				X			X			X																							
ORTR				X		X	X	X	X	X				X																							
PEOA			X	X												X						X				X		X						X			
PFAC									X	X																											
*PMOM									X	X																											
PSDD				X							X			X																							
PSDT		X		X		X		X	X	X				X		X												X						X			
*PSID						X		X	X	X																											
QELE		X									X												X														
QFIN		X									X																										
QMAX		X			X									X		X														X							
QMRS														X	X	X												X									
QSV1																						X			X	X											
RAIB		X				X				X																											
RFAC									X	X																											
*RMOM								X	X	X																											

TOPLOT	2470
STRIMA	2480
	2490
FORCE	2500
FORCE	2510
FORCE	2520
FORCE	2530
STANRO	2540
FORCE	2550
FORCE	2560
FORCE	2570
ROSTAR	2580
FORCE	2590
STRIAB	2600
FORCE	2610
FORCE	2620
FORCE	2630
FORCE	2640
FORCE	2650
FORCE	2660
FORCE	2670
FORCE	2680
FORCE	2690
FORCE	2700
FORCE	2710
FORCE	2720
STARAN	2730
FORCE	2740
ROMAN	2750
FORCE	2760
FORCE	2770
FORCE	2780
MANARO	2790
ROMAN	2800
STRIMA	2810
ANDOIT	2820
STANRO	2830
MANAL	2840
ROMAN	2850
ROMAN	2860
STANRO	2870
STARAN	2880
STRIMA	2890
STRIMA	2900
STRIAB	2910
ROSTAR	2920
ANDOIT	2930
STANRO	2940

VARIABLE	C81	STAR T	READ IN	CON1	MNEM	TINI T	INRO	VIND	ROTA N	ITRA T	DTRA T	DONA L	ACLD	SWAS T	WROT	MANU T	INIT	VARI	PGG	GUST	TILT	WFM	STAB	LMDE	LMOE	SETE	JACB I	AJCB	OFTR M	WRVP	TRIM	PARA	SOLV E	DMPE R	ITRI M	IVAR	PPLT	C81L	CURV ET
ROTJ									X		X																												
RTRP					X		X				X																												
R550					X	X										X																							
SZET					X							X									X		X																
TAIR		X			X	X			X																														
TAXL		X			X							X					X	X					X				X			X	X		X					
TAXR		X			X							X					X	X					X				X			X	X		X					
TIME																X		X													X								
TMAX			X		X											X																							
TMRS																							X		X	X					X			X					
TTRS																							X		X	X					X			X					
TZMS				X										X				X																					
TZMT										X	X					X	X						X					X				X							
TZTS				X										X				X																					
TZTT										X	X					X	X						X					X				X							
T1MS				X										X				X																					
T1MT									X							X	X						X					X				X							
T1TS				X										X				X																					
T1TT									X							X	X						X					X				X							
T2MS				X										X				X																					
T2MT									X							X	X						X					X				X							
T2TS				X										X				X																					
T2TT									X							X	X						X					X				X							
VIER					X							X																											
VIMR					X		X			X	X	X					X						X							X								
VITR					X		X			X	X	X					X						X							X								
VROT					X		X	X				X																											
VSND		X			X						X	X												X															
WLCG		X				X														X	X																		
XAWG		X			X							X								X	X		X																
XCIT			X															X																	X				
XCON		X	X		X																																		
XFMR												X																											
XFTR												X																											
XJET		X	X																																			
XK43									X		X																											
XLIM									X	X																													
XLNK					X									X							X																		
XMA1					X						X	X					X	X				X	X					X											
XMB1					X						X	X					X	X				X	X					X											
XMIN		X			X																													X				
YFIN												X																			X								
YFMR												X																											
YFTR												X																											
YMRF					X				X	X	X	X					X						X		X				X		X								
YTRF					X				X	X	X	X					X						X		X				X		X								
ZAWG		X			X							X								X	X																		
ZETA		X			X				X			X				X	X	X					X						X			X							

ANDOIT	2950
ROSTAR	2960
STAMAN	2970
MANAL	2980
ROSTAR	2990
MANAL	3000
MANAL	3010
STRIMA	3020
STRIMA	3030
STRIAB	3040
STRIAB	3050
STARAN	3060
ROMAN	3070
STARAN	3080
ROMAN	3090
STARAN	3100
ROMAN	3110
STARAN	3120
ROMAN	3130
STARAN	3140
ROMAN	3150
STARAN	3160
ROMAN	3170
STARAN	3180
MANARO	3190
MANARO	3200
STANRO	3210
STANRO	3220
STRIAB	3230
MANAL	3240
STRIMA	3250
STRIAB	3260
FORCE	3270
FORCE	3280
STRIAB	3290
ANDOIT	3300
ANDOIT	3310
MANAL	3320
ROMAN	3330
ROMAN	3340
STRIAB	3350
STANRO	3360
FORCE	3370
FORCE	3380
MANARO	3390
MANARO	3400
MANAL	3410
MANARO	3420

VARIABLE	C81	STAART	REAIN	CON1	MNEM	TINIT	INRO	VINO	ROTAN	ITROT	OORT	ANAL	CLCD	SWAST	WRONT	MANUT	INIRI	VARI	PCRG	GUST	TIMM	WRFM	STAB	LMODE	LAMODE	SETE	JACOBI	AJACOB	OFTRM	WRVP	TRIM	PARA	SLVE	DAMPER	ITRIM	IVAIR	PPLOT	CBLL	CURVET		
ZFEL												X																			X									STANRO	3430
ZFMR												X																											FORCE	3440
ZFTR												X																											FORCE	3450
ZZTR					X				X							X																							ROMAN	3460
AIBPM						X				X													X																ROMAN	3470
AIBPT						X				X													X																ROMAN	3480
AIBRM						X				X													X																ROMAN	3490
AIBRT						X				X													X																ROMAN	3500
ALCYP												X						X										X											MANAL	3510
ALERT						X												X																					STAMAN	3520
ALFIN					X							X					X															X							MANAL	3530
ALGE2		X																X										X											STRIMA	3540
ALGE1			X															X										X											STRIMA	3550
ALGE2			X															X										X											STRIMA	3560
ALLWG					X							X					X															X							MANAL	3570
ALRWG					X							X					X															X							MANAL	3580
APBMT					X				X			X				X		X					X						X											MANARO	3590
APDBS									X	X																														ANDOIT	3600
APTTD						X			X							X	X						X						X		X									ROMAN	3610
ARBMT					X				X			X				X							X						X											MANARO	3620
ARDBS									X	X																														ANDOIT	3630
ARTTD						X			X							X	X						X						X		X									ROMAN	3640
AYBMT					X				X			X				X		X					X						X											MANARO	3650
AYDMX						X												X																						STAMAN	3660
AYEFP																															X				X					STRIAB	3670
AZETA						X			X							X		X																						ROMAN	3680
A1BAL									X														X																	STANRO	3690
BETAO											X					X		X																						ROMAN	3700
BETAE					X					X	X					X							X			X	X				X				X					MANARO	3710
BETAN					X		X			X	X						X	X																						ROMAN	3720
BETAX					X		X			X	X						X	X																						ROMAN	3730
BETAZ					X		X			X	X					X		X																						ROMAN	3740
BETAO					X					X	X					X	X													X										MANARO	3750
BNPSI					X					X													X								X									ROMAN	3760
B1BAL									X														X																	STANRO	3770
CBFAC									X		X																													ANDOIT	3780
COELE					X							X					X																							MANAL	3790
COFIN					X							X					X																							MANAL	3800
CDLWG					X							X					X																							MANAL	3810
CORWG					X							X					X																							MANAL	3820
CGSTA		X			X												X	X														X								STRIMA	3830
CLBCL		X										X																												STARAN	3840
CLELE					X							X					X																							MANAL	3850
CLFIN					X							X					X																							MANAL	3860
CLLWG					X							X					X																							MANAL	3870
CLOCK				X										X				X					X																	MANAL	3880
CLRWG					X							X					X																							MANAL	3890
CNBCL		X										X																												STARAN	3900

VARIABLE	C81	START	REAIN	CON1	MNEM	TINIT	INRIO	IVND	VROTAN	IROOT	IDRAOT	DACAL	CLCALO	SWCAOS	WRAOUT	MANUIT	INAIRI	VPACG	PGUST	TGUILT	WRFM	STABE	LMODE	LAMODE	SEATE	JACBOI	AJACOB	OFTRM	WRVPM	TRIMA	PAIRA	SOLVE	DAMPER	ITRIM	IVAIR	PPLOT	C81OL	CURVET		
CNPCD		X			X																																STRIAB	3910
CNPCL		X										X																									STARAN	3920
CNRCD		X										X																									STARAN	3930
CNRCL		X										X																									STARAN	3940
COLKS					X							X																									STARAN	3950
CONDI		X								X																	X						X				STANRO	3960
COND2		X							X	X																											ROMAN	3970
CONEK							X				X																											ROSTAR	3980
CPWIC				X													X										X										STRIMA	3990
CWING					X							X							X			X															MANAL	4000
CYCR1					X									X			X										X										MANAL	4010
CYCR2					X									X			X										X										MANAL	4020
CZET4														X						X																	MANAL	4030
CZET6														X						X																	MANAL	4040
CZET9														X						X																	MANAL	4050
DCAFR							X		X																													ROSTAR	4060
DELT2															X																							STAMAN	4070
DIXIZ					X										X												X										STRIMA	4080
OIYIX					X										X												X										STRIMA	4090
OIZIY					X										X												X										STRIMA	4100
DPIXZ					X										X																							STAMAN	4110
OTBWT						X									X																							STAMAN	4120
OTZMT						X									X						X					X												STRIMA	4130
DIZM1						X									X						X					X												STRIMA	4140
DTZT1						X									X						X					X												STRIMA	4150
D3ELE		X										X																										STARAN	4160
FLOCK				X										X			X																					MANAL	4170
FNSWC		X										X																										STARAN	4180
FTKTS						X										X														X								STRIMA	4190
FVIND		X								X																												ROSTAR	4200
GDISK									X		X																											ANDOIT	4210
GMAXV											X								X															X				ROMAN	4220
GUESS		X	X		X																																	STRIAB	4230
GVERT									X			X			X	X																						MANARO	4240
HDELT															X		X	X																				STAMAN	4250
HGUSI						X										X			X																			STAMAN	4260
HLTR1					X												X																					STAMAN	4270
HLTR2					X	X											X																					STAMAN	4280
HUBKI																	X																	X				STRIMA	4290
HUBKM																	X																	X				STRIMA	4300
HUBKP							X				X				X	X	X																	X				ROMAN	4310
HUBKR							X				X				X	X	X																	X				ROMAN	4320
ISTOP						X									X		X																					STAMAN	4330
ITORS					X										X																							STAMAN	4340
KREAO			X														X																	X				STRIMA	4350
KTCTR						X									X																							STAMAN	4360
LLJET					X							X																										FORCE	4370
LRJET					X							X																										FORCE	4380

VARIABLE	C81	STAART	READIN	CON1	MNEM	TINIT	INRIO	VINND	ROTAN	ITROOT	DRAOT	ACNAL	CLACD	SWAOST	WRAOST	MANUT	INAIT	VARGI	PCG	GUSLT	TIFLT	WRFAM	STAOB	LMAODE	LAMODE	SETCE	JACBOI	AJACOB	OFFTRM	WRVP	TRIM	PARA	SOLVE	DAMPER	ITRIM	IVAR	PPLOT	C81L	CURVET
LWING					X							X																											
MLJET					X							X																											
MRJET					X							X																											
NLJET					X							X																											
NOPSI									X		X																											
NPART	X		X		X										X																X					X			
NPASS																																X			X				
NRJET					X							X																											
NTIME	X																X																					
NVARA	X																																			X		X	
NVARB	X				X											X																				X		X	
NVARC	X				X				X																											X		X	
NVARD					X				X																														
NVARS	X															X																							
OMEGM		X														X		X	X																				
PCDEL						X													X																				
PDPHI																		X													X		X		X				
PEDAL		X			X												X	X					X			X	X			X	X			X					
PIU3O		X															X																						
PMOMM										X	X	X																								X			
PMOMT										X	X	X																											
PMREL		X			X							X																											
PMRWG		X										X																											
PTRFN		X										X																											
QMRSA						X										X		X																					
RANGE														X							X,		X								X								
RATE1											X								X																X				
RATE2											X								X																X				
RMASS					X											X																							
RMOMM									X	X	X	X																											
RMOMT									X	X	X	X																											
RPIST					X							X																											
STACG		X					X																																
STOP2											X									X															X				
SWING					X							X											X																
SWKR1							X		X																														
SWKR2							X		X																														
SZET5														X							X																		
SZET7														X							X																		
SZET8														X							X																		
TANA1										X	X																												
TANB1										X	X																												
TANT1									X		X																												
TANT2									X		X																												
TDELT									X			X				X		X													X								
THROT									X							X																							
TIP18							X				X																												
TIP38							X				X																												

STARAN	4390
FORCE	4400
FORCE	4410
FORCE	4420
ANDOIT	4430
TOPLOT	4440
STRIAB	4450
FORCE	4460
TOPLOT	4470
TOPLOT	4480
TOPLOT	4490
TOPLOT	4500
ROSTAR	4510
TOPLOT	4520
STAMAN	4530
STAMAN	4540
STRIAB	4550
MANARO	4560
STRIMA	4570
STANRO	4580
STANRO	4590
STARAN	4600
STARAN	4610
STARAN	4620
STAMAN	4630
MANAL	4640
ROMAN	4650
ROMAN	4660
STAMAN	4670
STANRO	4680
STANRO	4690
STARAN	4700
STRIAB	4710
ROMAN	4720
STANRO	4730
ROSTAR	4740
ROSTAR	4750
MANAL	4760
MANAL	4770
MANAL	4780
ANDOIT	4790
ANDOIT	4800
ANDOIT	4810
ANDOIT	4820
MANARO	4830
ROMAN	4840
ROSTAR	4850
ROSTAR	4860

VARIABLE	C81	START	READIN	CON1	MONEN	TINIT	INRO	VIND	ROTAN	ITROOT	DONROT	ANAL	CLCD	SWAST	WROT	MANU	INIT	VARI	PCG	GUST	TILT	WRFM	STAB	LMODE	LAMODE	SEE	JACOBI	AJACOB	OFTRM	WRVP	TRIN	PRA	SOLVE	DANPER	ITRIN	IVAR	PLOT	C81L	CURVET		
TRALT					X	X										X																							STAMAN	4870
TRIND		X			X		X		X							X		X					X					X										ROMAN	4880
TSTAB		X	X			X										X							X															STRIMA	4890
TWIST					X		X				X																												ROSTAR	4900
TWOPI		X					X									X																							STAMAN	4910
TZERO			X		X																										X								STRIAB	4920
VGUST						X											X			X																			STAMAN	4930
VMAXE		X			X							X																											STARAN	4940
VZETA							X		X							X		X																					ROMAN	4950
WGCOL												X						X																					MANAL	4960
XAELE		X			X							X									X	X		X															MANAL	4970
XAFIN		X										X									X	X																	MANAL	4980
XAFUS		X										X										X																	MANAL	4990
XAGUN		X																				X																	STAMAN	5000
XAJET		X			X							X										X																	MANAL	5010
XAPYL		X																				X																	STAMAN	5020
XARSP					X		X										X					X																	STAMAN	5030
XFELE												X																					X							FORCE	5040
XFFIN												X																					X							FORCE	5050
XFFUS												X																												FORCE	5060
XFGUN												X						X																						FORCE	5070
XFLWG												X																					X							FORCE	5080
XFRWG												X																					X							FORCE	5090
XGUST											X									X																X				ROMAN	5100
XLOCK				X										X				X																						MANAL	5110
XMAIT					X					X	X					X						X	X				X													ROMAN	5120
XMBIT					X					X	X					X						X	X				X													ROMAN	5130
XMOMD									X	X	X																													ANDOIT	5140
XMOML									X	X	X																													ANDOIT	5150
*XSTAH											X																													ROMAN	5160
YAELE		X										X									X																			STARAN	5170
YAERO		X			X							X	X																											STARAN	5180
YAFIN		X										X								X	X																			MANAL	5190
YAFUS		X										X									X																			STARAN	5200
YAGUN		X																				X																	STAMAN	5210
YALWG					X							X										X																			STARAN	5220
YARSP					X		X															X																			STANAN	5230
YARWG		X			X							X										X																			STARAN	5240
YFFIN												X																					X	X							FORCE	5250
YFFUS												X																													FORCE	5260
YFGUN												X						X																							FORCE	5270
YGUST						X											X			X																					STAMAN	5280
*YSTAH											X																															ROMAN	5290
ZAELE		X			X							X									X	X																			NANAL	5300
ZAFIN		X										X									X	X																			NANAL	5310
ZAFUS		X										X										X																			NANAL	5320
ZAGUN		X																X				X																			STAMAN	5330
ZAJET		X			X							X										X																			MANAL	5340

VARIABLE	C81	STAART	READIN	CON1	MONEM	TINNIT	INROO	VINOD	RIOTAN	ITROOT	DOORT	ANACL	CLACD	SWAST	WRONT	NANUT	INAUT	VAKI	PCG	GUST	TILT	TFM	WFVP	SLADE	LMODE	LAMODE	SETE	JACOBI	AJACOB	OFTRM	WRVP	TRIM	PAIRA	SOLVE	DAMPER	ITRIM	IVAR	PPLOT	C81L	CURVET		
ZAPYL		X																			X																				STAMAN	5350
ZARSP					X		X											X			X																				STAMAN	5360
*ZETAR		X							X																																MANARO	5370
ZFELE												X																				X	X								FORCE	5380
ZFFUS												X																													FORCE	5390
ZFGUN												X						X																							FORCE	5400
ZFLWG												X				X																	X								FORCE	5410
ZFRWG												X				X																	X								FORCE	5420
ZMAX2			X		X											X																									STRIMA	5430
ZMAX3			X		X											X																									STRIMA	5440
ALECR1												X						X											X												MANAL	5450
ALGFPD												X						X											X												MANAL	5460
APBJET		X			X							X																													STARAN	5470
ARBJET					X							X																													STARAN	5480
ASECOL						X										X								X					X												STRIMA	5490
AYBJET		X			X							X																													STARAN	5500
*AZETAR							X		X																																ROMAN	5510
AZETAT							X		X							X		X																								ROMAN	5520
BETAES																					X						X	X				X				X					STRIAB	5530
BETAZD							X				X					X		X																								ROMAN	5540
BETAZS							X											X																								STAMAN	5550
BOTTOM														X							X																					MANAL	5560
CLRADK							X				X																															ROSTAR	5570
CNPCD1					X							X																														STARAN	5580
CNPCD2					X							X																														STARAN	5590
COLJET		X			X							X																														STARAN	5600
COLSTK		X			X							X				X	X	X							X			X	X			X	X			X					MANARO	5610
CYPWIC			X															X											X												STRIMA	5620
CYSTK1		X			X												X	X							X			X	X			X	X			X					MANARO	5630
CYSTK2		X			X												X	X							X			X	X			X	X			X					MANARO	5640
CZET11														X							X																					MANAL	5650
CZET12														X							X																					MANAL	5660
CZET13														X							X																					MANAL	5670
DCAFXK								X	X																																	ANDOIT	5680
DELTA3							X				X																															ROSTAR	5690
DELTZR																X		X																									STAMAN	5700
DODCOL																									X				X													STRIAB	5710
DTRRSO		X																								X																STRIAB	5720
DXWGEL					X							X																															STARAN	5730
DZWGEL					X							X																															STARAN	5740
EIMAST		X																			X																					STAMAN	5750
EIZETA												X									X																					MANAL	5760
ENGRPM		X																															X									STRIAB	5770
ETAOMX		X										X																															STARAN	5780
GEARAT		X			X											X	X																X	X								STRIMA	5790
GMAXV1											X									X																	X					ROMAN	5800
GMAXV2											X									X																	X					ROMAN	5810
GMAXV3											X									X																	X					ROMAN	5820

VARIABLE	C81	STAART	READIN	CONEM1	MNEMT	TINIT	IINRO	VINNO	RKTANN	ITROUT	DORDT	DANAL	CLCO	SWASST	WRONT	MANUT	INIT	VARI	PCG	GUST	TILT	WRFM	SLTAB	LMODE	LAMODE	SETER	JACOBI	AJACOB	OFTRM	WRVP	TRIM	PARA	SOLVE	OAMPER	ITRIM	IVAR	PPLOT	C81OL	CURVET		
GPRELO		X														X																								STAMAN	5830
GUSTYP					X				X		X									X																			ROMAN	5840
HALFPI		X		X	X							X				X		X																	X				MANAL	5850
*HFORCE									X	X	X																													MANARO	5860
HGUSTE					X				X			X								X																			MANARO	5870
HGUSTF					X				X			X								X																			MANARO	5880
HGUSTW					X				X			X								X																			MANARO	5890
HLPYLO		X																			X																			STAMAN	5900
HNPSIR					X						X												X							X										ROMAN	5910
*HUBKPR							X				X																													ROMAN	5920
HUBKPS							X				X					X		X																						ROMAN	5930
*HUBKRR							X				X																													ROMAN	5940
HUBKRS							X				X					X																								ROMAN	5950
HUBKTP							X				X					X	X	X																		X				ROMAN	5960
HUBKTR							X				X					X	X	X																		X				ROMAN	5970
HUBTPS							X				X					X																								ROMAN	5980
HUBTRS							X				X					X																								ROMAN	5990
IBRAKE					X	X										X		X																						STAMAN	6000
IPRINT									X		X																													ANDOIT	6010
KONFIG					X				X								X	X													X	X							ROMAN	6020
LAMBDA								X		X	X																													ROSTAR	6030
LNGTH1											X									X																X				ROMAN	6040
MXPASS		X																																X					STRIAB	6050
NORADL									X		X																													ANDOIT	6060
NPRINT	X																X	X																		X				TOPLOT	6070
NSCALE	X																																				X	X		TOPLOT	6080
OMEGMD					X													X	X																					STAMAN	6090
PCGOED		X																	X																					STAMAN	6100
PCGMAX		X																X	X																					STAMAN	6110
PCRATE					X													X	X																					STAMAN	6120
PILGH1											X									X																X				ROMAN	6130
PILGH2					X						X																				X									STANRO	6140
PSD30P		X																														X								STRIAB	6150
PSO550					X											X	X	X														X								STRIMA	6160
PSIREF					X		X				X					X		X																						ROMAN	6170
PSISTP					X											X																				X				STRIMA	6180
QXBRAK																X																				X				STRIMA	6190
PWGEL1		X										X												X																STANRO	6200
PWGWK1		X										X																												STARAN	6210
P010TR		X																			X																			STAMAN	6220
QBRAKE																X	X																							STAMAN	6230
RCWING					X							X																													STARAN	6240
RDELT1																X																									STAMAN	6250
RDELT2																X		X																							STAMAN	6260
RITORS					X	X										X																									STAMAN	6270
RUDINO			X	X														X									X					X								STRIMA	6280
SHEARO									X	X	X																														ANDOIT	6290
SHEARL									X	X	X																														ANDOIT	6300

VARIABLE	C81	START	READIN	CON1	MNEM	TININIT	ININIO	VINIO	ROTAN	ITROOT	OUTROOT	AANAL	ACCO	SWAOST	WROOT	MANUT	INANIT	VARI	PCG	GUST	TILT	WRFM	STABO	LMODE	LAMODE	SEATE	JACCBI	AJACOB	OFTAM	WRI	TRIM	PARA	SOLVE	DAMPER	ITRIM	IVAIR	PPLOT	C81L	CURVET
SHEARR									X	X	X																												
START2											X									X																X			
SWINGH					X							X																											
SZETIO														X							X																		
TCLOCK				X										X				X																					
*THRUST		X							X	X	X																												
*TORQUE										X	X																												
TRIND1		X			X																																	
TRIND2					X	X												X																				
UPGUST					X						X																											
URGUST					X						X																											
UTGUST					X						X																											
VENTER		X			X							X																										
VGUSTE					X				X			X								X																		
VGUSTW					X				X			X								X																		
VXMVER					X							X																										
*VZETAR							X		X																														
VZETAT							X		X							X		X																				
WROTOR					X				X																													
XAPYLD												X									X																	
XFLJET					X							X																										
XFRJET					X							X																										
*XLIMAX									X																														
*XLIMIN										X																													
XLIMIT		X			X																													X	X			
XLMAXM					X				X																													
XLMAXT					X				X																													
XLMINM		X			X					X																												
XLMINT		X			X					X																												
XSTAHM											X									X																		
XSTAHT											X									X																		
YALJET					X							X									X																	
YARJET		X			X							X									X																	
YFLJET					X							X																										
*YFORCE									X	X	X																												
YFRJET					X							X																										
YGUSTF					X				X			X								X																		
YGUSTW					X							X								X																		
YSTAHM											X									X																		
YSTAHT											X									X																		
ZAPYLD												X									X																	
ZDELT1			X		X											X															X							
ZDELT2			X		X											X																						
ZETATR		X			X				X								X	X														X						
ZFLJET					X							X																										
ZFLWG1												X				X																						
ZFRJET					X							X																										
ZFRWG1												X				X																						

ANDOIT	6310
ROMAN	6320
STARAN	6330
MANAL	6340
MANAL	6350
MANARO	6360
MANARO	6370
STRIAB	6380
STAMAN	6390
ROSTAR	6400
ROSTAR	6410
ROSTAR	6420
STARAN	6430
MANARO	6440
MANARO	6450
STARAN	6460
ROMAN	6470
ROMAN	6480
ROSTAR	6490
MANAL	6500
FORCE	6510
FORCE	6520
ROSTAR	6530
ROSTAR	6540
STRIAB	6550
ROSTAR	6560
ROSTAR	6570
ROSTAR	6580
ROSTAR	6590
ROMAN	6600
ROMAN	6610
STARAN	6620
STARAN	6630
FORCE	6640
MANARO	6650
FORCE	6660
MANARO	6670
MANAL	6680
ROMAN	6690
ROMAN	6700
MANAL	6710
STRIMA	6720
STRIMA	6730
MANARO	6740
FORCE	6750
MANAL	6760
FORCE	6770
MANAL	6780

APPENDIX C

COMMONS AND VARIABLES IN EACH SUBROUTINE AND COMMON

C81

TOPLOT
AH
AL
EXIT
IPSN
NPART
NTIME
NVARA
NVARB
NVARC
NVARS
NPRINT
NSCALE

START

STRIAB
STRIMA
STAMAN
MANAL
ROMAN
MANARO
STANRO
ROSTAR
STARAN
*B
D
O
T
W
BH
BM
DT
IX
IY
IZ
PI
ZZ
AGW
APE
ARE
AYE
AIM
BTR
BIM
CLP
CLR
DTR
ERM
ERR
ITM
IXZ
PSD
OWG
RHO
R12
SWC
TMR
TTR
XBW
XEL
XER
XFC
XFN

XFS
XGN
XIT
XMR
XTR
XWG
XXD
YEL
YFN
YFS
YMR
YTR
YWG
YYD
ZZD
ALGF
APBG
AYBG
AITR
BAIB
BLCG
BWTC
BWTK
BWTM
BITR
CGBL
CGWL
CLBO
CNBO
DAMP
DTRR
EPDS
ERTR
ERXM
ERXT
KVAR
NJET
PSDT
QELE
QFIN
QMAX
RAIB
TAIR
TAXL
TAXR
VSND
WLCG
XAWG

XCON
XJET
XMIN
ZAWG
ZETA
ALGEZ
CGSTA
CLBCL
CNBCL
CNPCD
CNPCL
CNRCD
CNRCL
COND1
COND2
D3ELE
FNSWC
FVIND
GUESS
OMEGM
PEDAL
PIU3D
PMREL
PMRWG
PTRFN
STACG
TRIND
TSTAB
TWOPI
VMAXE
XAELE
XAFIN
XAFUS
XAGUN
XAJET
XAPYL
YAELE
YAERO
YAFIN
YAFUS
YAGUN
YARWG
ZAELE
ZAFIN
ZAFUS
ZAGUN
ZAJET
ZAPYL

*ZETAR
APBJET
AYBJET
COLJET
COLSTK
CYSTK1
CYSTK2
DTRRSQ
EIMAST
ENGRPM
ETAQMX
GEARAT
PRELD
ALFPI
HLPYLD
MXPASS
PCGDED
PCGMAX
PSD30P
PWGEL1
PWGWK1
P01DTR
*THRUST
TRIND1
VENTER
XLIMIT
XLMINM
XLMINT
YARJET
ZETATR

READIN

STRIAB
STRIMA
TOPLOT
D
DT
XBW
XEL
XER
XFC
XFN
XFS
XGN
XIT
XMR
XTR
XWG
YEL
YFN
YMR
YTR
YWG
ICOM
IPSN
KCIT
TMAX
XCIT
XCON
XJET
GUESS
KREAD
NPART
TSTAB
TZERO
ZMAX2
ZMAX3
ZDELT1
ZDELT2

CONI

STRTMA
MANAL
COLL
CYCF
CYCL
PEDA
T2MS
T2TS
T1MS
T1TS
T2MS
T2TS
ALGE1
ALGE2
CLOCK
CPWIC
FLOCK
XLOCK
CYPWIC
HALFPI
RUDIND
TCLOCK

MNEM

MNEM

FORCE
STRIAB
STRIMA
STAMAN
MANAL
ROMAN
MANARO
STANRO
POSTAR
TOPLOT
STARAN
Q
V
W
Y
AM
AP
BM
CT
HL
IX
IY
IZ
RC
RM
PW
XF
ZZ
AGW
ALT
APD
APE
ARD
ARE
AYD
AYE
AIM
BTR
BIM
DOL
DQN
DTR
ERR
HMR
HTR
IND
ITM
IXZ
NXR
ORM
PED
PSD
QMX
QTR
QWG
RIY
SWC
TMR
TTR
T2M
T2T
T2T
UHS
VIW
VXB
VXS
VYB
VYS
VZB
VZS
XAR
XFC
XFW
XMR
XWG
XXD
YAR
YFS
YFW
YWG
YYD
ZAR
ZFW
ZZD
ALEL
APDD
APFP
ARDD
AYDD
AYFP
AITR
BAIB
BETA
BITR
CGWL
COLL
COSE
CYCF
CYCL
CZET
DAMP
DPIX
DPIZ
DPSI
EPDS
ERXM
ERXT
ETAQ
EXIT
LINK
MASS
NJET
NPSI
NWAG
ORTR
PEDA
PSDD
PSDT
RTRP
R550
SZET
TAIR
TAXL
TAXR
TMAX
VIER
VIMR
VITR
VROT
VSND
XAWG
XCON
XLNK
XMA1
XMB1
XMIN
YMRF
YTRF
ZAWG
ZFTA
ZZTR
ALFIN
ALLWG
ALRWG
APBMT
ARBMT
AYBMT
BETAE
BETAN
BETAX
BETAZ
BETAQ
BNPSI
CDELE
CDFIN
CDLWG
CDRWG
CGSTA
CLELE
CLFIN
CLLWG
CLRWG
CNPCD
COLKS
CWING
CYCR1
CYCR2
DIXIZ
DIYIX
DIZIY
DPIXZ
GUFSS
HLTR1
HLTR2
ITORS
LLJET
LRJET
LWING
MLJET
MRJET
NLJET
NPART
NRJET
NVARB
NVARC
NVARD
PEDAL
PMREL
RMASS
RPIST
SWING
TRALT
TRIND
TWIST
TZERO
VMAXE
XAELE
XAJET
XARSP
XMA1T
XMB1T
YAERO
YALWG
YARSP
YARWG
ZAELE
ZAJET
ZARSP
ZMAX2
ZMAX3
APBJET
ARBJET
AYBJET
CNPCD1
CNPCD2
COLJET
COLSTK
CYSTK1
CYSTK2
DXWGEL
DZWGEL
GEARAT
GUSTYP
HALFPI
HGUSTE
HGUSTF
HGUSTW
HNPSIR
IBRAKE
KONFIG
PILGH2
PSD550
PSIREF
PSISTP
RCWING
RITORS
RUDIND
SWINGH
TRIND1
TRIND2
UPGUST
URGUST
UTGUST
VENTER
VGUSTE
VGUSTW
VXMVER
WROTOR
XFLJET
XFRJET
XLIMIT
XLMAXM
XLMAXT
XLMINM
XLMINT
YALJET
YARJET
YFLJET
YFRJET
YGUSTF
YGUSTW
ZDELT1
ZDELT2
ZETATR
ZFLJET
ZFRJET

TINIT

STRIMA
STAMAN
HL
VH
DT1
DT2
KPD
QQQ
XXD
YYD
ZZD
APFP
ARBG
ASEP
AYFP
QMAX
R55D
TAIR
ALERT
AYDMX
DTBWT
DTZMT
DTZM1
DTZT1
FTKTS
HGUST
HLTR2
ISTOP
KTCTR
PCDEL
QMRSA
TRALT
TSTAB
VGUST
YGUST
ASECOL
IBRAKE
OMEGMD
PCRATE
RITORS
TRIND2

INRO

STRIAB
STAMAN
ROMAN
ROSTAR
D
*R
AM
OT
HL
*OR
RM
XB
AIR
AIR
AOR
OTR
EXH
NXR
ORM
PCC
PSO
PBH
RHO
RTR
R12
VXS
VYS
VZS
*AIRR
*AIBR
*APER
ARTO
*AOOR
ARIO
RLCG
COH3
COSE
OTRR
EHOT
LRHT
NPSI
ORTR
PSOT
*PSID
AAIR
OTRR
WLCG
AIBPM
AIBPT
AIBRM
AIBRT
APTTD
ARTTD
AZETA
BETAN
BETAX
BETAZ
CONEK
DCAFR
HUBKP
HUBKR
STACG
SWKR1
SWKR2
TIP18
TIP38
TRIND
TWIST
TWOPI
VZETA
XARSP
YARSP
ZARSP
*AZETAR
AZETAT
BETAZD
BETAZS
CLRADK
DELTA3
*HUBKPR
HUBKPS
*HUBKRR
HUBKRS
HUBKTP
HUBKTR
HUBTPS
HUBTRS
PSIREF
*VZETAR
VZETAT

VIND

VIND

ROMAN
MANARD
STANRD
R STAR
*R
*R
RM
CT
* DP
RM
ALT
A DR
BTR
ORM
RTR
UMS
*VIP
VZS
GRTC
VIMP
VITR
VROT
LAMPDA

ROTAN

ANDJIT
POMAN
MANARD
STANRD
RUSTAR
TOPLOT
I
J
*P
T
Y
A1
B1
*DS
PM
*T1
*T2
XK
ZZ
ALT
APD
APF
APD
APF
AYD
AYF
A1M
B1M
HMP
HTR
IND
NXR
OPM
PSD
PTP
SWC
TMP
TTP
UHS
VHS
VI2
VI4
VXR
VXS
VYR
VYS
VZR
VZS

XAR
YAR
ZAR
APDD
APDM
*APDR
APDS
APFM
APTD
ARDD
ARDM
*ARDR
ARDS
ARFM
ARTD
AYDD
AYFM
A1TR
B1TP
EXIT
GFWD
GLAT
LINK
LROT
NPSI
NWAG
ORTR
PSDT
*PSID
*PMOM
ROTJ
TAIP
T1MT
T1TT
T2MT
T2TT
V2DT
XK43
XLIM
YMRF
YTRF
ZETA
ZZTR
APBMT
APDBS
APTTD
ARBMT
ARDBS

ARTTD
AYBMT
AZETA
A1BAL
B1BAL
CBFAC
COND2
DCAFR
GDISX
GVERT
NOPSI
NVARC
NVARD
RMOMM
RMOMT
SWKR1
SWKR2
TANT1
TANT2
TOELT
THROT
TRIND
VZETA
XMOMD
XMOML
*ZETAR
*AZETAR
AZETAT
DCAFXK
GUSTYP
*HFORCE
HGUSTE
HGUSTF
HGUSTW
IPRINT
KONFIG
NORADL
SHEARD
SHEARL
SHEARR
*THRUST
VGUSTE
VGUSTW
*VZETAR
VZETAT
WROTOR
*XLIMAX
XLMAXM

XLMAXT
*YFORCE
YGUSTF
ZETATR

ITROT

ANDJIT	*RMOM
ROMAN	RTRP
MANARO	TZMT
STANRO	TZTT
ROSTAR	VIMR
TOPLOT	VITR
I	XLIM
J	XMA1
A1	XMB1
B1	YMRF
CT	YTRF
*ER	AIBPM
*OP	AIBPT
PI	AIBRM
XY	AIBRT
ERM	APOBS
*ERX	AROBS
HMR	BETAE
HTR	BETAN
ITM	BETAX
ORM	BETAZ
PCC	BETAO
PSD	BNPSI
QMX	COND1
QTR	COND2
TMR	FVIND
TTR	PMOMM
*TZR	PMOMT
*VIR	RMOMM
VI2	RMOMT
VI4	TANA1
VZS	TANB1
*XMA	XMA1T
*XMB	XMB1T
*AIBP	XMOMO
*AIBR	XMOML
DTRR	DCAFXK
ERTR	*HFORCE
ERXM	LAMBDA
ERXT	SHEARD
EXIT	SHEARL
LINK	SHEARR
ORTR	*THRUST
PFAC	*TORQUE
*PMOM	*XLIMIN
PSDT	XLMINM
*PSID	XLMINT
RFAC	*YFORCE

DOROT

ANDOIT
ROMAN
MANARO
STANRO
ROSTAR
TOPLOT
*P
Y
AM
*OP
RM
XB
XK
XY
AIB
EXH
HMR
HTR
ORM
PSD
QMX
QTR
PBH
RTR
TMR
TTR
*TZR
*VIR
VXS
VYS
VZS
*XMA
*XMB
APDM
APDS
APEM
ARDM
ARDS
AREM
AYEM
BETA
COMB
COSF
DPSI
DTRR
EXIT
LINK
ORTR
PFAC
*PMOM
PSDT
*PSID
RAIB
RFAC
*RMOM
ROTJ
TZNT
TZTT
VIMR
VITR
VSND
XK43
XMA1
XMB1
YMRF
YTRF
BETAD
BETAE
BETAN
BETAX
BETAZ
BETAO
CBFAC
CONEK
GDISK
GMAXV
HUBKP
HUBKR
NOPSI
PMOMM
PMOMT
RATE1
RATE2
RMOMM
RMOMT
STOP2
TANA1
TANB1
TANT1
TANT2
TIP1B
TIP3B
TWIST
XGUST
XMA1T
XMB1T
XMOMD
XMOML
*XSTAH
*YSTAH
BETAZD
CLRADK
DELTA3
GMAXV1
GMAXV2
GMAXV3
GUSTYP
*HFORCE
HNPSIR
*HUBKPR
HUBKPS
*HUBKRR
HUBKRS
HUBKTP
HUBKTR
HUBTPS
HUBTRS
IPRINT
LAMBDA
LNGTH1
NORADL
PILGH1
PILGH2
PSIREF
SHEARD
SHEARL
SHEARR
START2
*THRUST
*TORQUE
UPGUST
URGUST
UTGUST
XSTAHM
XSTAHT
*YFORCE
YSTAHM
YSTAHT

ANAL

[illegible]	VIW	QFIN	LQJET	APRJET
MANAL	VXR	SZET	LWING	ARBJET
MANARD	VYR	TAXL	ML JET	AYBJET
STANRD	VZB	TAXR	MRJET	CNPCDI
[illegible]DLOT	XAP	VIFR	NL JET	CNPCD?
STANRD	XFW	VIMR	NRJET	COLJET
!	YAR	VITR	PMOMN	COLSTK
"	YFS	VROT	PMOMT	DXWGFL
	YFW	VSND	PMREL	DZWGFL
#	ZAR	XAWG	PMPWG	FIZETA
$	ZFW	XFMR	PTRFN	FTAOMX
%P	ALEL	XFTR	RMOMM	HALFPI
&M	BAIB	YFIN	RMOMT	HGUSTF
'M	CLOO	YFMR	RPIST	HGUSTF
(	CNBO	YFTR	SWING	HGUSTW
(%	CZET	YMRF	TDELT	PWGFLI
)I	ETAO	YTRF	VMAXF	PWGWKI
)M	EXIT	ZAWG	WGCOL	RCWING
)%	GFWD	ZFTA	XAFLE	SWINGH
*M	GLAT	ZFFL	XAFIN	VENTFR
+F	LFLF	ZFMR	XAFUS	VGUSTE
+F	LFIN	ZFTR	XAJET	VGUSTW
,F	LFUS	ALCYP	XFFLE	VXMVER
-PO	LGUN	ALFIN	XFFIN	XAPYLD
-PF	LLWG	ALLWG	XFFUS	XFLJET
-RO	LOMR	ALRWG	XFGUN	XFRJET
-TF	LQTR	APAMT	XFLWG	YALJET
-YO	LRWG	ARAMT	XFRWG	YARJET
.TR	MELE	AYAMT	YAELE	YFLJET
/LP	MFIN	CDELE	YAERO	YFRJET
/LO	MFUS	CDFIN	YAFIN	YGUSTF
/PO	MGUN	CDLWG	YAFUS	YGUSTW
0L	MLWG	CDRWG	YALWG	ZAPYLD
00%	MQMR	CLACL	YARWG	ZFLJET
1MP	MQTR	CLELE	YFFIN	ZFLWGI
1TP	MRWG	CLFIN	YFFUS	ZFRJET
1WR	NFLE	CLLWG	YFGUN	
1TR	NFIN	CLRWG	ZAFLE	
1WP	NFUS	CNBCL	ZAFIN	
1TP	NGUN	CNPCL	ZAFUS	
1WR	NJET	CNRCO	ZAJET	
1TR	NLWG	CNRCL	ZFELE	
2MX	NQMR	COLKS	ZFFUS	
2TP	NQTR	CWING	ZFGUN	
2WR	NRWG	D?ELE	ZFLWG	
3MP	NWAG	FNSWC	ZFRWG	
3TP	PSDO	GVFRT	ALECRI	
4MS	QFLF	LLJET	ALGFPD	

CLCD

STAFAN
C3
C4
DCD
YAERO

SWAS

MANAL
PED
TZM
TZT
T1M
T1T
T2M
T2T
CZET
TZMS
TZTS
T1MS
T1TS
T2MS
T2TS
XLNK
CLOCK
CYCR1
CYCR2
CZET4
CZET6
CZET9
FLOCK
RANGE
SZET5
SZET7
SZET8
XLOCK
BOTTOM
CZET11
CZET12
CZET13
SZET10
TCLOCK

WROT

WROT

YCPLOT
ICOM
IPSN
NPART

MANU

FORCE
STEIMA
STAMAN
MANAL
ROMAN
MAMARO
STANRO
TOPLOT
I
T
V
Y
AY
OL
OM
ON
PM
VH
YF
XY
YF
YY
ZF
ZZ
AIR
AIR
APO
APF
ARO
ARE
AYO
AYF
AY1
AIM
RIM
DT1
DT2
GOV
IND
IXZ
ORM
PCC
PSI
QMA
QMX
OPC
QQJ
QTP
RIY
RTR
TMR
TTR
TZM
TZT
T1M
T1T
T2M
T2T
VXR
VYR
VZR
XXD
YYD
ZZD
APDD
APFP
APTD
ARDD
ARTD
AYDD
AYFP
ALTR
BETA
BWTC
BWTK
BWTM
RLTR
DIST
DPIX
DPIZ
DPSI
EXIT
FHPT
IPSN
LINK
NPSI
NWAG
ORTR
PSDD
PSDT
QMAX
QMRS
R550
TIME
TMAX
TZMT
TZTT
T1MT
T1TT
T2MT
T2TT
ZETA
ZZTR
APBMT
APTTD
ARBMT
ARTTD
AYBMT
AZETA
BETAD
BETAE
BETAZ
BETAO
DELT2
DIXIZ
DIYIX
DIZIY
DPIXZ
DTBWT
DTZMT
DTZM1
DTZT1
GVERT
HDELT
HUBKP
HUBKR
ISTOP
ITORS
KTCTR
NVARB
NVARS
OMEGM
QMRSA
RMASS
TDELT
THROT
TRALT
TRIND
TSTAB
TWOPI
VZETA
ZFLWG
ZFRWG
ZMAX2
ZMAX3
ASECOL
AZETAT
BETAZD
COLSTK
DELT2R
GEARAT
GPRELD
HALFPI
HUBKPS
HUBKRS
HUBKTP
HUBKTR
HUBTPS
HUBTRS
IBRAKE
PSD550
PSIREF
PSISTP
QXBRAK
QBRAKE
RDELT1
RDELT2
RITORS
VZETAT
ZDELT1
ZDELT2
ZFLWG1

INIT

[illegible]	NPSI	CYSTK2
STPIMA	QMRS	GEARAT
STAMAN	TAXL	HUBKTP
MANAL	TAXR	HUBKTR
ROMAN	TZMT	KONFIG
MANARO	TZTT	NPRINT
TOPLOT	TIMT	PSD55O
A	TITT	OBPAKE
T	T2MT	ZETATR
V	T2TT	
Y	VIMR	
AP	VITR	
AY	XMA1	
VH	XMB1	
A1M	YMRF	
B1M	YTRF	
[illegible]	ZETA	
HTP	ALFIN	
PSO	ALLWG	
QMR	ALRWG	
QMY	APTTO	
QTO	ARTTO	
TMR	BETAN	
TTP	BETAX	
T2M	BETAO	
T2T	CDELE	
T1M	CDFIN	
TIT	CDLWG	
T2M	CDRWG	
T2T	CGSTA	
VXS	CLELE	
VYS	CLFIN	
VZS	CLLWG	
ALFL	CLRWG	
APFP	FTKTS	
APTO	GVERT	
APTO	HGUST	
AYFP	HUBKP	
ALTP	HUBKR	
BLTP	NTIME	
CGBL	PEDAL	
CGWL	PIU30	
CIST	VGUST	
CPSI	XMAIT	
CTRR	XMBIT	
CEWO	YGUST	
CLAT	COLSTK	
IPSN	CYSTK1	

VARI

FORCE
STRIAB
STRIMA
STAMAN
MANAL
ROMAN
MANARD
TOPLOT
I
T
X
Y
AY
HL
ZF
AGW
APD
APE
AYI
A1M
R1M
DT1
DT2
GOV
KM1
KPD
PED
PSD
QPC
QQQ
TZM
T2T
T1M
T1T
T2M
T2T
XAR
YAR
ZAR
ALGF
APRG
ARRG
ASEP
AYRG
BITR
BETA
BITR
CGWL

COLL
COSE
CYCF
CYCL
DPSI
EXIT
KCIT
LGUN
MGUN
NGUN
NPSI
PEDA
PSDT
QMAX
QMRS
TAXL
TAXR
TIME
TZMS
TZTS
T1MS
T1TS
T2MS
T2TS
XCIT
XMA1
XMB1
ZETA
ALCYP
ALERT
ALGEZ
ALGE1
ALGE2
APBMT
AYBMT
AYDMX
AZETA
BETAD
BETAN
BETAX
BETAZ
CGSTA
CLOCK
CPWIC
CYCR1
CYCR2
FLOCK
HDELT

HLTR1
HLTR2
HUBKI
HUBKM
HUBKP
HUBKR
ISTOP
KREAD
OMEGM
PDPHI
PEDAL
QMRSA
TDELT
TRIND
VZETA
WGCOL
XAGUN
XARSP
XFGUN
XLOCK
YAGUN
YARSP
YFGUN
ZAGUN
ZARSP
ZFGUN
ALEGR1
ALGFPD
AZETAT
BETAZD
BETAZS
COLSTK
CYPWIC
CYSTK1
CYSTK2
DELT2R
HALFPI
HUBKPS
HUBKTP
HUBKTR
IBRAKE
KONFIG
NPRINT
OMEGMD
PCGMAX
PCRATE
PSD550
PSIREF

RDELT2
RUDIND
TCLOCK
TRIND2
VZETAT
ZETATR

PCG

OPC
HDELT
OMEGM
PCDEL
OMEGMD
PCGDFD
PCGMAX
PCRATE

STAMAN
MANAL
ROMAN
MANARO
0
XX
YY
ARE
ARE
AVE
OWG
XAR
YAR
ZAR
XAWG
ZAWG
CWING
GMAXV
HGUST
RATE1
RATE2
STOP2
VGUST
XAFLE
XAFIN
XGUST
YAFIN
YGUST
ZAFLE
ZAFIN
GMAXV1
GMAXV2
GMAXV3
GUSTYP
HGUSTE
HGUSTF
HGUST#
LNGTH1
PILGH1
START2
VGUSTE
VGUST#
XSTAH#
XSTAHT
YGUSTE
YGUST#
YSTAH#
YSTAHT

TILT

STAMAN
MANAL
HL
RC
CGOL
CZET
SZET
XAWG
XLNK
ZAWG
CZET4
CZET6
CZET9
RANGE
SZET5
SZET7
SZET8
XAELE
XAFIN
XAFUS
XAGUN
XAJET
XAPYL
XARSP
YAELE
YAFIN
YAFUS
YAGUN
YALWG
YARSP
YARWG
ZAELE
ZAFIN
ZAFUS
ZAGUN
ZAJET
ZAPYL
ZARSP
BOTTOM
CZET11
CZET12
CZET13
EIMAST
EIZETA
HLPYLD
P01DTR
SZET10
XAPYLD
YALJET
YARJET
ZAPYLD

WRFM

FORCE
ROMAN
A
XMA1
XMB1
XMA1T
XMB1T

STAB

FORCE
STRIAB
STRIMA
MANAL
ROMAN
MANARO
STANRO
TOPLOT
E
J
O
V
W
BM
PD
QL
QM
QN
XF
YF
ZF
APD
APE
ARD
ARE
AYD
AYE
AIM
BTR
BIM
DT1
DT2
HMR
HTR
ITM
KM1
PCC
PSD
QMX
QTR
QWG
SPD
TMR
TTR
TZM
TZT
T1M
T1T
T2M
T2T
VXB
VYB
VZB
XFW
XXD
YFW
YYD
ZFW
ZZD
APTD
ARTD
AITR
BITR
COLL
CYCF
CYCL
CZET
DPSI
DTRR
EPDS
EXIT
LINK
NPSI
PEDA
QSV1
SZET
TAXL
TAXR
TMRS
TTRS
TZMT
TZTT
T1MT
T1TT
T2MT
T2TT
VIMR
VITR
XAWG
XMA1
XMB1
YMRF
YTRF
ZETA
AIBPM
AIBPT
AIBRM
AIBRT
APBMT
APTTD
ARBMT
ARTTD
AYBMT
A1BAL
BETAE
BNPSI
B1BAL
CLOCK
CWING
DTZMT
DTZM1
DTZT1
PEDAL
RANGE
SWING
TRIND
TSTAB
XAELE
XMA1T
XMB1T
ASECOL
BETAES
COLSTK
CYSTK1
CYSTK2
DODCOL
HNPSIR

LMODE

STRIAB
STANRO
IY
PD
OTR
SPD
YEL
YWG
MASS
QELF
VSND
DTRRSQ
PWGEL1

LAMODE

STRIAB
IX
IZ
PD
SPD
XFS
MASS

SETE

SETE

FORCE
STRIAB
MANARO
A
E
PD
HMR
HTR
KM1
QMX
QTR
TMR
TTR
QSV1
TMRS
TTRS
YMRF
YTRF
BETAE
BETAES

JACOBI

STRIAB
MANARO
TOPLOT
F
PD
APE
ARE
AYE
A1M
B1M
EPD
KM1
OMX
QTR
TMR
TTR
A1TR
B1TR
DEPD
EXIT
KVAR
QSV1
TMRS
TTRS
BETAE
PEDAL
BETAES
COLSTK
CYSTK1
CYSTK2
DQDCOL

AJAC08

FORCE
STRIAB
STRIMA
MANAL
ROMAN
MANARO
STANRO
TOPLOT
F
J
DL
DM
DN
DX
DY
DZ
PD
QL
QM
QN
XF
YF
ZF
AGW
APF
ARF
AYE
A1M
B1M
DT1
DT2
KMI
PED
TZM
TZT
T1M
T1T
T2M
T2T
VXB
VYB
VZB
XXD
YYD
ZZD
ALGF
A1TR
B1TR

CYCF
CYCL
EXIT
LINK
PEDA
TAXL
TAXR
TZMT
TZTT
T1MT
T1TT
T2MT
T2TT
XMA1
XMB1
ALCYP
ALGE2
ALGE1
ALGE2
COND1
CPWIC
CYCR1
CYCR2
DTZMT
DTZM1
DTZT1
PEDAL
TRIND
WGCOL
XMA1T
XMB1T
ALECR1
ALGFPD
ASECOL
COLSTK
CYPWIC
CYSTK1
CYSTK2
RUDIND

OFFTRM

STRIAB
STRIMA
ROMAN
MANARO
V
Y
DL
DM
DN
DX
DY
DZ
APD
APE
ARD
ARE
AYD
AYE
IXZ
VXB
VYB
VZB
APEP
APTD
ARTD
AYEP
MASS
ZETA
APBMT
APTTD
ARBMT
ARTTD
AYBMT
DIXIZ
DIYIX
DIZIY

MRVP

MANARO
HMR
HTR
QMX
QTR
TMR
TTR
KVAR
VIMR
VITR
YMRF
YIRF
BETAO

MRVP

APF	NPART	FORCE	
ARD	PDPHI	DIST	
ARE	PEDAL	STRIAB	
AVD	RANGE	OPSI	
AVF	TDELT	STRIMA	
A1M	TZERO	EPDX	
RTR	YFFIN	EXIT	
BIM	ZFELE	MANAL	
IND	BETAES	LINK	
ITM	COLSTK	NPSI	
PSD	CYSTK1	MANARD	
QMP	CYSTK2	STANRD	
QMX	GEARAT	PFDA	
QTP	HNPSIR	PSDT	
TMP	KONFIG	QMRS	
TTR	PILGH2	TAXL	
VXM	ZDELT1	TAXR	
VYR		TIME	
VZR		TMRS	
XIT		TTRS	
APTD		VFIN	
ARTJ		ZFEL	
AVFP		APTTD	
A1TR		ARTTD	
RITR		AVEFP	
CYCF		BETAE	
CYCL		BNPSI	
		NPART	
		PDPHI	
		PEDAL	
		RANGE	
		TDELT	
		TZERO	
		YFFIN	
		ZFELE	
		BETAES	
		COLSTK	
		CYSTK1	
		CYSTK2	
		GEARAT	
		HNPSIR	
		KONFIG	
		PILGH2	
		ZDELT1	

TRIM TRIM

PARA

PARA

FORCE
STRIAB
STRIMA
MANAL
ROMAN
MANARO
TOPLOT
PD
VH
AIB
APF
ARE
AYE
A1M
B1M
HMR
HTR
KM1
QMX
QTR
TMR
TTR
ZZD
ALFL
A1TR
B1TR
CGWL
DTRR
EXIT
QMAX
TAXL
TAXR
TZMT
TZTT
T1MT
T1TT
T2MT
T2TT
YMRF
YTRF
ZETA
ALFIN
ALLWG
ALRWG
CGSTA
FTKTS
NPASS
PEDAL

XFELE
XFFIN
XFLWG
XFRWG
YFFIN
ZFELE
ZFLWG
ZFRWG
COLSTK
CYSTK1
CYSTK2
ENGRPM
GEARAT
KONFIG
PSD30P
PSD55O
RUDIND
ZETATR

SOLVE

STRIAB
TOPLOT
X
KM1
EXIT
POPHI

DAMPER

STRIAB
EPD
DEPD
EPDX
XMIN
XLIM[illegible]

ITRIM

STRIAB
MANAL
MANARO
STANRO
TOPLOT
F
J
W
X
Y
PM
PD
APE
APF
AYF
AIM
BTR
BIM
ERR
ITM
KM1
TMR
TTR
VXB
VYB
VZB
XFC
AITR
BITR
DAMP
EPDX
EXIT
TAXL
TAXR
TMRS
TTRS
AYEFP
BETAE
COND1
NPASS
PDPHI
PEDAL
BETAES
CDLSTK
CYSTK1
CYSTK2
HALFPI
MXPASS

XLIMIT

IVAR

IVAR

STRIMA
ROMAN
PSD
QMR
COLL
CYCF
CYCL
OTRR
KCIT
PEDA
PSDT
XCIT
RETAN
GMAXV
HUBKI
HUBKM
HUBKP
HUBKR
KREAD
PIU30
RATE1
RATE2
STOP2
XGUST
GMAXV1
GMAXV2
GMAXV3
HUBKTP
HUBKTR
LNGTH1
PILGH1
PSISTP
QXBRAK
START2

PPLOT

TOPLOT
AH
AL
IPSN
NPART
NTIME
NVARA
NVARB
NVARC
NPRINT
NSCALE

CALL

TOPLOT
ICOM
IPSN
NSCALE

CALL

CURVET

CURVET

TRIPLET
AL
NVARA
NVARB
NVARC

FORCE

FORCE
A
OL
OM
ON
XF
YF
ZF
LMR
LTR
MMR
MTR
NMP
NTR
XFW
YFW
ZFW
LELE
LFIN
LFUS
LGUN
LLWG
LOMR
LOTR
LRWG
MELE
MFIN
MFUS
MGUN
MLWG
MOMR
MOTR
MRWG
NELE
NFIN
NFUS
NGUN
NLWG
NOMR
NOTR
NRWG
XFMR
XFTR
YFMP
YFTR
ZFMP
ZFTR
LLJET
LRJET
MLJET
MRJET
NLJET
NRJET
XFELE
XFFIN
XFFUS
XFGUN
XFLWG
XFRWG
YFFIN
YFFUS
YFGUN
ZFELE
ZFFUS
ZFGUN
ZFLWG
ZFRWG
XFLJET
XFRJET
YFLJET
YFRJET
ZFLJET
ZFRJET

STRIAB

STRIAB
D
E
F
X
DL
DM
DN
DT
DX
DY
DZ
IX
IY
IZ
PD
DTR
EPD
ERR
KMI
RHO
R12
SPD
XBW
XEL
XER
XEC
XEN
XES
XGN
XIT
XMR
XTR
XWG
YEL
YEN
YMR
YTR
YWG
BLCG
DAMP
DEPD
EPDS
EPDX
MASS
OSV1
TMRS
TTRS

WLCG
XCON
XJET
XMIN
AYEEP
CNPCD
GUESS
NPASS
PDPHI
STACG
TZERO
BETAES
DODCOL
DTRRSO
ENGRPM
MXPASS
PSD30P
TRIND1
XLIMIT

STRIMA

STRIMA
AY
VH
AGW
DT1
DT2
IXZ
QMR
XXD
YYD
ZZD
ALGF
APFP
AYFP
CGWL
COLL
CYCF
CYCL
DIST
KCIT
PEDA
QMAX
QMRS
TIME
TMAX
XCIT
ALGE2
ALGF1
ALGE2
CGSTA
CPWIC
DIXIZ
DIYIX
DIZIY
DTZMT
DTZM1
DTZT1
FTKTS
HUBKI
HUBKM
KREAD
PIU30
TSTAB
ZMAX2
ZMAX3
ASECOL
CYPWIC
GEARAT

PSD550
PSISTP
QXBRAK
RUDIND
ZDELT1
ZDELT2

ANDOIT

ANDOIT
A1
H1
XK
XY
VI2
VI4
APDM
APDS
APFM
ARDM
ARDS
ARFM
AYFM
PFAC
PFAC
POTJ
XK43
XLIM
APDBS
ARDBS
CBFAC
GDISK
NOPSI
TANA1
TANA2
TANT1
TANT2
XMOMD
XMOML
DCAFXK
IPRINT
NOPADL
SHFARD
SHFARL
SHFARR

STAMAN

STAMAN
HL
RC
XX
YY
AY1
GOV
KPD
OPC
QQQ
RIY
APBG
ARBG
ASFP
AYBG
BWTC
BWTK
BWTM
CGRL
COSF
DPIX
DPIZ
FMPT
R550
ALERT
AYDMX
DELT2
DPIXZ
DTBWT
HDELT
HGUST
HLTR1
HLTR2
ISTOP
ITORS
KTCTR
OMEGM
PCDEL
QMRSA
RMASS
TRALT
TWOPI
VGUST
XAGUN
XAPYL
XARSP
YAGUN
YARSP
YGUST
ZAGUN
ZAPYL
ZARSP
BETAZS
DELT2R
EIMAST
GPRELD
HLPYLD
IBRAKE
OMEGMD
PCGDED
PCGMAX
PCRATE
PD1DTR
QBRAKE
RDELT1
RDELT2
RITORS
TRIND2

MANAL

MANAL
Q
AP
PED
QWG
TZM
TZT
T1M
T1T
T2M
T2T
ALEL
CZET
PSDD
SZET
TAXL
TAXR
XAWG
XLNK
ZAWG
ALCYP
ALFIN
ALLWG
ALRWG
CDELE
CDFIN
CDLWG
CDRWG
CLELE
CLFIN
CLLWG
CLOCK
CLRWG
CWING
CYCR1
CYCR2
CZET4
CZET6
CZET9
FLOCK
RANGE
SZET5
SZET7
SZET8
WGCOL
XAELE
XAFIN
XAFUS
XAJET
XLOCK
YAFIN
ZAELE
ZAFIN
ZAFUS
ZAJET
ALECR1
ALGFPD
BOTTOM
CZET11
CZET12
CZET13
EIZETA
HALFPI
SZET10
TCLOCK
XAPYLD
YGUSTW
ZAPYLD
ZFLWG1

ROMAN

ROMAN
*R
T
*OR
RM
*T1
*T2
ZZ
AIB
AIR
ORM
PCC
PSD
RTR
*TZR
VXS
VYS
VZS
*XMA
*XMB
*AIBP
*AIBR
APDD
*APDR
APTD
ARDD
*ARDR
ARTD
AYDD
BETA
DPSI
DTRR
NPSI
ORTR
PSDT
*PSID
TZMT
TZTT
T1MT
T1TT
T2MT
T2TT
XMA1
XMB1
ZZTR
AIBPM
AIBPT
AIBRM
AIBRT
APTTD
ARTTD
AZETA
BETAD
BETAN
BETAX
BETAZ
BNPSI
COND2
GMAXV
HUBKP
HUBKR
RATE1
RATE2
STOP2
THROT
TRIND
VZETA
XGUST
XMA1T
XMB1T
*XSTAH
*YSTAH
*AZETAR
AZETAT
BETAZD
GMAXV1
GMAXV2
GMAXV3
GUSTYP
HNPSIR
*HUBKPR
HUBKPS
*HUBKRR
HUBKRS
HUBKTP
HUBKTR
HUBTPS
HUBTRS
KONFIG
LNGTH1
PILGH1
PSIREF
START2
*VZETAR
VZETAT
XSTAHM
XSTAHT
YSTAHM
YSTAHT

MANARO

MANARO	HGUSTE
I	HGUSTF
V	HGUSTW
APD	*THRUST
APE	*TORQUE
APD	VGUSTE
APE	VGUSTW
AYD	*YFORCE
AYE	YGUSTF
AIM	ZETATP
BIM	
HMR	
HTR	
IND	
QMX	
QTR	
TMR	
TTR	
*VIR	
VXB	
VYB	
VZB	
XAR	
YAR	
ZAP	
ALTR	
BITR	
GFWJ	
GLAT	
NWAG	
VIMR	
VITR	
YMRF	
YTRF	
ZETA	
APBMT	
ARBMT	
AYBMT	
BETAE	
BETAD	
GVERT	
PEDAL	
TDELT	
*ZETAR	
COLSTK	
CYSTK1	
CYSTK2	
*HFORCE	

STANRO

```
STANRO
*B
J
W
BM
BTR
ITM
VHS
LINK
*PMOM
QELE
*RMOM
VROT
VSND
YFIN
ZFEL
A1BAL
B1BAL
COND1
PMOMM
PMOMT
RMOMM
RMOMT
SWING
PILGH2
PWGEL1
```

ROSTAR

ROSTAR
AM
CT
*ER
PI
XB
ALT
AOR
ERM
*ERX
EXH
NXR
RBH
SWC
UHS
COHB
ERTR
ERXM
ERXT
LROT
RAIB
RTRP
TAIR
CONEK
DCAFR
FVIND
NVARD
SWKR1
SWKR2
TIP1B
TIP3B
TWIST
CLRADK
DELTA3
LAMBDA
UPGUST
URGUST
UTGUST
WROTOR
*XLIMAX
*XLIMIN
XLMAXM
XLMAXT
XLMINM
XLMINT

TOPLOT

TOPLOT
AH
AL
EXIT
ICOM
IPSN
NPART
NTIME
NVARA
NVARB
NVARC
NVARS
NPRINT
NSCALE

STARAN
BH
C2
C4
RW
CLP
CLR
DCD
DOL
DON
VIW
YES
BAIB
CLBD
CNBD
ETAD
NJET
OFIN
T2MS
T2TS
T1MS
T1TS
T2MS
T2TS
VIER
CLBCL
CNBCL
CNPCL
CNRCD
CNRCL
COLKS
D3ELF
ENSWC
LWING
PMREL
PMRWG
PTREN
RPIST
VMAXE
YAFLE
YAERO
YAFUS
YALWG
YARWG
APBJET
ARBJET
AYBJET
CNPCD1
CNPCD2
COLJET
DXWGEL
DZWGEL
ETAQMX
PWGWK1
RCWING
SWINGH
VENTER
VXMVER
YALJET
YARJET

APPENDIX D

SUBROUTINES CONTAINING EACH VARIABLE, BY COMMON

VARIABLE	C81	START	READIN	DNI	MNEM	TININIT	INRDO	VNDD	ROTRANT	ITROOT	DOROOT	ANAL	CLCDS	SWAOST	WPOST	MANUT	INITT	VARI	PCGS	GUST	TILT	WRFM	STAB	LMODE	LAMODE	SETE	JACBI	AJACOB	OFFTRM	WRVP	TRIM	PARA	SOLVE	DAMPER	ITRIM	IVAR	PPLOT	C81L	CURVET	
FORCF					X							X				X	X	X				X	X			X		X				X	X							FORCE
A																	X					X				X														
QL												X				X							X					X												
QM												X				X							X					X												
QN												X				X							X					X												
XF					X							X				X							X					X												
YF												X				X							X					X												
ZF												X				X		X					X					X												
LMR												X																												
LTR												X																												
MMR												X																												
MTR												X																												
NMR												X																												
NTR												X																												
XFW					X							X											X																	
YFW					X							X											X																	
ZFW					X							X											X																	
LELE												X																												
LFIN												X																												
LFUS												X																												
LGUN												X						X																						
LLWG												X																												
LQMR												X																												
LQTR												X																												
LRWG												X																												
MELE												X																												
MFIN												X																												
MFUS												X																												
MGUN												X						X																						
MLWG												X																												
MQMR												X																												
MQTR												X																												
MRWG												X																												
NELE												X																												
NFIN												X																												
NFUS												X																												
NGUN												X						X																						
NLWG												X																												
NQMR												X																												
NQTR												X																												
NRWG												X																												
XFMR												X																												
XFTR												X																												
YFMR												X																												
YFTR												X																												
ZFMR												X																												
ZFTR												X																												
LLJET					X							X																												

VARIABLE	C81	STAART	READIN	CON1	MONEM	TINIT	INRIO	VIND	ROTAN	ITROOT	DONACL	ACLDS	SWAST	WRONT	MANUT	INIRT	VARI	PCG	GUST	TILTT	WRFM	STABE	LMODE	LAMDE	SETE	JACOBI	AJACOB	OFTRM	WRVP	TRIM	PARA	SOLVE	DAMPER	ITRIM	IVAR	PPLOT	C81L	CURVET
FORCE				X							X				X	X	X				X	X			X		X			X	X							
LRJET				X							X																											
MLJET				X							X																											
MRJET				X							X																											
NLJET				X							X																											
NRJET				X							X																											
XFELE											X																				X							
XFFIN											X																				X							
XFFUS											X																											
XFGUN											X					X																						
XFLWG											X																				X							
XFRWG											X																				X							
YFFIN											X																				X	X						
YFFUS											X																											
YFGUN											X					X																						
ZFELE											X																				X	X						
ZFFUS											X																											
ZFGUN											X					X																						
ZFLWG											X				X																	X						
ZFRWG											X				X																	X						
XFLJET					X						X																											
XFRJET					X						X																											
YFLJET					X						X																											
YFRJET					X						X																											
ZFLJFT					X						X																											
ZFRJET					X						X																											

FORCE

VARIABLE	CRL	START	READIN	CONL	MNEM	TINIT	INROD	VIND	ROTAON	ITROOT	DORDT	ACLACL	CLACOS	SWRONT	MANIUT	INITI	VAIRI	PCG	GUSTT	TILTT	WRFM	STABDE	LMODE	LAMODE	SETE	JACOBI	ADJACOBM	OFFTRM	WRVP	TRIM	PARA	SOLVE	DAMPER	ITRIM	IVAIR	PPLOT	CBIL	CURVET
STRIAB		X	X		X		X										X					X	X	X	X	X	X			X	X	X	X	X			
D		X	X				X																														
E																						X			X												
F																										X	X							X			
X																	X													X		X		X			
DL																											X	X		X							
DM																											X	X		X							
DN																											X	X		X							
DT		X	X				X																				X	X		X							
DX																											X	X		X							
DY																											X	X		X							
DZ																											X	X		X							
IX		X			X																			X													
IY		X			X																		X														
IZ		X			X																			X													
PD																						X	X	X	X	X	X			X	X			X			
DTR		X			X		X																X														
EPD																										X							X				
ERR		X			X																													X			
KM1																	X					X			X	X	X			X	X			X			
RHO		X					X																														
PI2		X					X																														
SPD																						X	X	X													
XBW		X	X																																		
XEL		X	X																																		
XER		X	X																																		
XFC		X	X		X																													X			
XFN		X	X																																		
XFS		X	X																					X													
XGN		X	X																																		
XIT		X	X																										X								
XMR		X	X		X																																
XTR		X	X																																		
XWG		X	X		X																																
YEL		X	X																				X														
YFN		X	X																																		
YMR		X	X																																		
YTR		X	X																																		
YWG		X	X		X																		X														
BLCG		X					X																														
DAMP		X			X																													X			
DEPD																										X							X				
EPDS		X			X																y																
EPDX																														X			X	X			
MASS					X																		X	X				X					X				
OSV1																					X				X	X											
TMRS																					X				X	X				X				X			
TTRS																					X				X	X				X				X			

STRIAB

VARIABLE	C81	START	READIN	CONE1	MNEM	TININT	INRIOD	VINDD	ROTANT	TRODOT	DONOOT	ANACL	CLCDS	SWAOST	WRONUT	MANIUT	INARI	VARI	PCG	GUSST	TUILT	WRFM	STABDE	LMODDE	LAMODE	SETE	JACOBI	AJACOB	OFTRM	WRVP	TRIM	PARA	SOLVE	DAMPER	ITRIM	IVAR	PPLOT	C81L	CURVET
STRIAB		X	X		X		X										X						X	X	X	X	X	X			X	X	X	X	X				
WLCG		X					X																																
XCON		X	X		X																																		
XJET		X	X																																				
XMIN		X			X																													X					
AYEFP																														X				X				
CNPCD		X			X																																		
GUESS		X	X		X																																		
NPASS																															X			X					
PDPHI																	X													X		X		X					
STACG		X					X																																
TZERO			X		X																									X									
BETAFS																							X			X	X			X					X				
DQDCOL																							X				X												
DTRRSQ		X																						X															
ENGRPM		X																													X								
MXPASS		X																																	X				
PSD30P		X																													X								
TRIND1		X			X																																		
XLIMIT		X			X																													X	X				

STRIAB

VARIABLE	C81	STAART	READIN	CONE1	MONEM	TINIT	INRIOD	VIOTAN	RIOTROOT	DONACL	ACLCDS	SWASOT	WRONUT	MANIUT	INAIRI	VARIPCG	GUSTT	TIILT	WRFM	STABDE	LMODDE	LAMODE	SETEE	JACOBI	AJACOB	OFFTPM	WRVP	TRIM	PAIRA	SOLVE	OAMPER	ITRIM	IVARIR	PPLOT	C8IL	CURVET
STRIMA		X	X	X	X	X								X	X	X					X				X	X			X	X				X		
AY														X	X	X												X								
VH						X								X	X														X							
AGW		X			X											X									X											
DT1						X								X		X					X				X											
DT2						X								X		X					X				X											
IXZ		X			X									X												X										
OMR														X	X													X				X				
XXD		X			X	X								X							X				X							X				
YYD		X			X	X								X							X				X											
ZZD		X			X	X								X							X				X			X								
ALGF		X														X									X											
APFP					X	X								X	X											X										
AYFP					X	X								X	X											X		X								
CGWL		X			X										X	X												X								
COLL				X	X											X					X											X				
CYCF				X	X											X					X				X			X				X				
CYCL				X	X											X					X				X			X				X				
DIST														X	X													X								
KCIT			X													X																X				
PEDA				X	X											X					X				X			X				X				
QMAX		X				X								X		X													X							
QMRS														X	X	X													X							
TIME														X		X													X							
TMAX			X		X									X																						
XCIT			X													X																X				
ALGEZ		X														X									X											
ALGE1				X												X									X											
ALGE2				X												X									X											
CGSTA		X			X										X	X												X								
CPWIC				X												X									X											
DIXIZ					X									X												X										
DIYIX					X									X												X										
DIZIY					X									X												X										
DTZMT						X								X							X				X											
DTZM1						X								X							X				X											
DTZT1						X								X							X				X											
FTKTS						X									X													X								
HUBKI																X																X				
HUBKM																X																X				
KREAD			X													X																X				
PIU30		X													X																	X				
TSTAB		X	X			X								X							X															
ZMAX2			X		X									X																						
ZMAX3			X		X									X																						
ASECOL						X								X							X				X											
CYPWIC				X												X									X											
GEARAT		X			X									X	X													X	X							

STRIMA

VARIABLE	C81	START	READIN	CONE1	MONEM	TINIT	INRIO	VIND	ROTRAN	IDTROT	DGRAD	ACALC	CLACD	SWAST	WRONT	MANUT	INIT	VARI	PCG	GUST	TILT	WRFM	STAB	LMODE	LAMODE	SETE	JACOBI	AJACOB	OFTRM	WRVP	TRIM	PARA	SOLVE	DAMPER	ITRIM	IVARR	PPLOT	C8IL	CURVET
STRIMA		X	X	X	X	X										X	X	X					X				X	X		X	X			X				
PSD550					X											X	X	X													X							
PSISTP					X											X																						
QXBRAK																X																			X	X			
RUDIND				X	X													X									X				X							
ZDELT1			X		X											X													X								
ZDELT2			X		X											X																						

STRIMA

VARIABLE	C81	START	READIN	CONEM	TINIT	ININIT	VINOD	ROTANN	ITROOT	DOORT	ANACL	CLACDS	SWRAOST	WRANOUT	MANIUT	IANIRI	VACRG	PCRGUST	GUSLTT	TIRFMB	WRFMSTAB	SLMODE	LAMODE	SETEE	JACOBI	AJACOBI	OFFTRM	WRVP	TRIMA	PARLA	SOLVE	DAMPER	ITR_M	IVAR	IPLOT	C81L	CURVET
ANDOIT								X	X	X																										
A1								X	X																											
B1								X	X																											
XK								X		X																										
XY									X	X																										
VI2								X	X																											
VI4								X	X																											
APDM								X		X																										
APDS								X		X																										
APFM								X		X																										
ARDM								X		X																										
ARDS								X		X																										
ARFM								X		X																										
AYFM								X		X																										
PFAC									X	X																										
RFAC									X	X																										
ROTJ								X		X																										
XK43								X		X																										
XLIM								X	X																											
APDBS								X	X																											
ARDBS								X	X																											
CBFAC								X		X																										
GDISK								X		X																										
NOPSI								X		X																										
TANA1									X	X																										
TANB1									X	X																										
TANT1								X		X																										
TANT2								X		X																										
XMOMD								X	X	X																										
XMOML								X	X	X																										
DCAFXK								X	X																											
IPPINT								X		X																										
NORADL								X		X																										
SHEARD								X	X	X																										
SHEARL								X	X	X																										
SHEARR								X	X	X																										

ANDOIT

VARIABLE	C81	START	READIN	CON1	MNEM	TINIT	INRIO	VIND	ROTAN	ITROOT	DORROT	DACOL	CLCD	SWCAS	WROST	MANUT	INIT	VARI	PCG	GUST	TILT	WRFM	STAB	LMODE	LAMODE	SETE	JACOBI	AJACOB	OFTRM	WRVP	TRIM	PARA	SOLVE	DAMPER	ITRIM	IVAR	PPLOT	CBL	CURVET
STAMAN		X			X	X	X									X	X	X		X	X																		
HL					X	X	X											X			X																		
RC					X																X																		
XX																X				X																		
YY																X				X																		
AY1																X		X																				
GOV																X		X																				
KPD						X												X																				
OPC																X		X	X																			
QQQ						X										X		X																				
PIY					X											X																						
APBG		X																X																				
ARBG						X												X																				
ASEP						X												X																				
AYBG		X																X																				
BWTC		X														X																						
BWTK		X														X																						
BWTM		X														X																						
CGBL		X															X				X																	
COSE					X		X				X							X																				
DPIX					X											X																						
DPIZ					X											X																						
FHPT							X									X																						
R550					X	X										X																						
ALERT						X												X																				
AYDMX						X												X																				
DELT2																X																						
DPIXZ					X											X																						
DTBWT						X										X																						
HDELT																X		X	X																			
HGUST						X											X			X																		
HLTR1					X													X																				
HLTR2					X	X												X																				
ISTOP						X										X		X																				
ITORS					X											X																						
KTCTR						X										X																						
OMEGM		X														X		X	X																			
PCDEL						X													X																			
QMRSA						X										X		X																				
RMASS					X											X																						
TRALT					X	X										X																						
TWOPI		X					X									X																						
VGUST						X											X			X																		
XAGUN		X																X			X																	
XAPYL		X																			X																	
XARSP					X		X											X			X																	
YAGUN		X																X			X																	
YARSP					X		X											X			X																	

STAMAN

VARIABLE	C81	START	READIN	CON1	MNEM	TINIT	INRO	VIND	ROTAN	ITROT	DOROT	ANAL	CLCD	SWAS	WROT	MANU	INIT	VARI	PCG	GUST	TILT	WRFM	STAB	LMODE	LAMODE	SETE	JACOBI	AJACOB	OFFTRM	WRVP	TRIM	PARA	SOLVE	DAMPER	ITRIM	IVAR	PPLOT	C8IL	CURVET
STAMAN		X			X	X	X									X	X	X		X	X																		
YGUST						X											X			X																			
ZAGUN		X																X			X																		
ZAPYL		X																			X																		
ZARSP					X		X											X			X																		
BETAZS							X											X																					
DELT2R																X		X																					
EIMAST		X																			X																		
GPRELD		X														X																							
HLPYLD		X																			X																		
IBRAKE					X	X										X		X																					
OMEGMD						X												X	X																				
PCGDED		X																	X																				
PCGMAX		X																X	X																				
PCRATE						X												X	X																				
PO1DTR		X																			X																		
QBRAKE																X	X																						
RDELT1																X																							
RDELT2																X		X																					
RITORS					X	X										X																							
TRIND2					X	X												X																					

VARIABLE	C81	START	READIN	CON1	MNEM	TINIT	INRO	VIND	RTAN	ITROOT	DROOT	ANAL	CLCD	SWAS	WROT	MANU	INIT	VARI	PCG	GUST	TILT	WRFM	STAB	LMODE	LAMODE	SETE	JACOBI	AJACOB	OFTRM	WRVP	TRIM	PARA	SOLVE	DAMPER	ITRIM	IVAR	PLDT	C81L	CURVET
MANAL		X		X	X							X		X		X	X	X		X	X		X					X			X	X			X				
Q		X			X							X								X			X																
AP					X							X					X																						
PED					X									X				X										X											
QWG		X			X							X								X			X																
TZM					X									X		X	X	X					X					X											
TZT					X									X		X	X	X					X					X											
T1M					X									X		X	X	X					X					X											
T1T					X									X		X	X	X					X					X											
T2M					X									X		X	X	X					X					X											
T2T					X									X		X	X	X					X					X											
ALEL					X							X					X															X							
CZET					X							X		X							X		X																
PSDD					X							X				X																							
SZET					X							X									X		X																
TAXL		X			X							X					X	X					X					X			X	X			X				
TAXR		X			X							X					X	X					X					X			X	X			X				
XAWG		X			X							X								X	X		X																
XLNK					X									X							X																		
ZAWG		X			X							X								X	X																		
ALCYP												X						X										X											
ALFIN					X							X					X															X							
ALLWG					X							X					X															X							
ALRWG					X							X					X															X							
CDELE					X							X					X																						
CDFIN					X							X					X																						
CDLWG					X							X					X																						
CDRWG					X							X					X																						
CLELE					X							X					X																						
CLFIN					X							X					X																						
CLLWG					X							X					X																						
CLOCK				X										X				X					X																
CLRWG					X							X					X																						
CWING					X							X								X			X																
CYCR1					X									X				X										X											
CYCR2					X									X				X										X											
CZET4														X							X																		
CZET6														X							X																		
CZET9														X							X																		
FLOCK				X										X				X																					
RANGE														X							X		X								X								
SZET5														X							X																		
SZET7														X							X																		
SZET8														X							X																		
WGCOL												X						X										X											
XAELE		X			X							X								X	X		X																
XAFIN		X										X								X	X																		
XAFUS		X										X									X																		

MANAL

VARIABLE	C81	START	READIN	CON1	MNEM	TINIT	INRD	VIND	RTAN	ITRDT	DORDT	ANAL	CLCD	SWAS	WROT	MANU	INIT	VARI	PCG	GUST	TILT	WRFM	STABD	LMODE	LAMDE	SETE	JACOBI	AJACOB	OFTRM	WRVP	TRIM	PARA	SOLVE	DAMPER	ITRIM	IVAR	PPLOT	C81L	CURVET
MANAL		X		X	X							X		X		X	X	X		X	X		X					X			X	X			X				
XAJET		X			X							X									X																		
XLOCK				X										X				X																					
YAFIN		X										X								X	X																		
ZAELE		X			X							X								X	X																		
ZAFIN		X										X								X	X																		
ZAFUS		X										X									X																		
ZAJET		X			X							X									X																		
ALECR1												X						X										X											
ALGFPD												X						X										X											
BOTTOM														X							X																		
CZET11														X							X																		
CZET12														X							X																		
CZET13														X							X																		
EIZETA												X									X																		
HALFPI		X		X	X							X				X		X																	X				
SZET10														X							X																		
TCLOCK				X										X				X																					
XAPYLD												X									X																		
YGUSTW					X							X								X																			
ZAPYLD												X									X																		
ZFLWG1												X				X																							

MANAL

ROMAN

VARIABLE	CB1	START	PFADIN	CON1	MNEM	TINIT	INRO	VIND	ROTAN	ITROT	DOROT	ANAL	CLCD	SWAS	WROT	MANU	INIT	VARI	PCG	GUST	TILT	WRFM	STAB	LMODE	LAMODE	SETE	JACOBI	AJACOB	OFFTRM	WRVP	TRIM	PARA	SOLVE	DAMPER	ITRIM	IVAR	PPLOT	CB1L	CURVET
ROMAN		X			X		X	X	X	X	X					X	X	X		X		X	X					X	X		X	X				X			
*R							X	X	X		X																												
T		X							X							X	X	X																					
*DR							X	X	X	X	X																												
RM					X		X	X	X		X					X																							
*T1									X																														
*T2									X																														
ZZ		X			X				X							X																							
AIB							X				X					X																X							
AIR							X									X																							
DRM					X		X	X	X	X	X					X																							
PCC							X			X						X							X																
PSD		X			X		X		X	X	X					X	X	X					X								X					X			
RTR							X	X	X		X					X																							
*TZR										X	X																												
VXS					X		X		X		X						X																						
VYS					X		X		X		X						X																						
VZS					X		X	X	X	X	X						X																						
*XMA										X	X																												
*XMB										X	X																												
*AIBP							X			X																													
*AIBR							X			X																													
APDD					X				X							X																							
*APDR							X		X																														
APTD							X		X							X	X						X						X		X								
ARDD					X				X							X																							
*ARDR							X		X																														
ARTD							X		X							X	X						X						X		X								
AYDD					X				X							X																							
BETA					X						X					X		X																					
DPSI					X						X					X	X	X					X								X								
DTRR		X					X			X	X						X						X									X				X			
NPSI					X		X		X							X	X	X					X								X								
DRTR					X		X	X	X	X	X					X																							
PSDT		X			X		X		X	X	X					X		X													X					X			
*PSIC							X		X	X	X																												
TZMT										X	X					X	X						X					X				X							
TZTT										X	X					X	X						X					X				X							
T1MT									X							X	X						X					X				X							
T1TT									X							X	X						X					X				X							
T2MT									X							X	X						X					X				X							
T2TT									X							X	X						X					X				X							
XMA1					X					X	X						X	X				X	X					X											
XMB1					X					X	X						X	X				X	X					X											
ZZTP					X				X							X																							
AIBPM							X			X													X																
AIBPT							X			X													X																
AIBRM							X			X													X																

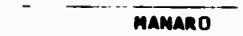
VARIABLE	C81	STEADIN	CONE1	MNEMIT	TINIT	INRIOD	VINDED	VROTRAN	IOTROOT	DONROT	DACALD	CLCADS	SWAOST	WROUT	MANIUT	INIRIT	VARIRI	PCG	GUSTT	TILTT	WRFMT	STABT	LMODDE	LAMODE	SEATOE	JACOBI	AJACOB	OFTRMT	WRVPT	TRIRMT	PARLVE	SOLVER	DAMPER	ITRIMT	IVARIR	PPLOT	C81L	CURVET
ROMAN		X		X		X	X	X	X	X					X	X	X		X		X	X					X	X		X	X			X			
AIBRT						X			X													X															
APTTD						X		X							X	X						X					X	X									
ARTTD						X		X							X	X						X					X	X									
AZETA						X		X							X		X																				
BETAD										X					X		X																				
BETAN				X		X			X	X						X	X																	X			
BETAX				X		X			X	X						X	X																				
BETAZ				X		X			X	X					X		X																				
BNPSI				X					X													X							X								
COND2		X						X	X																												
GMAXV										X									X															X			
HUBKP						X				X					X	X	X																	X			
HUBKR						X				X					X	X	X																	X			
RATE1										X									X															X			
RATE2										X									X															X			
STOP2										X									X															X			
THROT								X							X																						
TRIND		X		X		X		X							X		X					X				X										
VZETA						X		X							X		X																				
XGUST										X									X															X			
XMAIT				X					X	X						X					X	X				X											
XMBIT				X					X	X						X					X	X				X											
*XSTAH										X																											
*YSTAH										X																											
*AZETAR						X		X																													
AZETAT						X		X							X		X																				
BETAZD						X				X					X		X																				
GMAXV1										X									X															X			
GMAXV2										X									X															X			
GMAXV3										X									X															X			
GUSTYP				X				X		X									X																		
HNPSIR				X						X												X							X								
*HUBKPR						X				X																											
HUBKPS						X				X					X		X																				
*HUBKRR						X				X																											
HUBKRS						X				X					X																						
HUBKTP						X				X					X	X	X																	X			
HUBKTR						X				X					X	X	X																	X			
HUBTPS						X				X					X																						
HUBTRS						X				X					X																						
KONFIG				X				X								X	X												X	X						
LNGTH1										X									X															X			
PILGH1										X									X															X			
PSIREF				X		X				X					X		X																				
START2										X									X															X			
*VZETAR						X		X																													
VZETAT						X		X							X		X																				

ROMAN

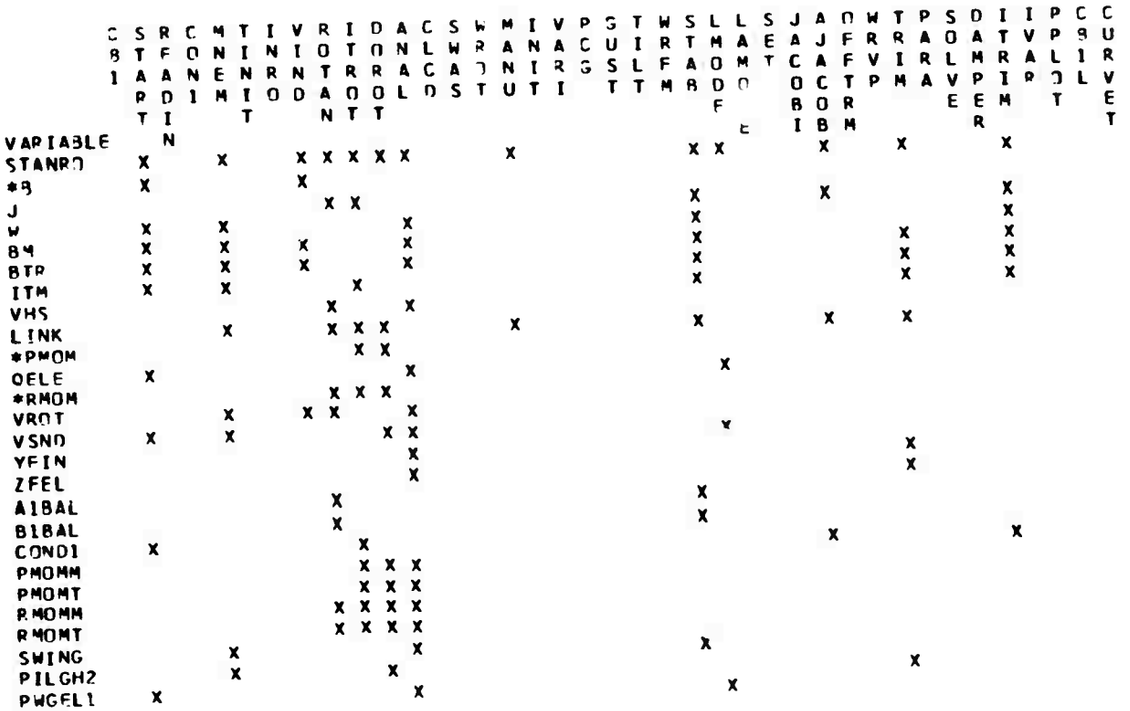
ROMAN

VARIABLE	C81	START	READIN	CON1	MNEM	TINIT	INRO	VINO	ROTAN	ITROT	DOROT	ANAL	CLCO	SWAS	WROT	MANU	INIT	VARI	PCG	GUST	TILT	WRFM	STAB	LMODE	LAMODE	SETE	JACOBI	AJACOB	OFFTRM	WRVP	TRIM	PARA	SOLVE	DAMPER	ITRIM	IVAR	PPLOT	C81L	CU-VET
ROMAN		X			X		X	X	X	X	X					X	X	X		X		X	X					X	X		X	X				X			
XSTAHM											X									X																			
XSTAHT											X									X																			
YSTAHM											X									X																			
YSTAHT											X									X																			

VARIABLE	C81	STAR T	READ IN	CON1	MNEM	TINIT	INRO	VIND	ROTAN	ITROT	DORDT	ANAL	CLCD	SWAS	WROT	MANU	INIT	VARI	PCG	GUST	TILT	WRFM	STAB	LMODE	LAMDE	SETE	JACOBI	AJACDB	OFFTRM	WRVP	TRIM	PARA	SOLVE	DAMPER	ITRIM	IVAR	PPLOT	C81L	CURVET
MANARO		X			X			X	X	X	X	X				X	X	X		X			X			X	X	X	X	X	X	X			X				
I									X	X		X				X		X																					
V				X					X			X				X	X						X						X		X								
APD				X					X			X				X		X					X						X		X								
APE		X		X					X			X				X		X		X			X				X	X	X		X	X			X				
ARD				X					X			X				X							X						X		X								
ARE		X		X					X			X				X				X			X				X	X	X		X	X			X				
AYD				X					X			X				X							X						X		X								
AYE		X		X					X							X				X			X				X	X	X		X	X			X				
A1M		X		X					X							X	X	X					X				X	X			X	X			X				
B1M		X		X					X							X	X	X					X				X	X			X	X			X				
HMR				X					X	X	X	X					X						X			X			X		X								
HTR				X					X	X	X	X					X						X			X			X		X								
IND				X					X							X														X									
QMX				X						X	X	X				X	X						X			X	X			X	X	X							
QTR				X						X	X	X				X	X						X			X	X			X	X	X							
TMR		X		X					X	X	X	X				X	X						X			X	X			X	X	X			X				
TTR		X		X					X	X	X	X				X	X						X			X	X			X	X	X			X				
*VIR							X			X	X																												
VXB				X					X			X				X							X					X	X		X				X				
VYB				X					X			X				X							X					X	X		X				X				
VZB				X					X			X				X							X					X	X		X				X				
XAR				X					X			X						X		X																			
YAR				X					X			X						X		X																			
ZAR				X					X			X						X		X																			
A1TR		X		X					X							X	X	X					X				X	X			X	X			X				
B1TR		X		X					X							X	X	X					X				X	X			X	X			X				
GFWD									X			X					X																						
GLAT									X			X					X																						
NWAG					X				X			X				X																							
VIMR					X			X		X	X	X					X						X							X								
VITR					X			X		X	X	X					X						X							X								
YMRF					X				X	X	X	X					X						X			X				X		X						
YTRF					X				X	X	X	X					X						X			X				X		X						
ZETA		X			X				X			X				X	X	X					X						X			X						
APBMT					X				X			X				X		X					X						X									
ARBMT					X				X			X				X							X						X									
AYBMT					X				X			X				X		X					X						X									
BETAE					X					X	X					X							X			X	X				X							
BETAO					X					X	X					X	X													X								
GVERT									X			X				X	X																					
PEDAL		X			X												X	X					X				X	X			X	X			X				
TDELT									X			X				X		X													X								
*ZETAR		X							X																														
COLSTK		X			X							X				X	X	X					X				X	X			X	X			X				
CYSTK1		X			X												X	X					X				X	X			X	X			X				
CYSTK2		X			X												X	X					X				X	X			X	X			X				
*HFORCE									X	X	X																												



VARIABLE	C81	START	RFAIN	CON1	MNEM	TINIT	INRO	VIND	RTRAN	ITROT	DTROT	ACL	CLCD	SWAST	WRONT	MANUT	IANIT	VARI	PCG	GUST	TLT	WRFM	STAB	LMODE	LMODE	SETE	JACOBI	AJACOB	OFTRM	WRVP	TRIM	PAIRA	SOLVE	DAMPER	ITRIM	IVAIR	PPLOT	C81L	CURVET
MANARO		X			X			X	X	X	X	X				X	X	X		X			X			X	X	X	X	X	X	X			X				MANARO
HGUSTE					X				X			X								X																		
HGUSTF					X				X			X								X																		
HGUSTW					X				X			X								X																		
*THRUST		X							X	X	X									X																		
*TORQUE										X	X																												
VGUSTE					X				X			X								X																		
VGUSTW					X				X			X								X																		
*YFORCE									X	X	X																												
YGUSTE					X				X			X								X																		
ZETATR		X			X				X								X	X														X						


C81
STAPT
READIN
CON1
MONEM
TINIT
INRTO
VIND
ROTAN
ITROT
DOROT
ANAL
CLCD
SWAS
WROT
MANU
INIT
VARI
PCG
GUST
TILT
WRFM
STAB
LMODF
LAMDE
SET
JACOBI
AJACOB
OFTRM
WRVP
TRIM
PARA
SOLVE
DAMPER
ITRIM
IVAP
PPLOT
C81L
CURVET
VARIABLE
STANRO
*B
J
W
B4
BTR
ITM
VHS
LINK
*PMOM
QELE
*RMOM
VROT
VSND
YFIN
ZFEL
A1BAL
B1BAL
COND1
PMOMM
PMOMT
RMOMM
RMOMT
SWING
PILGH2
PWGEL1

STANRO

VARIABLE	CB1	START	READIN	CON1	MONEM	TINIT	INRID	VIND	ROTAN	ITROOT	DONROT	ACNLCD	SWCAST	WRONTU	MANIUT	IANIRI	VACIG	PCG	GUSTT	TILTT	WRFM	STABE	LMODDE	LMDDE	SETE	JACOBI	AJACOB	OFTRM	WRVP	TRIM	PRAA	SDLVE	DAMPER	DIRIM	IVAIR	PPLOT	CBIL	CURVST
ROSTAR		X			X		X	X	X	X	X																										
AM					X		X				X																										
CT					X			X		X																											
*ER										X																											
PI		X								X																											
XB							X				X																										
ALT					X			X	X																												
ADR							X	X																													
ERM		X								X																											
*ERX										X																											
EXM							X				X																										
NXR					X		X		X																												
RBM							X				X																										
SWC		X			X				X																											
UMS					X			X	X																												
COMB							X				X																										
ERTR		X								X																											
ERXM		X			X					X																											
ERXT		X			X					X																											
LROT							X		X																												
RAIB		X					X				X																										
RTRP					X		X			X																											
TAIR		X			X	X			X																											
CONEK							X				X																										
DCAFR							X		X																												
FVIND		X								X																											
NVARD					X				X																												
SWKR1							X		X																												
SWKR2							X		X																												
TIP18							X				X																										
TIP38							X				X																										
TWIST					X		X				X																										
CLRADK							X				X																										
DELTA3							X				X																										
LAMBDA								X		X	X																										
UPGUST					X						X																										
URGUST					X						X																										
UTGUST					X						X																										
WROTOR					X				X																											
*XLIMAX									X																											
*XLIMIN										X																										
XLMAXM					X				X																											
XLMAXT					X				X																											
XLMINM		X			X					X																										
XLMINT		X			X					X																										

ROSTAR

TOPLOT

VARIABLE	CB1	START	READIN	CON1	MNEM	TINIT	INRO	VIND	ROTAN	ITROT	DOROT	ANAL	CLCD	SWAS	WPCT	MANU	INIT	VARI	PCG	GUST	TILT	WRFM	STAB	LMODE	LAMODE	SETE	JACOBI	AJACOB	OFFTRM	WRVP	TRIM	PARA	SOLVE	DAMPER	ITRIM	IVAR	PPLOT	C8IL	CURVET
TOPLOT	X		X		X				X	X	X	X			X	X	X	X					X				X	X			X	X	X		X		X	X	X
AH	X																																				X		
AL	X																																				X		X
EXIT	X				X				X	X	X	X				X		X					X				X	X			X	X	X		X				
ICOM			X												X																							X	
IPSN	X		X												X	X	X																				X	X	
NPART	X		X		X										X																X						X		
NTIME	X																X																				X		
NVARA	X																																				X		X
NVARB	X				X											X																					X		X
NVARC	X				X				X																												X		X
NVARS	X															X																							
NPRINT	X																X	X																			X		
NSCALE	X																																				X	X	

STARAN

VARIABLE	CB1	START	READIN	CON1	MNEM	TINIT	INRO	VINO	ROTAN	ITROT	DOROT	ANAL	CLCD	SWAS	WROT	MANU	INIT	VARI	PCG	GUST	TILT	WRFM	STAB	LMODE	LAMODE	SETE	JACOBI	AJACOB	OFFTRM	WRVP	TRIM	PARA	SOLVE	DAMPER	ITRIM	IVAR	PPLOT	C8IL	CURVET
STARAN		X			X							X	X																										
RH		X										X																											
C3												X	X																										
C4												X	X																										
RW					X							X																											
CLP		X										X																											
CL?		X										X																											
DCD												X	X																										
DOL					X							X																											
DON					X							X																											
VIW					X							X																											
YES		X			X							X																											
BATH		X			X							X																											
CLBO		X										X																											
CNBO		X										X																											
FTAO					X							X																											
NJET		X			X							X																											
OFIN		X										X																											
TZMS				X										X				X																					
TZTS				X										X				X																					
T1MS				X										X				X																					
T1TS				X										X				X																					
T2MS				X										X				X																					
T2TS				X										X				X																					
VIFR					X							X																											
CLRCL		X										X																											
CNBCL		X										X																											
CNPCL		X										X																											
CNPCD		X										X																											
CNRCL		X										X																											
CDLKS					X							X																											
DBELF		X										X																											
FNSWC		X										X																											
LWING					X							X																											
PMREL		X			X							X																											
PMRWG		X										X																											
PTREN		X										X																											
RPIST					X							X																											
VMAXF		X			X							X																											
YAFLF		X										X									X																		
YAFRO		X			X							X	X																										
YAFUS		X										X									X																		
YALWG					X							X									X																		
YARWG		X			X							X									X																		
APRJET		X			X							X																											
ARBJET					X							X																											
AVRJET		X			X							X																											
CNPCPT					X							X																											

VARIABLE	CBI	START	PFADIN	CONI	MNEM	TINIT	INRO	VIND	POTAN	ITROT	DOROT	ANAL	CICD	SWAS	WP-T	MANU	INIT	VARI	PCG	GUST	TILT	WRFM	STAB	LMODE	LAMODE	SETE	JACOBI	AJACOB	OFFTRM	WRVP	TRIM	PARA	SOLVE	DAMPER	ITRIM	IVAR	PPLOT	CBIL	CURVET
STARAN		X			X							X	X																										
CNPCD2					X							X																											
COLJET		X			X							X																											
DXWGEL					X							X																											
DZWGEL					X							X																											
ETAOMX		X										X																											
PWGWK1		X										X																											
RCWING					X							X																											
SWINGH					X							X																											
VENTER		X			X							X																											
VXMVER					X							X																											
YALJET					X							X									X																		
YARJET		X			X							X									X																		

STARAN

APPENDIX E

PROGRAM SECTIONS CONTAINING EACH VARIABLE, BY COMMON

VARIABLE	C&L	START	RANTAL	MANAL	STAUB	TRIM	PPLOT
FORCE		X		X	X	X	X	
STRIAB		X			X	X	X	
STRIMA		X			X	X	X	
ANDOIT			X					
STAMAN		X			X			
MANAL		X		X	X	X	X	
ROMAN		X	X		X	X	X	
MANARD		X	X	X	X	X	X	
STANRD		X	X	X	X	X	X	
ROSTAR		X	X					
TOPLOT	X	X	X	X	X	X	X	X
STARAN		X		X				

VARIABLE	CGL	STRT	RONAL	MANUB	STABM	TRIM	PPLOT
FORCE		X	X	X	X	X	
A				X	X	X	
QL			X	X	X	X	
QM			X	X	X	X	
QN			X	X	X	X	
XF		X	X	X	X	X	
YF			X	X	X	X	
ZF			X	X	X	X	
LMR			X				
LTP			X				
MMP			X				
MTR			X				
NMR			X				
NTR			X				
XFW		X	X		X		
YFW		X	X		X		
ZFW		X	X		X		
LELE			X				
LEIN			X				
LEUS			X				
LGUN			X	X			
LLWG			X				
LQMR			X				
LQTR			X				
LRWG			X				
MELE			X				
MEIN			X				
MEUS			X				
MGUN			X	X			
MLWG			X				
MQMR			X				
MQTR			X				
MRWG			X				
NELE			X				
NEIN			X				
NEUS			X				
NGUN			X	X			
NLWG			X				
NQMR			X				
NQTR			X				
NRWG			X				
XFMR			X				
XFTR			X				
YFMR			X				
YFTR			X				
ZFMR			X				
ZFTR			X				
TIJET		X	X				

VARIABLE	CB1	START	RSTART	ANAL	MANAU	STAB	TRIM	PPLOT
FORCE		X		X	X	X	X	
LRJET		X		X				
MLJET		X		X				
MRJET		X		X				
NLJET		X		X				
NRJET		X		X				
XFFLE				X			X	
XFFIN				X			X	
XFFUS				X				
XFGUN				X	X			
XFLWG				X			X	
XFRWG				X			X	
YFFIN				X			X	
YFFUS				X				
YFGUN				X	X			
ZFELE				X			X	
ZFFUS				X				
ZFGUN				X	X			
ZFLWG				X	X		X	
ZFRWG				X	X		X	
XFLJET		X		X				
XFRJET		X		X				
YFLJET		X		X				
YFRJET		X		X				
ZFLJET		X		X				
ZFRJET		X		X				

VARIABLE	C81	STARTR	STRAN	ANALU	MANAU	STABM	STRIM	PPLOT
STRIAB		X			X	X	X	
D		X						
E						X		
F						X	X	
X					X		X	
DL						X	X	
DM						X	X	
DN						X	X	
DT		X						
DX						X	X	
DY						X	X	
DZ						X	X	
IX		X				X		
IY		X				X		
IZ		X				X		
PD						X	X	
DTR		X				X		
EPD						X	X	
ERR		X					X	
KM1					X	X	X	
RHO		X						
R12		X						
SPD						X		
X8W		X						
XEL		X						
XER		X						
XFC		X					X	
XFN		X						
XFS		X				X		
XGN		X						
XIT		X					X	
XMR		X						
XTR		X						
XWG		X						
YEL		X				X		
YFN		X						
YMR		X						
YTR		X						
YWG		X				X		
BLCG		X						
DAMP		X					X	
DEPD						X	X	
EPDS		X				X		
EPDX							X	
MASS		X				X	X	
OSVI						X	X	
TMRS						X	X	
TTRS						X	X	

STRIAB

VARIABLE	C81	STAPT	RONTAL	MANALU	STABM	TRIM	PPLOT
STRIAB		X		X	X	X	
WLCG		X					
XCON		X					
XJET		X					
XMIN		X				X	
AYEFP						X	
CNPCD		X					
GUESS		X					
NPASS						X	
PDPHI				X		X	
STACG		X					
TZERO		X				X	
BETAES					X	X	
DODCOL					X	X	
DTRRSQ		X			X		
ENGRP4		X				X	
MXPASS		X				X	
PSD30P		X				X	
TRIND1		X					
XLIMIT		X				X	

STRIAB

VARIABLE	C81	START	RONTAL	MANANU	STATAB	TRIM	PPLOT
STRIMA		X		X	X	X	
AY				X		X	
VH		X		X		X	
AGW		X		X	X	X	
DT1		X		X	X	X	
DT2		X		X	X	X	
IXZ		X		X	X	X	
QMR		X		X		X	
XXD		X		X	X	X	
YYD		X		X	X	X	
ZZD		X		X	X	X	
ALGF		X		X	X	X	
APFP		X		X	X	X	
AYFP		X		X	X	X	
CGWL		X		X		X	
COLL		X		X	X	X	
CYCF		X		X	X	X	
CYCL		X		X	X	X	
DIST				X		X	
KCIT		X		X		X	
PEDA		X		X	X	X	
QMAX		X		X		X	
QMRS				X		X	
TIME				X		X	
TMAX		X		X			
XCIT		X		X		X	
ALGEZ		X		X	X	X	
ALGFI		X		X	X	X	
ALGF2		X		X	X	X	
CGSTA		X		X		X	
CPWIC		X		X	X	X	
DIXIZ		X		X	X	X	
DIYIX		X		X	X	X	
DIZIY		X		X	X	X	
DTZMT		X		X	X	X	
DTZM1		X		X	X	X	
DTZT1		X		X	X	X	
ETKTS		X		X		X	
HUBKI		X		X		X	
HUBKM		X		X		X	
KREAD		X		X		X	
PIUBC		X		X		X	
TSTAB		X		X	X		
ZMAX2		X		X			
ZMAX3		X		X			
ASECOL		X		X	X	X	
CYPWIC		X		X	X	X	
GEARAT		X		X		X	

VARIABLE	C81	STRAT	RANAL	AMANAL	STAUB	TRIM	PPLOT
STRIMA		X		X	X	X	
PSD55D		X		X		X	
PSISTP		X		X		X	
QXBRAK		X		X		X	
RUDIND		X		X	X	X	
ZDELT1		X		X		X	
ZDELT2		X		X			

STRIMA

VARIABLE	C81	START	RUNTAL	ANALYS	MATAUB	STRIM	PPLOT
ANDOIT			X				
A1			X				
B1			X				
XK			X				
XY			X				
VI2			X				
VI4			X				
APDM			X				
APDS			X				
APFM			X				
ARDM			X				
ARDS			X				
ARFM			X				
AYFM			X				
PFAC			X				
RFAC			X				
ROTJ			X				
XK43			X				
XLIM			X				
APDBS			X				
ARDBS			X				
CBFAC			X				
GDISK			X				
NOPSI			X				
TANA1			X				
TANB1			X				
TANT1			X				
TANT2			X				
XMOMD			X				
XMOML			X				
DCAFXK			X				
IPRINT			X				
NORADL			X				
SHEARD			X				
SHEARL			X				
SHEARR			X				

110

ANDOIT

VARIABLE	CALL	STARTN	RANAL	AMANAL	STRAIB	TRIM	PPLOT
STAMAN		X		X			
HL		X		X			
PC		X		X			
XX				X			
YY				X			
AY1				X			
GOV				X			
KPD		X		X			
QPC				X			
QQQ		X		X			
RIY		X		X			
APBG		X		X			
ARBG		X		X			
ASEP		X		X			
AYBG		X		X			
BWTC		X		X			
BWTK		X		X			
BWTM		X		X			
CGBL		X		X			
COSE		X	X	X			
DPIX		X		X			
DPIZ		X		X			
EHPT		X		X			
R550		X		X			
ALERT		X		X			
AYDMX		X		X			
DELT2				X			
DPIXZ		X		X			
DTBWT		X		X			
HDELT				X			
HGUST		X		X			
HLTR1		X		X			
HLTR2		X		X			
ISTOP		X		X			
ITORS		X		X			
KTCTR		X		X			
OMEGM		X		X			
PCDEL		X		X			
QMRSA		X		X			
RMASS		X		X			
TRALT		X		X			
TWOPI		X		X			
VGUST		X		X			
XAGUN		X		X			
XAPYL		X		X			
XARSP		X		X			
YAGUN		X		X			
YARSP		X		X			

VARIABLE	CALL START	SPOTRAN	AMANAL	AMANUB	STRIM	TRIM	PPLOT
STAMAN	X		X				
YGUST	X		X				
ZAGUN	X		X				
ZAPYL	X		X				
ZAPSP	X		X				
BETAZS	X		X				
DELT2P			X				
EIMAST	X		X				
GPPELD	X		X				
HLPYLD	X		X				
IBRAKE	X		X				
OMEGMD	X		X				
PCGDED	X		X				
PCGMAX	X		X				
PCRATE	X		X				
PQ1DTR	X		X				
QBRAKE			X				
SDELT1			X				
SDELT2			X				
RITOPS	X		X				
TPIND2	X		X				

MANAL

VARIABLE	MANAL	Q	AP	PED	QWG	TZM	TZT	T1M	T1T	T2M	T2T	ALEL	CZFT	PSDD	SZET	TAXL	TAXR	XAWG	XLNK	ZAWG	ALCYP	ALFIN	ALLWG	ALRWG	CDELF	CDFIN	CDLWG	CDRWG	CLFLF	CLFIN	CLLWG	CLOCK	CLRWG	CWING	CYCR1	CYCR2	CZET4	CZET6	CZET9	FLOCK	RANGE	SZFT5	SZFT7	SZET8	WGCOL	XAELE	XAFIN	XAFUS
MANAL	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Q	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
AP	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
PED	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
QWG	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
TZM	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
TZT	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
T1M	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
T1T	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
T2M	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
T2T	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
ALEL	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
CZFT	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
PSDD	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
SZET	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
TAXL	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
TAXR	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
XAWG	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
XLNK	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
ZAWG	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
ALCYP	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
ALFIN	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
ALLWG	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
ALRWG	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
CDELF	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
CDFIN	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
CDLWG	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
CDRWG	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
CLFLF	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
CLFIN	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
CLLWG	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
CLOCK	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
CLRWG	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
CWING	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
CYCR1	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
CYCR2	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
CZET4	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
CZET6	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
CZET9	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
FLOCK	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
RANGE	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
SZFT5	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
SZFT7	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
SZET8	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
WGCOL	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
XAELE	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
XAFIN	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
XAFUS	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X

VARIABLE	C81	STARTRN	ANAL	MANUB	STAB	TRIM	PPLOT
MANAL		X	X	X	X	X	
XAJET		X	X	X			
XLOCK		X	X	X			
YAFIN		X	X	X			
ZAELE		X	X	X			
ZAFIN		X	X	X			
ZAFUS		X	X	X			
ZAJET		X	X	X			
ALECR1			X	X	X	X	
ALGFPD			X	X	X	X	
BOTTOM		X	X	X			
CZET11		X	X	X			
CZET12		X	X	X			
CZET13		X	X	X			
EIZETA		X	X	X			
HALFPI		X	X	X		X	
SZET13		X	X	X			
TCLOCK		X	X	X			
XAPYLD		X	X	X			
YGUSTW		X	X	X			
ZAPYLD		X	X	X			
ZFLWG1			X	X			

VARIABLE	C81	STARTROTAN	RANAL	MANALU	STABTRIM	PPLOT
ROMAN		X X		X	X X	X
*R		X X				
T		X X		X		
*OR		X X				
RM		X X		X		
*T1		X				
*T2		X				
ZZ		X X		X		
AIB		X X		X		X
AIR		X		X		
ORM		X X		X		
PCC		X X		X	X	
PSD		X X		X	X	X
RTR		X X		X		
*TZR		X				
VXS		X X		X		
VYS		X X		X		
VZS		X X		X		
*XMA		X				
*XMB		X				
*AIBP		X X				
*AIBR		X X				
APDD		X X		X		
*APDR		X X				
APTD		X X		X	X	X
ARDD		X X		X		
*ARDR		X X				
ARTD		X X		X	X	X
AYDD		X X		X		
BETA		X X		X		
DPSI		X X		X	X	X
DTRR		X X		X	X	X
NPSI		X X		X	X	X
ORTR		X X		X		
PSDT		X X		X		X
*PSID		X X				
TZMT		X		X	X	X
TZTT		X		X	X	X
T1MT		X		X	X	X
T1TT		X		X	X	X
T2MT		X		X	X	X
T2TT		X		X	X	X
XMA1		X X		X	X	X
XMB1		X X		X	X	X
ZZTR		X X		X		
AIBPM		X X			X	
AIBPT		X X			X	
AIBRM		X X			X	

VARIABLE	C81	START	RSTART	ANALU	MANAUB	STRIM	TRIM	PPLOT
ROMAN		X	X		X	X	X	
AIRRT		X	X			X		
APTTD		X	X		X	X	X	
ARTTD		X	X		X	X	X	
AZETA		X	X		X			
BETAD			X		X			
BETAN		X	X		X		X	
BETAX		X	X		X			
BETAZ		X	X		X			
BNPSI		X	X			X	X	
COND2		X	X					
GMAXV		X	X		X		X	
HUBKP		X	X		X		X	
HUBKR		X	X		X		X	
RATE1		X	X		X		X	
RATE2		X	X		X		X	
STOP2		X	X		X		X	
THROT			X		X			
TRIND		X	X		X	X	X	
VZETA		X	X		X			
XGUST		X	X		X		X	
XMAIT		X	X		X	X	X	
XMRIT		X	X		X	X	X	
*XSTAH			X					
*YSTAH			X					
*AZETAR		X	X					
AZETAT		X	X		X			
BETAZD		X	X		X			
GMAXV1		X	X		X		X	
GMAXV2		X	X		X		X	
GMAXV3		X	X		X		X	
GUSTYP		X	X		X			
HNPSIR		X	X			X	X	
*HUBKPR		X	X					
HUBKPS		X	X		X			
*HUBKRR		X	X					
HUBKPS		X	X		X			
HUBKTP		X	X		X		X	
HUBKTR		X	X		X		X	
HUBTPS		X	X		X			
HUBTRS		X	X		X			
KONFIG		X	X		X		X	
LNGTH1		X	X		X		X	
PILGH1		X	X		X		X	
PSIREF		X	X		X			
START2		X	X		X		X	
*VZETAR		X	X					
VZETAT		X	X		X			

VARIABLE	CALL	STARPT	RSTANDARD	AMANALU	STATSUB	TRIM	PPLOT
ROMAN		X	X	X	X	X	
XSTAHH			X	X			
XSTAHT			X	X			
YSTAHH			X	X			
YSTAHT			X	X			

ROMAN

VARIABLE	CALL START	STORAGE	ANALYS	MANUAL	STABLE	TRIM	PPLOT
MANARO	X	X	X	X	X	X	
I		X	X	X			
V	X	X	X	X	X	X	
APD	X	X	X	X	X	X	
APE	X	X	X	X	X	X	
ARD	X	X	X	X	X	X	
ARE	X	X	X	X	X	X	
AYD	X	X	X	X	X	X	
AYE	X	X		X	X	X	
A1M	X	X		X	X	X	
B1M	X	X		X	X	X	
HMR	X	X	X	X	X	X	
HTR	X	X	X	X	X	X	
IND	X	X		X		X	
QMX	X	X	X	X	X	X	
QTR	X	X	X	X	X	X	
TMR	X	X	X	X	X	X	
TTR	X	X	X	X	X	X	
*VIR	X	X					
VXB	X	X	X	X	X	X	
VYB	X	X	X	X	X	X	
VZB	X	X	X	X	X	X	
XAR	X	X	X	X			
YAR	X	X	X	X			
ZAR	X	X	X	X			
A1TR	X	X		X	X	X	
B1TR	X	X		X	X	X	
GFWD		X	X	X			
GLAT		X	X	X			
NWAG	X	X	X	X			
VIMR	X	X	X	X	X	X	
VITR	X	X	X	X	X	X	
YMRF	X	X	X	X	X	X	
YTRF	X	X	X	X	X	X	
ZETA	X	X	X	X	X	X	
APBMT	X	X	X	X	X	X	
ARBMT	X	X	X	X	X	X	
AYBMT	X	X	X	X	X	X	
BETAE	X	X		X	X	X	
BETAO	X	X		X	X	X	
GVERT		X	X	X			
PEDAL	X			X	X	X	
TDELT		X	X	X		X	
*ZETAR	X	X					
COLSTK	X		X	X	X	X	
CYSTK1	X			X	X	X	
CYSTK2	X			X	X	X	
*HFORCE		X					

VARIABLE	C81	STAR T	RONTAL	AMANALU	STAIB	TRIM	PPLOT
MANARO		X	X	X	X	X	X
HGUSTE		X	X	X	X		
HGUSTF		X	X	X	X		
HGUSTW		X	X	X	X		
*THRUST		X	X				
*TORQUE			X				
VGUSTE		X	X	X	X		
VGUSTW		X	X	X	X		
*YFORCE			X				
YGUSTF		X	X	X	X		
ZETATR		X	X		X		X

VARIABLE	C*I	STAPT	ROTAN	ANAL	MANAU	STAB	TRIM	PPLOT
STANRO		X	X	X	X	X	X	
*R		X	X					
J			X			X	X	
W		X		X		X	X	
RM		X	X	X		X	X	
BTP		X	X	X		X	X	
ITM		X	X			X	X	
VHS			X	X				
LINK		X	X		X	X	X	
*PMOM			X					
QSLP		X		X		X		
*RMOM			X					
VROT		X	X	X				
VSND		X	X	X		X		
YEIN				X			X	
ZEFI				X			X	
AIRAL			X			X		
BIRAL			X			X		
CONDI		X	X			X	X	
PMOMM			X	X				
PMOMT			X	X				
RMOMM			X	X				
RMOMT			X	X				
SWING		X		X		X		
PILGH2		X	X				X	
PHGELI		X		X		X		

VARIABLE	C81	START	ROTAT	RANAL	AMANAL	STATUB	TRIM	PPLOT
ROSTAR		X	X					
AM		X	X					
CT		X	X					
*ER			X					
PI		X	X					
XB		X	X					
ALT		X	X					
AOR		X	X					
ERM		X	X					
*ERX			X					
EXH		X	X					
NXR		X	X					
RBH		X	X					
SWC		X	X					
UHS		X	X					
CDHB		X	X					
ERTR		X	X					
ERXM		X	X					
ERXT		X	X					
LROT		X	X					
RAIB		X	X					
RTRP		X	X					
TAIR		X	X					
CONEK		X	X					
DCAFR		X	X					
FVIND		X	X					
NVARD		X	X					
SWKR1		X	X					
SWKR2		X	X					
TIP18		X	X					
TIP38		X	X					
TWIST		X	X					
CLRADK		X	X					
DELTA3		X	X					
LAMBDA		X	X					
UPGUST		X	X					
URGUST		X	X					
UTGUST		X	X					
WROTOR		X	X					
*XLIMAX			X					
*XLIMIN			X					
XLMAXM		X	X					
XLMAXT		X	X					
XLMINM		X	X					
XLMINT		X	X					

VARIABLE	CSILR	STATN	RAONAL	MANAU	STRAIB	TRIM	PPLOT
TOPLOT	X	X	X	X	X	X	X
AH	X						X
AL	X						X
EXIT	X	X	X	X	X	X	
ICOM		X					X
IPSW	X	X		X			X
NPART	X	X				X	X
NTIME	X			X			X
NVARA	X						X
NVARB	X	X		X			X
NVARC	X	X	X				X
NVARS	X			X			
NPRINT	X			X			X
NSCALE	X						X

TOPLOT

VARIABLE	C91	STARTRN	RANAL	MANALU	STATSB	TRIM	PPLOT
STARAN		X	X				
BH		X	X				
C3			X				
C4			X				
RW		X	X				
CLP		X	X				
CLR		X	X				
DCD			X				
DQL		X	X				
DQN		X	X				
VIW		X	X				
YES		X	X				
BAIB		X	X				
CLBD		X	X				
CNBD		X	X				
FTAQ		X	X				
NJET		X	X				
QFIN		X	X				
TZMS		X	X	X			
TZTS		X	X	X			
TIMS		X	X	X			
TITS		X	X	X			
T2MS		X	X	X			
T2TS		X	X	X			
VIER		X	X				
CLBCL		X	X				
CNBCL		X	X				
CNPCL		X	X				
CNRCD		X	X				
CNRCL		X	X				
COLKS		X	X				
DBELF		X	X				
FNSWC		X	X				
LWING		X	X				
PMREL		X	X				
PMRWG		X	X				
PTREN		X	X				
RPIST		X	X				
VMAXF		X	X				
YAELF		X	X	X			
YAFRD		X	X				
YAFUS		X	X	X			
YALWG		X	X	X			
YARWG		X	X	X			
APBJET		X	X				
ARBJET		X	X				
AYBJET		X	X				
CNPCD1		X	X				

VARIABLE	C81	STARAN	RONALD	AMANAU	STABM	TRIM	PPLOT
STARAN		X	X				
CNPCD?		X	X				
COLJET		X	X				
DXWGEL		X	X				
DZWGEL		X	X				
FTAQMX		X	X				
PWGWK1		X	X				
RCWING		X	X				
SWING4		X	X				
VENTER		X	X				
VXMVER		X	X				
YALJET		X	X	X			
YARJET		X	X	X			

APPENDIX F

FORTRAN LISTING

```
C                                                                       C8100010
C         ASAJ01  C81 STABILITY AND CONTROL ANALYSIS                    C8100020
C                                                                       C8100030
C                       PROGRAM CONTROL SECTION                         C8100040
C                                                                       C8100050
      COMMON /TOPLOT/ AH(3),AL(3),EXIT,ICOM(49),IPSN,                   C8100060
     1                NPART,NVARA,NVARB,NVARC,NSCALE                    C8100070
     1                ,NVARS,NPRINT,NTIME                               C8100080
      DIMENSION AA(17),IDUM(266)                                        C8100090
      READ (5,2000) AA                                                  C8100100
      WRITE (6,1002)                                                    C8100110
      DO 2002 I=1,6                                                     C8100120
      WRITE (6,2003) AA                                                 C8100130
 2002 CONTINUE                                                          C8100140
      CALL WROT1                                                        C8100150
      CALL SETIME (600.)                                                C8100160
      CALL ERRSET (207,2,2,0,0,0)                                       C8100170
      CALL ERRSET (208,256,-1,0,0,0)                                    C8100180
      CALL ERRSET (209,2,2,0,0,0)                                       C8100190
      NVARS=0                                                           C8100200
      EXIT=2.                                                           C8100210
      AH(2)=0.                                                          C8100220
   13 CONTINUE                                                          C8100230
      IF(AH(2).EQ.88..AND.EXIT.EQ.1.) CALL A3DUMP                       C8100240
C                                                                       C8100250
C     THIS PROGRAM DEPENDS UPON THE VALUE OF NPART FIRST TO DETERMINE   C8100260
C       ITS EXECUTION PROCESS.                                          C8100270
C     WHEN TWO VALUES OF NPART USE THE SAME SUBROUTINES THE PATHS TAKEN C8100280
C        IN THE SUBROUTINES ARE DIFFERENT DEPENDING UPON THE VALUES OF  C8100290
C        THE OTHER VARIABLES IN THE PROBLEM.                            C8100300
C                                                                       C8100310
      READ (5,1001,END=70) NPART,NPRINT,NSCALE,NVARA,AL(1),AH(1),       C8100320
     1                     NVARB,AL(2),AH(2),NVARC,AL(3),AH(3)          C8100330
C                                                                       C8100340
C     CHECK NPART TO SEE IF IT IS AN ALLOWABLE VALUE.                   C8100350
C     IF IT IS NOT THE PROGRAM IS TERMINATED AFTER ITS VALUE IS WRITTEN.C8100360
C                                                                       C8100370
   14 IF(NPART.GT.11.OR.NPART.LT.1) GO TO 50                            C8100380
C                                                                       C8100390
C     IF NPART IS EQUAL TO 10 AFTER AN ERROR OR INITIALLY, THE PROGRAM  C8100400
C       IS TERMINATED IMMEDIATELY.                                      C8100410
C                                                                       C8100420
      IF(EXIT.NE.0..AND.NPART.EQ.10) GO TO 70                           C8100430
      NTIME=-1                                                          C8100440
      IF(NPRINT.LE.0) NPRINT=1                                          C8100450
      EXIT=0.                                                           C8100460
      GO TO (1,2,3,60,60,60,7,3,60,10,11),NPART                         C8100470
    1 CONTINUE                                                          C8100480
      CALL START                                                        C8100490
C                                                                       C8100500
C     CHECK EXIT FOR AN ERROR VALUE WHEN CONTROL HAS RETURNED FROM START C8100510
C                                                                       C8100520
      IF(EXIT.NE.0.) GO TO 13                                           C8100530
      CALL TRIM                                                         C8100540
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C
C     START A NEW PROBLEM AFTER RETURNING FROM TRIM.                    C8100550
C                                                                       C8100560
      GO TO 13                                                          C8100570
C                                                                       C8100580
C     A VALUE OF 2 FOR NPART CONSTITUTES A MANEUVER PROBLEM.            C8100590
C                                                                       C8100600
    2 CONTINUE                                                          C8100610
      CALL START                                                        C8100620
C                                                                       C8100630
C     IF AN ERROR APPEARS  IN EITHER START OR TRIM FLUSH THE MANEUVER   C8100640
C        DATA.                                                          C8100650
C                                                                       C8100660
      IF(EXIT.NE.0.) GO TO 18                                           C8100670
      CALL TRIM                                                         C8100680
      IF(EXIT.NE.0.) GO TO 18                                           C8100690
   12 CONTINUE                                                          C8100700
      CALL MANU                                                         C8100710
      IF(EXIT.NE.0..OR.NVARS.EQ.0) GO TO 13                             C8100720
      CALL STAB                                                         C8100730
      IF(EXIT.EQ.0.) GO TO 12                                           C8100740
      A4=99999999.                                                      C8100750
      WRITE (3) IPSN,A4,IDUM                                            C8100760
      GO TO 13                                                          C8100770
   18 CONTINUE                                                          C8100780
      READ (5,1001,END=70) NPART,NPPINT,NSCALE,NVARA,AL(1),AH(1),       C8100790
     1                     NVARB,AL(2),AH(2),NVARC,AL(3),AH(3)          C8100800
C                                                                       C8100810
C     IF NPART = 1,2,7, START A NEW PROBLEM                             C8100820
C                                                                       C8100830
      IF(NPART.EQ.3.OR.NPART.EQ.8) GO TO 18                             C8100840
      IF(NPART.EQ.10) GO TO 70                                          C8100850
      IF(NPART.EQ.11) GO TO 21                                          C8100860
      GO TO 14                                                          C8100870
C                                                                       C8100880
C     FLUSH CURVE FIT DATA (NVARB AND ND DATA CARDS)                    C8100890
C                                                                       C8100900
   21 READ (5,900) (IDUM(II),II=1,NVARA)                                C8100910
      IF(NVARB.EQ.0) GO TO 23                                           C8100920
      DO 22 IJ=1,NVARB                                                  C8100930
      READ (5,900) NNUM,ND,(IDUM(II),II=1,NNUM)                         C8100940
   22 CONTINUE                                                          C8100950
   23 CONTINUE                                                          C8100960
      ND=AL(2)+.1                                                       C8100970
      IF(ND.EQ.0) GO TO 18                                              C8100980
      DO 24 IJ=1,ND                                                     C8100990
      READ (5,900) (IDUM(II),II=1,3)                                    C8101000
   24 CONTINUE                                                          C8101010
      GO TO 18                                                          C8101020
    3 CONTINUE                                                          C8101030
      REWIND 3                                                          C8101040
      CALL PPLOT                                                        C8101050
      GO TO 13                                                          C8101060
C                                                                       C8101070
C                                                                       C8101080
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C     A VALUE OF 7 FOR NPART RESULTS IN THE CALCULATION OF STABILITY    C8101090
C        DERIVATIVES.                                                   C8101100
C                                                                       C8101110
    7 CONTINUE                                                          C8101120
      CALL START                                                        C8101130
      IF(EXIT.NE.0.) GO TO 13                                           C8101140
      CALL TRIM                                                         C8101150
      IF(EXIT.NE.0.) GO TO 13                                           C8101160
      CALL STAB                                                         C8101170
      GO TO 13                                                          C8101180
C                                                                       C8101190
C     AN NPART VALUE OF 10 RESULTS IN A PARAMETER SWEEP USING TRIM OR   C8101200
C        STABILITY DERIVATIVES ONLY.                                    C8101210
C                                                                       C8101220
   10 CONTINUE                                                          C8101230
      CALL START                                                        C8101240
      IF(EXIT.NE.0.) GO TO 70                                           C8101250
      CALL TRIM                                                         C8101260
      IF(EXIT.NE.0.) GO TO 70                                           C8101270
      IF(NVARA.NE.0) CALL STAB                                          C8101280
      IF(EXIT.NE.0.) GO TO 70                                           C8101290
      GO TO 13                                                          C8101300
C                                                                       C8101310
C     A VALUE OF 11 FOR NPART RESULTS IN A LEAST SQUARES CURVE FIT OF   C8101320
C        TIME HISTORY DATA.                                             C8101330
C                                                                       C8101340
   11 CONTINUE                                                          C8101350
      REWIND 3                                                          C8101360
      CALL CURVET                                                       C8101370
      GO TO 13                                                          C8101380
   60 WRITE (6,1000)NPART                                               C8101390
   70 STOP                                                              C8101400
  900 FORMAT (14I5)                                                     C8101410
 1000 FORMAT (1H1,18X,'BELL HELICOPTER IBM OS/360 PROGRAM ASAJ01'/      C8101420
     1       1H 17X39HHELICOPTER RIGID BODY DYNAMICS ANALYSIS////////   C8101430
     2       23H DATA ERROR .. NPART = ,I5)                             C8101440
 1001 FORMAT (I2,X,I3,3X,I1,3(I5,5X,2F5.0))                            C8101450
 1002 FORMAT (1H1)                                                      C8101460
 2000 FORMAT (17A4)                                                     C8101470
 2003 FORMAT (1HO,17X,17A4////////)                                     C8101480
      END                                                               C8101490
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      SUBROUTINE AJACOB                                                 AJAC0010
      COMMON /FORCE/ XF,XFRWG,XFLWG,XFELE,XFFUS,XFRJET,                 AJAC0020
     1               XFJJET,XFMR,XFTR,XFGUN,XFFIN,XFW,                  AJAC0030
     2               YF,YFFUS,YFRJET,YFLJET,YFMR,YFTR,                  AJAC0040
     3               YFGUN,YFFIN,YFW,                                   AJAC0050
     4               ZF,ZFRWG,ZFLWG,ZFELE,ZFFUS,ZFRJET,                 AJAC0060
     5               ZFLJET,ZFMR,ZFTR,ZFGUN,ZFW,                        AJAC0070
     6               QL,LRWG,LLWG,LELE,LFUS,LRJET,LLJET,                AJAC0080
     7               LMR,LTR,LGUN,LFIN,LQMR,LQTR,                       AJAC0090
     8               QM,MRWG,MLWG,MELE,MFUS,MRJET,MLJET,                AJAC0100
     9               MMR,MTR,MGUN,MFIN,MQMR,MQTR,                       AJAC0110
     A               QN,NRWG,NLWG,NELE,NFUS,NRJET,NLJET,                AJAC0120
     B               NMR,NTR,NGUN,NFIN,NQMR,NQTR                        AJAC0130
      COMMON /STRIAB/ D(21),DT(21),E(79),F(10),X(10),                   AJAC0140
     1               DL,DM,DN,DX,DY,DZ,IX,IY,IZ,PD(10,11),              AJAC0150
     2               DTR,EPD,ERR(10),KM1,RHO,                           AJAC0160
     3               R12,SPD(6,6,3),XBW(21),XEL(14),                    AJAC0170
     4               XER(7),XFC(28),XFN(7),XFS(35),                     AJAC0180
     5               XGN(7),XIT(21),XMR(49),XTR(49),                    AJAC0190
     6               XWG(21),YMR(21),YTR(21),YWG(21),                   AJAC0200
     7               YEL(21),YFN(21),BLCG,DAMP,DEPD(10),                AJAC0210
     8               EPDS,EPDX(10),MASS,QSV1,TMRS,TTRS,                 AJAC0220
     9               WLCG,XCON(63),XJET(14),XMIN,AYEFP,                 AJAC0230
     A               BETAES(2),CNPCD,DHADQ,DYBDR,GUESS,                 AJAC0240
     B               NPASS,PDPHI(10,11),STACG,TZERO,                    AJAC0250
     C               XMAST,DHADAQ,DODCOL,DTRRSQ,DYBDBR,                 AJAC0260
     D               ENGRPM,MXPASS,PSD30P,TRIND1,XLIMIT                 AJAC0270
      COMMON /STRIMA/ AY,VH,AGW,DT1(2),DT2(2),IXZ,                      AJAC0280
     1               QMR,XXD,YYD,ZZD,ALGF,APFP,AYFP,                    AJAC0290
     2               CGWL,COLL(6),CYCF(3),CYCL(3),                      AJAC0300
     3               DIST,KCIT(20),PEDA(3),QMAX,                        AJAC0310
     4               QMRS,TIME,TMAX,XCIT(20,6),ALGEZ,                   AJAC0320
     5               ALGE1,ALGE2,CGSTA,CPWIC,DIXIZ,                     AJAC0330
     6               DIYIX,DIZIY,DTZMT,DTZM1,DTZT1,FTKTS,               AJAC0340
     *               HUBKM(2,2),HUBKI(2,2),                             AJAC0350
     7               KREAD,PIU30,TSTAB(14),ZMAX2,ZMAX3,                 AJAC0360
     8               ASECOL,CYPWIC,GEARAT,PSD550,                       AJAC0370
     9               PSISTP,QXBRAK,RUDIND,ZDELT1,ZDELT2                 AJAC0380
      COMMON /MANAL/  Q,AP,PED,QWG,TZM,T1M,T2M,                         AJAC0390
     1               TZT,T1T,T2T,ALEL,CZET,PSDD,                        AJAC0400
     2               SZET,TAXL,TAXR,XAWG,XLNK(16),ZAWG,                 AJAC0410
     3               ALCYP,ALFIN,ALLWG,ALRWG,CDELE,CDFIN,               AJAC0420
     4               CDLWG,CDRWG,CLELE,CLFIN,CLLWG,CLRWG,CWING,         AJAC0430
     5               CYCR1,CYCR2,CZET4,CZET6,CZET9,RANGE,               AJAC0440
     6               SZET5,SZET7,SZET8,WGCOL,XAELE,XAFIN,               AJAC0450
     7               XAFUS,XAJET,YAFIN,ZAELE,ZAFIN,ZAFUS,               AJAC0460
     *               YAELE,YAFUS,YALWG,YARWG,YALJET,YARJET,             AJAC0470
     8               ZAJET,ALECR1,ALGFPD,BDTTOM,CZET11,                 AJAC0480
     9               CZET12,CZET13,ETZETA,HALFPI,SZET10,                AJAC0490
     A               XAPYLD,YGUSTW,ZAPYLD,ZFLWG1,ZFRWGI                 AJAC0500
     B               ,TZMS,T1MS,T2MS,TZTS,T1TS,T2TS,                    AJAC0510
     C               CLOCK,FLOCK,XLOCK,TCLOCK                           AJAC0520
      COMMON /ROMAN/  ZZ,VXS(2),VYS(2),VZS(2),BETA(12,2),               AJAC0530
     *               T,PCC(2),COSE(7,7,2),BETAN(2),BETAX(2),BETAZ(2),   AJAC0540
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     *                AIB(2),APDD,ARDD,AYDD,AIR(2),                          AJACD550
     1                DPSI(12,2),DTRR,NPSI(2),ZZTR,                          AJAC0560
     2                BETAD(12,2),BNPSI(2),                                  AJACD570
     3                COND2,GMAXV,RATE1,RATE2,STOP2,                         AJACD58D
     4                THROT(2),TRIND,XGUST,BETAZD(2),GMAXVI,                 AJACD590
     5                GMAXV2,GMAXV3,GUSTYP,HNPSIR(2),                        AJAC0600
     6                HUBKPS,HUBKRS,HUBTPS,HUBTRS,                           AJAC0610
     7                KONFIG,LNGTH1,PILGH1,PSIREF(2),                        AJAC0620
     8                START2,XMOMLI(12,2),                                   AJAC0630
     9                RM,RTR,ORM,ORTR,T1MT,T1TT,                             AJAC0640
     A                T2MT,T2TT,TZMT,TZTT,XMA1,XMA1T,                        AJAC0650
     B                XMB1,XMB1T,AIBPM,AIBPT,AIBRM,AIBRT,                    AJAC0660
     C                APTD,APTTD,ARTD,ARTTD,PSD,PSDT,                        AJACD67D
     D                XSTAHM,XSTAHT,YSTAHM,YSTAHT,                           AJACD680
     E                HUBKP,HUBKTP,HUBXR,HUBKTR                              AJAC0690
     F                ,AZETA,AZETAT,VZETA,VZETAT                             AJACD7D0
      COMMON /MANARO/ I,V,IND,NWAG,APBMT,ARBMT,AYBMT,BETA0(2),TDELT,         AJAC0710
     1                BETAE(2),HGUSTE,HGUSTF,HGUSTW,VGUSTE,                  AJAC0720
     2                VGUSTW,YGUSTF,GFWD,GLAT,GVERT,                         AJAC0730
     3                VXB,VZB,APD,VYB,ARD,AYD,                               AJAC0740
     4                COLSTK,CYSTK1,CYSTK2,PEDAL,AYE,                        AJAC0750
     5                APE,ARE,A1M,B1M,A1TR,B1TR,                             AJAC0760
     6                XAR(2),YAR(2),ZAR(2),                                  AJACD770
     7                VIMR,VITR,ZETA,ZETATR,HMR,HTR,                         AJAC0780
     8                TMR,TTR,QMX,QTR,YMRF,YTRF                              AJAC0790
      COMMON /STANRO/ J,W,ITM,VHS(2),LINK,QELE,VROT(2),                      AJAC0800
     1                VSND,YFIN(2),ZFEL(2),A1BAL(2),                          AC0810
     2                B1BAL(2),COND1,SWING,PILGH2,PWGELI,                    AJAC0820
     3                BM,BTR,PMOMM,PMOMT,RMOMM,RMOMT                         AJAC0830
      COMMON /TOPLOT/ AH(3),AL(3),EXIT,ICOM(49),IPSN,                        AJAC0840
     1                NPART,NVARA,NVARB,NVARC,NSCALE                         AJAC0850
     1                ,NVARS,NPRINT,NTIME                                    AJAC0860
      DIMENSION VAR(11)                                                      AJAC0870
      EQUIVALENCE (VAR(1),COLSTK)                                            AJACD880
      CYCR1=CYSTK1*CYCF(3)+CYCF(2)                                           AJAC0890
      CYCR2=CYSTK2*CYCL(3)+CYCL(2)                                           AJAC0900
      PED= PEDAL*PEDA(3)+PEDA(2)                                             AJAC0910
      WGCOL=CPWIC*COLSTK+AGW                                                 AJAC092D
      ALECR1=ALGEZ+CYCR1*(ALGE1+ALGE2*CYCR1)                                 AJAC0930
      ALCYP=CYPWIC*CYCR2                                                     AJACD940
      ALGFPD=ALGF+RUDIND*PED                                                 AJAC0950
      CALL SWAS(COLSTK)                                                      AJAC0960
      TZMT=TZM+DTZM1+DTZMT+ASECOL                                            AJAC0970
      TZTT=TZT+DTZT1+TRIND*(DTZMT+ASECOL)                                    AJAC0980
      T1MT=T1M+DT1(1)                                                        AJAC0990
      T1TT=T1T+DT1(2)                                                        AJAC1D00
      T2MT=T2M+DT2(1)                                                        AJAC1010
      T2TT=T2T+DT2(2)                                                        AJAC1020
      CALL RATS (XXD,YYD,ZZD,AYE,APE,ARE,VXB,VYB,VZB,-1)                     AJAC1030
      IF(LINK.EQ.2) CALL OFFTRM                                              AJAC1040
C                                                                            AJAC1050
      CALL ANAL                                                              AJAC1060
C                                                                            AJAC1070
      IF(EXIT.NE.0.) RETURN                                                  AJAC1080
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F(1) = XF - DX                                                    AJAC1090
F(2) = YF - DY                                                    AJAC1100
F(3) = ZF - DZ                                                    AJAC1110
F(4) = QN - DN                                                    AJAC1120
F(5) = QM - DM                                                    AJAC1130
F(6) = QL - DL                                                    AJAC1140
F(7)=XMB1                                                         AJAC1150
F(8)=XMA1                                                         AJAC1160
F(9)= XMB1T                                                       AJAC1170
F(10)=-XMA1T                                                      AJAC1180
IF(COND1.LE.1.5.AND.J.NE.1) RETURN                                AJAC1190
(F(COND1.LE.1.5.AND.LINK.EQ.3) RETURN                             AJAC1200
IF(COND1.EQ.0.) RETURN                                            AJAC1210
CALL WRVP (1,VAR,KM1,PD,TAXL,TAXR)                                AJAC1220
CALL WRFM                                                         AJAC1230
RETURN                                                            AJAC1240
END                                                               AJAC1250
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      SUBROUTINE ANAL                                                   ANAL0010
      COMMON /FORCE/ XF,XFRWG,XFLWG,XFELE,XFFUS,XFRJET,                 ANAL0020
     1               XFLJET,XFMR,XFTR,XFGUN,XFFIN,XFW,                  ANAL0030
     2               YF,YFFUS,YFRJET,YFLJET,YFMR,YFTR,                  ANAL0040
     3               YFGUN,YFFIN,YFW,                                   ANAL0050
     4               ZF,ZFRWG,ZFLWG,ZFELE,ZFFUS,ZFRJET,                 ANAL0060
     5               ZFLJET,ZFMR,ZFTR,ZFGUN,ZFW,                        ANAL0070
     6               OL,LRWG,LLWG,LELE,LFUS,LRJET,LLJET,                ANAL0080
     7               LMR,LTR,LGUN,LFIN,LOMR,LOTR,                       ANAL0090
     8               OM,MRWG,MLWG,MELE,MFUS,MRJET,MLJET,                ANAL0100
     9               MMR,MTR,MGUN,MFIN,MOMR,MOTR,                       ANAL0110
     A               ON,NRWG,NLWG,NELE,NFUS,NRJET,NLJET,                ANAL0120
     B               NMR,NTR,NGUN,NFIN,NOMR,NOTR                        ANAL0130
      COMMON /MANAL/  Q,AP,PED,QWG,TZM,T1M,T2M,                         ANAL0140
     1               TZT,T1T,T2T,ALEL,CZET,PSOD,                        ANAL0150
     2               SZET,TAXL,TAXR,XAWG,XLNK(16),ZAWG,                 ANAL0160
     3               ALCYP,ALFIN,ALLWG,ALRWG,CDELE,CDFIN,               ANAL0170
     4               CDLWG,CDRWG,CLELE,CLFIN,CLLWG,CLRWG,CWING,         ANAL0180
     5               CYCR1,CYCR2,CZET4,CZET6,CZET9,RANGE,               ANAL0190
     6               SZET5,SZET7,SZET8,WGCOL,XAELE,XAFIN,               ANAL0200
     7               XAFUS,XAJET,YAFIN,ZAELE,ZAFIN,ZAFUS,               ANAL0210
     *               YAELE,YAFUS,YALWG,YARWG,YALJET,YARJET,             ANAL0220
     8               ZAJET,ALECR1,ALGFPD,BOTTOM,CZET11,                 ANAL0230
     9               CZET12,CZET13,EIZETA,HALFPI,SZET10,                ANAL0240
     A               XAPYLD,YGUSTW,ZAPYLD,ZFLWG1,ZFRWG1                 ANAL0250
     B               ,TZMS,T1MS,T2MS,TZTS,T1TS,T2TS,                    ANAL0260
     C               CLOCK,FLOCK,XLOCK,TCLOCK                           ANAL0270
      COMMON /MANAPD/ I,V,IND,NWAG,APRMT,ARBMT,AYBMT,BETAO(2),TDELT,    ANAL0280
     1               BETAE(2),HGUSTE,HGUSTF,HGUSTW,VGUSTE,              ANAL0290
     2               VGUSTW,YGUSTF,GFWD,GLAT,GVERT,                     ANAL0300
     3               VXB,VZB,APD,VYB,ARD,AYD,                           ANAL0310
     4               COLSTK,CYSTK1,CYSTK2,PEDAL,AYE,                    ANAL0320
     5               APE,ARE,A1M,B1M,A1TR,B1TR,                         ANAL0330
     6               XAR(2),YAR(2),ZAR(2),                              ANAL0340
     7               VIMR,VITR,ZETA,ZETATR,HMR,HTR,                     ANAL0350
     8               TMR,TTR,QMX,QTR,YMRF,YTRF                          ANAL0360
      COMMON /STANRO/ J,W,ITM,VHS(2),LINK,QELE,VRDT(2),                 ANAL0370
     1               VSND,YFIN(2),ZFEL(2),A1BAL(2),                     ANAL0380
     2               B1BAL(2),CDND1,SWING,PILGH2,PWGEL1,                ANAL0390
     3               BM,BTR,PMOMM,PMOMT,RMOMM,RMOMT                     ANAL0400
      COMMON /TOPLOT/ AH(3),AL(3),EXIT,ICOM(49),IPSN,                   ANAL0410
     1               NPART,NVARA,NVARB,NVARC,NSCALE                     ANAL0420
     1               ,NVARS,NPRINT,NTIME                                ANAL0430
      COMMON /STARAN/ BH(2),C3,C4,RW,CLP,CLR,DCD,DQL,DQN,VIW,           ANAL0440
     1               BAIB(2),CL8D,CNBO,ETAO ,NJET,                      ANAL0450
     2               QFIN,                                              ANAL0460
     3               VIER,CLBCL,YFS(14),                                ANAL0470
     4               CNBCL,CNPCL,CNRCD,CNRCL,CDLKS,D3ELE,               ANAL0480
     5               FNSWC,LWING,PMREL,PMRWG,                           ANAL0490
     6               PTRFN,RPIST,VMAXE,YAERO(31,5),                     ANAL0500
     7               APBJET,ARBJET,AYBJET,                              ANAL0510
     8               CNPCD1,CNPCD2,COLJET,DXWGEL,DZWGEL,                ANAL0520
     9               ETAOMX,PWGWK1,RCWING,SWINGH,                       ANAL0530
     A               VENTER,VXMVFR                                      ANAL0540
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      COMMON /FORY/   Y(4,150)                                              ANAL0550
      REAL LELE, LFIN, LGUN, LHURK, LHURKT, LLJET, LLWG, LMR,               ANAL0560
     1     LQMR, LQTR, LRJET, LRWG, LTR, MELE, MFIN, MFUS,                  ANAL0570
     2    MGUN, MHURKT, MLJET, MMR, MPYL, MQMR,                             ANAL0580
     3     MQTR, MRJET, MRWG, MTR, NELE, NFIN, NFUS, NGUN, NLWG,            ANAL0590
     4     NHURK, NHURKT, NLJET, NLWG, NMR, NQMR, NQTR, NRJET,              ANAL0600
     5     NRWG, NTR, LFUS, NFFUS, MFUS                                     ANAL0610
      V3=0.                                                                 ANAL0620
      WP=W*COS(APE)                                                         ANAL0630
      XFW=-W*SIN(APE)                                                       ANAL0640
      YFW=WP*SIN(ARE)                                                       ANAL0650
      ZFW=WP*COS(ARE)                                                       ANAL0660
      GFWD=(XFW-XF)*RW                                                      ANAL0670
      GLAT=(YFW-YF)*RW                                                      ANAL0680
      GVERT=(ZFW-ZF)*RW                                                     ANAL0690
      IF(BM.EQ.0.) GO TO 300                                                ANAL0700
      CALL ROTAN (1)                                                        ANAL0710
      IF(EXIT.NE.0.) RETURN                                                 ANAL0720
      CALL RATS (-HMR,YMRF,-TMR,0.,-ZETA,0.,XFMR,YFMR,ZFMR,1)               ANAL0730
      CALL DOGS (XAR(1),YAR(1),ZAR(1),XFMR,YFMR,ZFMR,LMR,MMR,NMR)           ANAL0740
      QREACT=QMX+BAIB(1)*PSDD                                               ANAL0750
      CALL MICE (0.,QREACT,-ZETA,LQMR,NQMR,-1)                              ANAL0760
      RMOMH=RMOMM*BH(1)                                                     ANAL0770
      PMOMH=PMOMM*BH(1)                                                     ANAL0780
      CALL RATS (RMOMH,PMOMH,0.,0.,-ZETA,0.,LHURK,MQMR,NHURK,1)            ANAL0790
      LQMR=LQMR+LHURK                                                       ANAL0800
      MQMR=MQMR+MHURK                                                       ANAL0810
      IF(VROT(1).NE.0.) V3=(VHS(1)/VROT(1))**3                              ANAL0820
  300 IF(BTR.EQ.0.) GO TO 299                                               ANAL0830
      CALL ROTAN (2)                                                        ANAL0840
      IF(EXIT.NE.0.) RETURN                                                 ANAL0850
      CALL RATS (-HTR,YTRF,-TTR,AYBMT,APBMT,ARBMT,XFTR,YFTR,ZFTR,1)         ANAL0860
      CALL DOGS (XAR(2),YAR(2),ZAR(2),XFTR,YFTR,ZFTR,LTR,MTR,NTR)           ANAL0870
      QREATT=QTR+BAIB(2)*PSDD                                               ANAL0880
      CALL RATS (0.,0.,-QREATT,AYBMT,APBMT,ARBMT,LQTR,MQTR,NQTR,1)          ANAL0890
      PMOMH=PMOMT*BH(2)                                                     ANAL0900
      RMOMH=RMOMT*BH(2)                                                     ANAL0910
      CALL RATS (RMOMH,PMOMH,0.,AYBMT,APBMT,ARBMT,LHURKT,MHURKT,NHURKT,    ANAL0920
     1           1)                                                         ANAL0930
      LQTR=LQTR+LHURKT                                                      ANAL0940
      MQTR=MQTR+MHURKT                                                      ANAL0950
      NQTR=NQTR+NHURKT                                                      ANAL0960
  299 XMAC=V*VSND                                                           ANAL0970
      AP=0.                                                                 ANAL0980
      APDOT=0.                                                              ANAL0990
      VXZBSQ=VXB**2+VZB**2                                                  ANAL1000
      IF(VXZBSQ.EQ.0.) GO TO 303                                            ANAL1010
      AP=ATAN2(VZB,VXB)                                                     ANAL1020
      APDOT=(VXB*Y(1,78)-VZB*Y(1,76))/VXZBSQ                                ANAL1030
C                                                                           ANAL1040
C     WING EQUATIONS                                                        ANAL1050
C                                                                           ANAL1060
  303 CONTINUE                                                              ANAL1070
      ANGE=0.                                                               ANAL1080
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      IF(OWG.LT.0) GO TO 304                                            ANAL1090
      VIW=VIMR*PMRWG                                                    ANAL1100
      XXW=VXB-WGUSTW+VIW*SZET                                           ANAL1110
      ST1=VZB-VGUSTW-VIW*CZET                                           ANAL1120
      ANGRW=ATAN2(ST1,XXW)                                              ANAL1130
      ALGEO=ANGRW+WGCOL                                                 ANAL1140
      ALRWG=ALGEO-ALCYP                                                 ANAL1150
      CALL CLCD (ALRWG,CLRWG,CDRWG,XMAC,EXIT,3)                         ANAL1160
      IF(EXIT.NE.0.) GO TO 1                                            ANAL1170
      CD=C3                                                             ANAL1180
      CL=C4                                                             ANAL1190
      DCDR=DCD                                                          ANAL1200
      VELSQ=XXW**2+ST1**2                                               ANAL1210
      QRW=QWG*VELSQ                                                     ANAL1220
      CALL MICE (-CDRWG,-CLRWG,ANGRW,C1,C2,1)                           ANAL1230
      XFRWG=C1*QRW                                                      ANAL1240
      ZFRWG=C2*QRW                                                      ANAL1250
      CALL DOGS (XAWG,YARWG,ZAWG,XFRWG,0.    ,ZFRWG,LRWG,MRWG,NRWG)     ANAL1260
      ALLWG=ALGEO+ALCYP                                                 ANAL1270
      CALL CLCD (ALLWG,CLLWG,CDLWG,XMAC,EXIT,3)                         ANAL1280
      IF(EXIT.NE.0.) GO TO 1                                            ANAL1290
      CD=.5*(C3+CD)                                                     ANAL1300
      CLWG=.5*(C4+CL)                                                   ANAL1310
      ALWG=.5*(ALRWG+ALLWG)                                             ANAL1320
      DCD=.5*(DCDR+DCD)                                                 ANAL1330
      CALL MICE (-CDLWG,-CLLWG,ANGRW,C1,C2,1)                           ANAL1340
      XFLWG=C1*QRW                                                      ANAL1350
      ZFLWG=C2*QRW                                                      ANAL1360
      CALL DOGS (XAWG,YALWG,ZAWG,XFLWG,0.    ,ZFLWG,LLWG,MLWG,NLWG)     ANAL1370
      TS=SWINGH/SQRT(VELSQ)                                             ANAL1380
      FF=QRW*SWING                                                      ANAL1390
      YAW=0.                                                            ANAL1400
      IF(VYB-YGUSTW.NE.0..OR.XXW.NE.0.) YAW=ATAN2(VYB-YGUSTW,XXW)       ANAL1410
                                                                        ANAL1420
      DQL AND DQN ARE CONTRIBUTION OF EACH WING. NOT TOTAL              ANAL1430
                                                                        ANAL1440
      DQL=FF*(YAW*(CLBO+CLBCL*CLWG)+TS*(AYD*CLR*CLWG+ARD*CLP))          ANAL1450
      DQN=FF*(YAW*(CNBO+CNBCL*CLWG**2)+TS*(AYD*(CNRCL*CLWG**2+CNRCD*DCD)ANAL1460
     1    +ARD*(CNPCL*CLWG+CNPCD1+CNPCD2*ALWG)))                        ANAL1470
      LRWG=LRWG+DQL                                                     ANAL1480
      LLWG=LLWG+DQL                                                     ANAL1490
      NRWG=NRWG+DQN                                                     ANAL1500
      NLWG=NLWG+DQN                                                     ANAL1510
      ANGE=-PWGEL1*CLWG                                                 ANAL1520
      ANG1=0.                                                           ANAL1530
      IF(VXB.NE.0.) ANG1=APDOT*XAELE*PWGEL1/VXB                         ANAL1540
      IF(ALWG.EQ.0.) GO TO 305                                          ANAL1550
      ANGE=ANGE-ANG1*CLWG/ALWG                                          ANAL1560
      GO TO 306                                                         ANAL1570
  305 CONTINUE                                                          ANAL1580
      ANGE=ANGE-ANG1*YAERO(17,3)                                        ANAL1590
  306 CONTINUE                                                          ANAL1600
      AWAKE=PWGWK1*CLWG                                                 ANAL1610
      DSTALL=RPIST*AMAX1(0.,(ALWG-YAERO(19,3)))                         ANAL1620
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      XA=DXWGEL-DSTALL                                                          ANAL1630
      AWGEL=ATAN2(DZWGEL,XA)                                                    ANAL1640
      DWGEL=SQRT(XA**2+DZWGEL**2)*RCWING                                        ANAL1650
      ANGLE=AWAKE-AP-AWGEL                                                      ANAL1660
      DIS =DWGEL*ABS(SIN(ANGLE))                                                ANAL1670
      XI=DWGEL*ABS(COS(ANGLE))                                                  ANAL1680
      HWAKE=.68*SQRT(CD*(XI+.15))                                               ANAL1690
      ETAQ=0.                                                                   ANAL1700
      IF(DIS .LT.HWAKE .AND. ABS(ANGLE).LT.HALFPI)                              ANAL1710
     1   ETAQ=ETAQMX*SQRT(CD)/(XI+.3)*(COS(DIS *HALFPI/HWAKE))**2               ANAL1720
      IF(NWAG.EQ.0) GO TO 304                                                   ANAL1730
      LWING=LWING+1                                                             ANAL1740
      LWING1=LWING                                                              ANAL1750
      DLIFT=ZFRWG-ZFRWG1                                                        ANAL1760
      CALL WAG (CWING,LWING,3,V,TDELT,RED,DLIFT)                                ANAL1770
      ZFRWG=ZFRWG-RED                                                           ANAL1780
      DLIFT=ZFLWG-ZFLWG1                                                        ANAL1790
      CALL WAG (CWING,LWING1,4,V,TDELT,RED,DLIFT)                               ANAL1800
      ZFLWG=ZFLWG-RED                                                           ANAL1810
C                                                                               ANAL1820
C     ELEVATOR EQUATIONS                                                        ANAL1830
C                                                                               ANAL1840
  304 IF(QELE.LT.0) GO TO 302                                                   ANAL1850
      VIER=0.                                                                   ANAL1860
      IF(V.GT.VENTER) VIER=VIMR*(V-VENTER)*VXMVER                               ANAL1870
      IF(V.GT.VMAXE) VIER=PMREL*VIMR                                            ANAL1880
      ST1=VZB+ARD*YAELE-APD*XAELE-VIER*CZET-VGUSTE                              ANAL1890
      XXE=VXB+APD*ZAELE-AYD*YAELE-HGUSTE                                        ANAL1900
      VELSQ=XXE**2+ST1**2                                                       ANAL1910
      IF(VELSQ.NE.0.) ANGE=ATAN2(ST1,XXE)+ANGE                                  ANAL1920
      ALEL=ALECR1+D3ELE*COLSTK+EIZETA+ANGE                                      ANAL1930
      CALL CLCD (ALEL,CLELE,CDELE,XMAC,EXIT,4)                                  ANAL1940
      IF(EXIT.NE.0.) GO TO 1                                                    ANAL1950
      QE=QELE*VELSQ*(1.-ETAQ)                                                   ANAL1960
      IF(ALFL.NE.0.) CLELE=CLELE*ALEL/(ALEL+CLELE*QE*YAERO(11,4))               ANAL1970
      CALL MICE (-CDELE,-CLELE,ANGE,C1,C2,1)                                    ANAL1980
      XFELE=C1*QE                                                               ANAL1990
      ZFELE=C2*QE                                                               ANAL2000
      CALL DOGS (XAELE,YAELE,ZAELE,XFELE,0.    ,ZFELE,LELE,MELE,NELE)           ANAL2010
      IF(NWAG.EQ.0) GO TO 302                                                   ANAL2020
      ZFEL(2)=ZFELE                                                             ANAL2030
      ZFELE=.5*(ZFEL(1)+ZFEL(2))                                                ANAL2040
      IF(I.NE.3) ZFEL(1)=ZFEL(2)                                                ANAL2050
C                                                                               ANAL2060
C     FIN EQUATIONS                                                             ANAL2070
C                                                                               ANAL2080
  302 IF(QFIN.LT.0) GO TO 301                                                   ANAL2090
      ST1=ARD*ZAFIN-AYD*XAFIN-VYB*FNSWC-VITR*PTRFN+YGUSTF                       ANAL2100
      XXFN=VXB+APD*ZAFIN-AYD*YAFIN-HGUSTF                                       ANAL2110
      QF=QFIN*(XXFN*XXFN+ST1*ST1)                                               ANAL2120
      ANGF=0.                                                                   ANAL2130
      IF(QF.NE.0.) ANGF=ATAN2(ST1,XXFN)                                         ANAL2140
      ALFIN=ANGF+ALGFPD                                                         ANAL2150
      CALL CLCD (ALFIN,CLFIN,CDFIN,XMAC,EXIT,5)                                 ANAL2160
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      IF(EXIT.NE.0.) GO TO 1                                                    ANAL2170
      IF(ALFIN.NE.0.) CLFIN=CLFIN*ALFIN/(ALFIN+CLFIN*QF*YAERO(11,5))            ANAL2180
      CALL MICE (-CDFIN,CLFIN,ANGF,C1,C2,-1)                                    ANAL2190
      XFFIN=C1*QF                                                               ANAL2200
      YFFIN=C2*QF                                                               ANAL2210
      CALL DOGS (XAFIN,YAFIN,ZAFIN,XFFIN,YFFIN,0.    ,LFIN,MFIN,NFIN)           ANAL2220
      IF(NWAG.EQ.0) GO TO 301                                                   ANAL2230
      YFIN(2)=YFFIN                                                             ANAL2240
      YFFIN=.5*(YFIN(1)+YFIN(2))                                                ANAL2250
      IF(I.NE.3) YFIN(1)=YFIN(2)                                                ANAL2260
C                                                                               ANAL2270
C     FUSELAGE EQUATIONS                                                        ANAL2280
C                                                                               ANAL2290
  301 XXF=VXB-HGUSTW                                                            ANAL2300
      ST1=VZB-VGUSTW                                                            ANAL2310
      ANG1=0.                                                                   ANAL2320
      QVXZB=Q*(XXF*XXF+ST1*ST1)                                                 ANAL2330
      IF(QVXZB.NE.0.) ANG1=ATAN2(ST1,XXF)                                       ANAL2340
      FSLIFT=QVXZB*(YFS(1)+ANG1*YFS(2))                                         ANAL2350
      DF=QVXZB*(YFS(7)+ANG1*(YFS(8)+ANG1*YFS(9)))                               ANAL2360
      ST2=YGUSTW-VYB                                                            ANAL2370
      QVXYB=Q*(XXF*XXF+ST2*ST2)                                                 ANAL2380
      ANG2=0.                                                                   ANAL2390
      IF(QVXYB.NE.0.) ANG2=ATAN2(ST2,XXF)                                       ANAL2400
      YFFS=QVXYB*(YFS(10)+ANG2*(YFS(11)+ANG2*YFS(12)))                          ANAL2410
      DFAY=QVXYB*YFS(13)*ANG2**2                                                ANAL2420
      CALL MICE (-DF,-FSLIFT,ANG1,XFFUS,ZFFUS,1)                                ANAL2430
      CALL MICE (-DFAY,YFFS,ANG2,XFFUSY,YFFUS,-1)                               ANAL2440
      DPYLON=QVXZB*YFS(14)*V3                                                   ANAL2450
      CALL MICE (-DPYLON,0.,ANG1,XFPYL,ZFPYL,1)                                 ANAL2460
      XFFUS=XFFUS+XFPYL+XFFUSY                                                  ANAL2470
      ZFFUS=ZFFUS+ZFPYL                                                         ANAL2480
      CALL DOGS(XAPYLD,0.,ZAPYLD,XFPYL,0.,ZFPYL,TV,MPYL,TV1)                    ANAL2490
      CALL DOGS (XAFUS,YAFUS,ZAFUS,XFFUS,YFFUS,ZFFUS,LFUS,MFFUS,NFFUS)          ANAL2500
      MFUS=QVXZB*(YFS(3)+ANG1*YFS(4))+MPYL+MFFUS                                ANAL2510
      NFUS=QVXYB*(YFS(5)+ANG2*YFS(6))+NFFUS                                     ANAL2520
C                                                                               ANAL2530
C     JET THRUST EQUATIONS                                                      ANAL2540
C                                                                               ANAL2550
      IF(COLJET.EQ.0.) GO TO 79                                                 ANAL2560
      DCOL=COLJET*(COLSTK-COLKS)                                                ANAL2570
      COLKS=COLSTK                                                              ANAL2580
      TAXR=TAXR+QCOL                                                            ANAL2590
      IF(NJET.EQ.1) GO TO 79                                                    ANAL2600
      TAXL=TAXL+QCOL                                                            ANAL2610
   79 CONTINUE                                                                  ANAL2620
      CALL RATS (TAXR,0.,0.,AYBJET,APBJET,ARBJET,XFRJET,YFRJET,ZFRJET,1)        ANAL2630
      CALL DOGS (XAJET,YARJET,ZAJET,XFRJET,YFRJET,ZFRJET,LRJET,MRJET,           ANAL2640
     1    NRJET)                                                                ANAL2650
      CALL RATS(TAXL,0.,0.,-AYBJET,APBJFT,ARBJET,XFLJET,YFLJET,ZFLJET,1)        ANAL2660
      CALL DOGS (XAJET,YALJET,ZAJET,XFLJET,YFLJET,ZFLJET,LLJET,MLJET,           ANAL2670
     1    NLJET)                                                                ANAL2680
C                                                                               ANAL2690
C     FORCE EQUATIONS                                                           ANAL2700
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C                                                                                ANAL2710
      XF=XFRWG+XFLWG+XFELE+XFFUS+XFRJET+XFLJET+XFMR+XFTR+XFGUN+XFFIN+XFW         ANAL2720
      YF=                    YFFUS+YFRJET+YFLJET+YFMR+YFTR+YFGUN+YFFIN+YFW      ANAL2730
      ZF=ZFRWG+ZFLWG+ZFELE+ZFFUS+ZFRJFT+ZFLJET+ZFMR+ZFTR+ZFGUN       +ZFW       ANAL2740
C                                                                                ANAL2750
C     MOMENT EQUATIONS                                                           ANAL2760
C                                                                                ANAL2770
      QL=LRWG+LLWG+LELE+LFUS+LRJET+LLJET+LMR+LTR+LGUN+LFIN+LQMR+LQTR             ANAL2780
      QM=MRWG+MLWG+MELE+MFUS+MRJET+MLJET+MMR+MTR+MGUN+MFIN+MQMR+MQTR             ANAL2790
      QN=NRWG+NLWG+NELE+NFUS+NRJET+NLJET+NMR+NTR+NGUN+NFIN+NQMR+NQTR             ANAL2800
C                                                                                ANAL2810
C                                                                                ANAL2820
    1 RETURN                                                                     ANAL2830
      END                                                                        ANAL2840
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      SUBROUTINE CATS (A1,A2,A3,B1,B2,B3,C1,C2,C3,N1,N2)                CATS0010
C                                                                       CATS0020
C      A IS THE MATRIX OF THE A SET OF EULER ANGLES                     CATS0030
C      B IS THE MATRIX OF THE B SET OF EULER ANGLES                     CATS0040
C      C IS THE MATRIX OF THE C SET OF EULER ANGLES                     CATS0050
C                                                                       CATS0060
C      N1= 1, N2= 1 IS FOR B*A                                          CATS0070
C      N1=-1, N2= 1 IS FOR B*A(TRANSPOSE)                               CATS0080
C      N1= 1, N2=-1 IS FOR B(TRANSPOSE)*A                               CATS0090
C      N1=-1, N2=-1 IS FOR B(TRANSPOSE)*A(TRANSPOSE)                    CATS0100
C                                                                       CATS0110
      DIMENSION A(3,3),B(3,3),C(3,3)                                    CATS0120
C         COMPUTE A AND B MATRICES                                      CATS0130
      CALL MATRIX (A1,A2,A3,A,N1)                                       CATS0140
      CALL MATRIX (B1,B2,B3,B,N2)                                       CATS0150
C         COMPUTE C MATRIX                                              CATS0160
      DO 101 I=1,3                                                      CATS0170
      DO 101 J=1,3                                                      CATS0180
      C(I,J)=0.                                                         CATS0190
      DO 101 L=1,3                                                      CATS0200
      C(I,J)=C(I,J)+B(L,J)*A(I,L)                                       CATS0210
  101 CONTINUE                                                          CATS0220
C         CHECK TO SEE IF PITCH ANGLE IS 90 DEGREES                     CATS0230
      IF(C(1,1).EQ.0..AND.C(1,2).EQ.0.) GO TO 104                       CATS0240
      C1=ATAN2(C(1,2),C(1,1))                                           CATS0250
      C3=ATAN2(C(2,3),C(3,3))                                           CATS0260
      CC3=COS(C3)                                                       CATS0270
      IF(ABS(CC3).LE.0.001) GO TO 102                                   CATS0280
      C2=ATAN2((-C(1,3)*CC3),C(3,3))                                    CATS0290
      GO TO 103                                                         CATS0300
  102 CONTINUE                                                          CATS0310
      C2=ATAN2(-C(1,3),(C(2,3)*SIN(C3)))                                CATS0320
  103 CONTINUE                                                          CATS0330
C         CHECK TO SEE IF C1,C2,C3 ARE IN WRONG QUADRANT                CATS0340
      IF(COS(C2).GE.0.) RETURN                                          CATS0350
C         RECOMPUTE C1,C2,C3 IN CORRECT QUADRANT                        CATS0360
      C1=ATAN2(-C(1,2),-C(1,1))                                         CATS0370
      C3=ATAN2(-C(2,3),-C(3,3))                                         CATS0380
      IF(ABS(CC3).LE.0.001) RETURN                                      CATS0390
      C2=ATAN2((-C(1,3)*COS(C3)),C(3,3))                                CATS0400
      RETURN                                                            CATS0410
C         RESOLVE INDETERMINACY CAUSED BY PITCH ANGLE BY USING OLD      CATS0420
C              YAW ANGLE                                                CATS0430
  104 CONTINUE                                                          CATS0440
      C2 = -SIGN(1.570796,C(1,3))                                       CATS0450
      C3=(ATAN2(-C(2,1),(-C(1,3)*C(3,1)))-C1)*C(1,3)                    CATS0460
      RETURN                                                            CATS0470
      END                                                               CATS0480
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      SUBROUTINE CLCD (ALP,CL,CD,XMAC,EXIT,N)                                  CLCD0010
      COMMON /STARAN/ BH(2),C3,C4,RW,CLP,CLR,DCD,DQL,DQN,VIW,                  CLCD0020
     1                BAIB(2),CLBO,CNBO,ETAQ ,NJET,                            CLCD0030
     2                QFIN,                                                    CLCD0040
     3                VIER,CLBCL,YFS(14),                                      CLCD0050
     4                CNBCL,CNPCL,CNRCD,CNRCL,COLKS,O3ELE,                     CLCD0060
     5                FNSWC,LWING,PMREL,PMRWG,                                 CLCD0070
     6                PTRFN,RPIST,VMAXE,YAERO(31,5),                           CLCD0080
     7                APBJET,ARBJET,AYBJET,                                    CLCD0090
     8                CNPCD1,CNPCD2,COLJET,OXWGEL,OZWGEL,                      CLCD0100
     9                ETAQMX,PWGWK1,RCWING,SWINGH,                             CLCD0110
     A                VENTER,VXMVER                                            CLCD0120
      DIMENSION HEAD(3,3)                                                      CLCD0130
      DATA  DTRR,PI,TWOPI/ 57.29578,3.141593,6.283185/                         CLCD0140
      DATA HALFPI/1.570796/                                                    CLCD0150
      DATA HEAD/              '       WING    ELEVATOR  FIN/RUDDER '/          CLCD0160
      LOGICAL STALL                                                            CLCD0170
      STALL=.FALSE.                                                            CLCD0180
      ALF=ALP                                                                  CLCD0190
      AL=YAERO(17,N)                                                           CLCD0200
 6010 SG=1.                                                                    CLCD0210
      IF(ALF.LT.0.) SG=-1.                                                     CLCD0220
      AMG=SG*ALF                                                               CLCD0230
      IF(20.LE.AMG) GO TO 6015                                                 CLCD0240
      IF(PI.GE.AMG) GO TO 6020                                                 CLCD0250
      AMG=AMG-TWOPI                                                            CLCD0260
      ALF=AMG*SG                                                               CLCD0270
      GO TO 6010                                                               CLCD0280
 6015 WRITE (6,6101) N                                                         CLCD0290
      EXIT=1.                                                                  CLCD0300
      RETURN                                                                   CLCD0310
 6020 IF(AL.NE.0.) GO TO 50                                                    CLCD0320
      ALD=AMG*DTRR                                                             CLCD0330
      CALL TABINT (CL,CD,XMAC,ALD,SG)                                          CLCD0340
      CL=CL*SG                                                                 CLCD0350
      RETURN                                                                   CLCD0360
   50 SMAC=1./SQRT(ABS(1.-XMAC**2))                                            CLCD0370
      ALI=0.                                                                   CLCD0380
      CRM=YAERO(1,N)                                                           CLCD0390
      SSMM=YAERO(2,N)                                                          CLCD0400
      CDZ=YAERO(12,N)                                                          CLCD0410
      CD1 = YAERO(13,N)                                                        CLCD0420
      CD2 = YAERO(14,N)                                                        CLCD0430
      CDMX=YAERO(16,N)                                                         CLCD0440
      SMALM = AMIN1(XMAC,SSMM)                                                 CLCD0450
      AR = YAERO(18,N)                                                         CLCD0460
      ALD=ALP*DTRR                                                             CLCD0470
      ZK3=1.+.25*XMAC**4                                                       CLCD0480
      IF((HALFPI).GE.AMG) GO TO 6032                                           CLCD0490
      AMG=PI-AMG                                                               CLCD0500
      SG=-SG                                                                   CLCD0510
      CLZ=YAERO(7,N)                                                           CLCD0520
      CLMX=CLZ+SMALM*(YAERO(8,N)+SMALM*(YAERO(9,N)+SMALM*YAERO(10,N)))         CLCD0530
      ALB=YAERO(23,N)                                                          CLCD0540
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      SALB=YAERO(21,N)                                                    CLCD0550
      S2ALB=YAERO(25,N)                                                   CLCD0560
      CALB=YAERO(27,N)                                                    CLCD0570
      GO TO 6031                                                          CLCD0580
 6032 CLZ=YAERO(3,N)                                                      CLCD0590
      CLMX=CLZ+SMALM*(YAERO(4,N)+SMALM*(YAERO(5,N)+SMALM*YAERO(6,N)))     CLCD0600
      ALB=YAERO(22,N)                                                     CLCD0610
      SALB=YAERO(20,N)                                                    CLCD0620
      S2ALB=YAERO(24,N)                                                   CLCD0630
      CALB=YAERO(26,N)                                                    CLCD0640
 6031 IF(XMAC.LT.CRM) GO TO 6041                                          CLCD0650
      IF(SSMM.LE.XMAC) GO TO 6042                                         CLCD0660
      AL=YAERO(29,N)+XMAC*(YAERO(30,N)+XMAC*YAERO(31,N))                  CLCD0670
      GO TO 5000                                                          CLCD0680
 6041 AL=AL*SMAC                                                          CLCD0690
      GO TO 5000                                                          CLCD0700
 6042 AL=4.*SMAC                                                          CLCD0710
 5000 ANG=AMG                                                             CLCD0720
      ALPHI4=CLMX/AL                                                      CLCD0730
      SAMG=SIN(AMG)                                                       CLCD0740
      CAMG=COS(AMG)                                                       CLCD0750
      IF(N.LT.3) GO TO 11                                                 CLCD0760
      F1=CLZ                                                              CLCD0770
      F2=.81                                                              CLCD0780
      GO TO 10                                                            CLCD0790
   11 F1=.938                                                             CLCD0800
      F2=.581                                                             CLCD0810
   10 CONTINUE                                                            CLCD0820
      IF(ALB.GT.AMG) GO TO 6044                                           CLCD0830
      STALL=.TRUE.                                                        CLCD0840
      IF(XMAC.GT.1.0)ZK3=.84+.082/(XMAC-.8)                               CLCD0850
      IF(ABS(AMG).GE.1.565) GO TO 35                                      CLCD0860
      QQ=F1*ZK3                                                           CLCD0870
      Q1=QQ+QQ                                                            CLCD0880
      A=QQ*SIN(AMG+AMG)                                                   CLCD0890
      Q2=.81+Q1*SAMG-F2*ZK3                                               CLCD0900
      BQ2A=(AR-SAMG*Q2+Q1*CAMG**2)/(A+A)                                  CLCD0910
      COA=CAMG*Q2/A                                                       CLCD0920
      DISC=SQRT(BQ2A**2+COA)                                              CLCD0930
      IF(BQ2A.GT.0.) GO TO 31                                             CLCD0940
      ALI=DISC-BQ2A                                                       CLCD0950
      GO TO 36                                                            CLCD0960
   31 CONTINUE                                                            CLCD0970
      ALI=COA/(BQ2A+DISC)                                                 CLCD0980
      GO TO 36                                                            CLCD0990
   35 ALI = 0.                                                            CLCD1000
   36 CL = AR * ALI                                                       CLCD1010
      GO TO 20                                                            CLCD1020
 6044 ALI = AL/(AL+AR)*AMG                                                CLCD1030
      ANG=AMG-ALI                                                         CLCD1040
      CL=AL*ANG                                                           CLCD1050
      IF(CLMX.GE.CL) GO TO 20                                             CLCD1060
      QQ=F1*ZK3                                                           CLCD1070
      Q1=QQ+QQ                                                            CLCD1080
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      A=Q0*S2ALB                                                        CLCD1090
      Q2=.81+Q1*SALB-F2*ZK3                                             CLCD1100
      BO2A=(AR-SALB*Q2+Q1*CALB**2)/(A+A)                                CLCD1110
      COA=CAL8*Q2/A                                                     CLCD1120
      DISC=SQRT(BO2A**2+COA)                                            CLCD1130
      IF(BO2A.GT.0.) GO TO 32                                           CLCD1140
      ALIB=DISC-BO2A                                                    CLCD1150
      GO TO 33                                                          CLCD1160
   32 CONTINUE                                                          CLCD1170
      ALIB=COA/(BO2A+DISC)                                              CLCD1180
   33 CONTINUE                                                          CLCD1190
      CLB = AR * ALIB                                                   CLCD1200
      ALIMX = CLMX/(AR + AL)                                            CLCD1210
      AOVER = (AMG-ALPH14)/(ALPH14-ALB)                                 CLCD1220
      ALI = ALIMX+(ALIMX-ALIB)*AOVER                                    CLCD1230
      CL = CLMX+(CLMX-CLB)*AOVER                                        CLCD1240
      ANG=AMG-ALI                                                       CLCD1250
      STALL=.TRUE.                                                      CLCD1260
   20 CL=CL*SG                                                          CLCD1270
      IF(1.0.LE.XMAC) GO TO 6050                                        CLCD1280
      CDZ = CDZ*SMAC                                                    CLCD1290
      XMACM = AMAX1(XMAC,.35) - CRM                                     CLCD1300
      IF(ALPH14.LT.AMG) GO TO 60                                        CLCD1310
      DD = XMACM + 1.9*AMG                                              CLCD1320
      C5=1.9                                                            CLCD1330
      IF(DD.GE.0.) GO TO 30                                             CLCD1340
      C5=0.                                                             CLCD1350
      DD=0.                                                             CLCD1360
   30 CONTINUE                                                          CLCD1370
      C6=AMG*CD2                                                        CLCD1380
      C7=CD1 + C6                                                       CLCD1390
      CD=CDZ+AMG*C7+DD                                                  CLCD1400
      IF(CD.GT.CDMX) GO TO 70                                           CLCD1410
      DCD=C5+C6+C7                                                      CLCD1420
      GO TO.253                                                         CLCD1430
   70 CONTINUE                                                          CLCD1440
      CDSX=CDMX                                                         CLCD1450
      AS1 = CD1 + 1.9                                                   CLCD1460
      AS2 = CDZ - CDSX + XMACM                                          CLCD1470
      IF(CD2          .EQ.0.) GO TO 80                                  CLCD1480
      ALFSX = (SQRT(.25*AS1*AS1 - AS2*CD2         )-.5*AS1)/CD2         CLCD1490
      GO TO 6040                                                        CLCD1500
   80 CONTINUE                                                          CLCD1510
      ALFSX = -AS2/AS1                                                  CLCD1520
      GO TO 6040                                                        CLCD1530
   60 CONTINUE                                                          CLCD1540
      CDSX=CDZ+ALPH14*(CD1         +ALPH14*CD2         )+               CLCD1550
     1    AMAX1(0.,XMACM + 1.9*ALPH14)                                  CLCD1560
      IF(CDSX.GT.CDMX) GO TO 70                                         CLCD1570
      ALFSX=ALPH14                                                      CLCD1580
 6040 CONTINUE                                                          CLCD1590
      IF(N.LT.3) GO TO 40                                               CLCD1600
      C5=AMG-HALFPI                                                     CLCD1610
      C6=C5*(CDSX-2.0)/(ALFSX-HALFPI)**2                                CLCD1620
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```
      CD=C5*C6+2.0                                                      CLCD1630
      DCD=C5+C6                                                         CLCD1640
      GO TO 254                                                         CLCD1650
   40 CONTINUE                                                          CLCD1660
      ZK4=2.1*ZK3                                                       CLCD1670
      CALF=1./COS(ALFSX)                                                CLCD1680
      SALF=CALF*SIN(ALFSX)**2                                           CLCD1690
      CALF=CDSX*CALF                                                    CLCD1700
      CD=ZK4*SAMG**2+(CALF-SALF*ZK4)*CAMG                               CLCD1710
      RETURN                                                            CLCD1720
 6050 CD=CDMX                                                           CLCD1730
      DCD=0.                                                            CLCD1740
      IF(SSMM.GT.XMAC) GO TO 253                                        CLCD1750
      CD=4.*(AMG**2+YAERO(15,N))*SMAC+CDZ                               CLCD1760
      DCD=8.*AMG*SMAC                                                   CLCD1770
 6060 IF(CD.LE.CDMX) GO TO 253                                          CLCD1780
      CD=CDMX                                                           CLCD1790
      DCD=0.                                                            CLCD1800
  253 IF(N.LT.3) RETURN                                                 CLCD1810
  254 CONTINUE                                                          CLCD1820
      IF(STALL) WRITE (6,22) (HEAD(J,N-2),J=1,3),ALD,CL,CD              CLCD1830
      C3=CD                                                             CLCD1840
      C4=CL                                                             CLCD1850
      NSGG = -SG                                                        CLCD1860
      CALL MICE (C3,C4,ALI,CD,CL,NSGG)                                  CLCD1870
      RETURN                                                            CLCD1880
   22 FORMAT (1HO,3A4,'STALLED AT ',F7.3,' DEGREES CL = ',F6.3,' CD = ',CLCD1890
     1      F6.3)                                                      CLCD1900
 6101 FORMAT ('0 EXCESSIVE ANGLE OF ATTACK FOR N = ',I2)                CLCD1910
      END                                                               CLCD1920
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```
      SUBROUTINE CCMSOL(COEF,REPRT1,ZPRT1,REPRT2,ZPRT2)                 COMS0010
C                                                                       COMS0020
C             SOLUTION OF SIMULTANEOUS EQUATIONS                        COMS0030
C             WITH COMPLEX COEFFICIENTS                                 COMS0040
C             N = ORDER OF MATRIX                                       COMS0050
C                                                                       COMS0060
      DIMENSION COEF(2,3),A(2,5)                                        COMS0070
      COMPLEX A,TEMP,DET,COEF                                           COMS0080
      N=2                                                               COMS0090
      NP1 = 3                                                           COMS0100
      DO 3J = 1,NP1                                                     COMS0110
      DO 3I = 1,N                                                       COMS0120
      A(I,J) = COEF(I,J)                                                COMS0130
    3 CONTINUE                                                          COMS0140
      DET = (1.0,0.0)                                                   COMS0150
C                                                                       COMS0160
C             COLUMNAR REARRANGEMENT OF MATRIX                          COMS0170
C                                                                       COMS0180
      NM1=N-1                                                           COMS0190
      DO 60 I=1,NM1                                                     COMS0200
      JJ=I+1                                                            COMS0210
      IMAX=I                                                            COMS0220
      AMAXT = REAL(A(JJ,I))**2 + AIMAG(A(JJ,I))**2                      COMS0230
      DO 29J=JJ,N                                                       COMS0240
      ATEST1 = REAL(A(J,I))**2 + AIMAG(A(J,I))**2                       COMS0250
      ATEST2 = REAL(A(IMAX,I))**2 + AIMAG(A(IMAX,I))**2                 COMS0260
      IF(ATEST1-ATEST2) 29,29,28                                        COMS0270
   28 IF(ATEST1.LE.AMAXT) GO TO 29                                      COMS0280
      AMAXT = ATEST1                                                    COMS0290
      IMAX = J                                                          COMS0300
   29 CONTINUE                                                          COMS0310
      IF(IMAX-I) 60,60,33                                               COMS0320
   33 DET=-DET                                                          COMS0330
      DO 50K=1,NP1                                                      COMS0340
      TEMP=A(I,K)                                                       COMS0350
      A(I,K)=A(IMAX,K)                                                  COMS0360
      A(IMAX,K)=TEMP                                                    COMS0370
   50 CONTINUE                                                          COMS0380
   60 CONTINUE                                                          COMS0390
C                                                                       COMS0400
C     AUGMENT INPUT MATRIX WITH THE IDENTITY MATRIX                     COMS0410
C                                                                       COMS0420
      NP2 = 4                                                           COMS0430
      N2P1 = 5                                                          COMS0440
      DO 10 I=1,N                                                       COMS0450
      DO 11 J =NP2,N2P1                                                 COMS0460
      A(I,J) = 0.0                                                      COMS0470
   11 CONTINUE                                                          COMS0480
   10 CONTINUE                                                          COMS0490
      DO 13 I = 1,N                                                     COMS0500
      J = I + NP1                                                       COMS0510
      A(I,J) = 1.0                                                      COMS0520
   13 CONTINUE                                                          COMS0530
C                                                                       COMS0540
```

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C     SOLUTION                                                          COMS0550
C                                                                       COMS0560
      DO 19 I=1,N                                                       COMS0570
      IP1 = I+1                                                         COMS0580
      TTEST = REAL(A(I,I))**2 + AIMAG(A(I,I))**2                        COMS0590
      IF(TTEST.LE.0.000001)  GO TO 99                                   COMS0600
   12 DO 15 J = IP1,N2P1                                                COMS0610
      A(I,J) = A(I,J)/A(I,I)                                            COMS0620
   15 CONTINUE                                                          COMS0630
      DO 18 K = 1,N                                                     COMS0640
      IF(K-I) 16,18,16                                                  COMS0650
   16 DO 17 J = IP1,N2P1                                                COMS0660
      A(K,J) = A(K,J) - A(K,I)*A(I,J)                                   COMS0670
   17 CONTINUE                                                          COMS0680
   18 CONTINUE                                                          COMS0690
   19 CONTINUE                                                          COMS0700
C                                                                       COMS0710
C     DETERMINANT EVALUATION                                            COMS0720
C                                                                       COMS0730
      DO 20 I = 1,N                                                     COMS0740
      DET = DET * A(I,I)                                                COMS0750
   20 CONTINUE                                                          COMS0760
      REPRT1 = REAL(A(1,3))                                             COMS0770
      ZPRT1 = AIMAG(A(1,3))                                             COMS0780
      REPRT2 = REAL(A(2,3))                                             COMS0790
      ZPRT2 = AIMAG(A(2,3))                                             COMS0800
      RETURN                                                            COMS0810
C                                                                       COMS0820
C     SINGULAR MATRIX                                                   COMS0830
C                                                                       COMS0840
   99 PRINT 999,I,I,A(I,I)                                              COMS0850
  999 FORMAT (/3H A(,I2,1H,,I2,4H) = ,2F10.8 )                          COMS0860
   94 FORMAT(7E12.4)                                                    COMS0870
      RETURN                                                            COMS0880
      END                                                               COMS0890
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```
      SUBROUTINE CON1 (XCON,D3ELE,TRIND,COLJET,EIMAST,PCGOEO,PCGMAX)     CON10010
      COMMON /STRIMA/ AY,VH,AGW,DT1(2),DT2(2),IXZ,                      CON10020
     1                QMR,XXO,YYO,ZZO,ALGF,APFP,AYFP,                   CON10030
     2                CGWL,COLL(6),CYCF(3),CYCL(3),                     CON10040
     3                DIST,KCIT(20),PEDA(3),QMAX,                       CON10050
     4                QMRS,TIME,TMAX,XCIT(20,6),ALGEZ,                  CON10060
     5                ALGE1,ALGE2,CGSTA,CPWIC,DIXIZ,                    CON10070
     6                DIYIX,DIZIY,DTZMT,DTZM1,DTZT1,FTKTS,              CON10080
     *                HUBKM(2,2),HUBKI(2,2),                            CON10090
     7                KREAD,PIU30,TSTAB(14),ZMAX2,ZMAX3,                CON10100
     8                ASECOL,CYPWIC,GEARAT,PSO550,                      CON10110
     9                PSISTP,QXBRAK,RUDINO,ZOELT1,ZOELT2                CON10120
      COMMON /MANAL/  Q,AP,PEO,QWG,TZM,T1M,T2M,                         CON10130
     1                TZT,T1T,T2T,ALFL,CZFT,PSDO,                       CON10140
     2                SZET,TAXL,TAXR,XAWG,XLNK(16),ZAWG,                CON10150
     3                ALCYP,ALFIN,ALLWG,ALRWG,CDELE,COFIN,              CON10160
     4                CDLWG,CDRWG,CLELE,CLFIN,CLLWG,CLRWG,CWING,        CON10170
     5                CYCR1,CYCR2,CZET4,CZET6,CZET9,RANGE,              CON10180
     6                SZET5,SZET7,SZET8,WGCOL,XAELE,XAFIN,              CON10190
     7                XAFUS,XAJET,YAFIN,ZAELE,ZAFIN,ZAFUS,              CON10200
     *                YAELE,YAFUS,YALWG,YARWG,YALJET,YARJET,            CON10210
     8                ZAJET,ALECR1,ALGFPO,BOTTOM,CZET11,                CON10220
     9                CZET12,CZET13,FIZETA,HALFPI,SZET10,               CON10230
     A                XAPYLO,YGUSTW,ZAPYLO,ZFLWG1,ZFRWG1                CON10240
     B                ,TZMS,T1MS,T2MS,TZTS,T1TS,T2TS,                   CON10250
     C                CLOCK,FLOCK,XLOCK,TCLOCK                          CON10260
      DIMENSION XCON(63)                                                CON10270
      DATA DTR,DTRR,PO1DTR/ .1745329E-01,57.29578,.1745329E-03/         CON10280
C                                                                       CON10290
C     SET UP VALUES FOR COLLECTIVE                                      CON10300
C                                                                       CON10310
      COLL(1)=XCON(1)                                                   CON10320
      IF(COLL(1).EQ.0.) COLL(1)=100.                                    CON10330
      COLL(2)=XCON(2)*DTR                                               CON10340
      COLL(3)=XCON(3)                                                   CON10350
      COLL(4)=XCON(4)*DTRR                                              CON10360
      COLL(5) = XCON(5)                                                 CON10370
      IF(COLL(5).EQ.0.) COLL(5) = 100.                                  CON10380
      XXX = XCON(6)                                                     CON10390
      IF(XXX.EQ.0.) XXX=COLL(5)                                         CON10400
C                                                                       CON10410
C     SLOPE OF RANGE                                                    CON10420
C                                                                       CON10430
      COLL(6)=(XXX-COLL(5))/HALFPI                                      CON10440
      CLOCK=XCON(7)                                                     CON10450
      TZMS=XCON(8)*DTR                                                  CON10460
      CPWIC=XCON(10)*COLL(1)*PO1DTR                                     CON10470
      D3ELE=XCON(11)*COLL(1)*PO1DTR                                     CON10480
      COLJET=XCON(12)*COLL(1)/100.                                      CON10490
C                                                                       CON10500
C     SET UP VALUES FOR F/A CYCLIC                                      CON10510
C                                                                       CON10520
      CYCF(1)=XCON(15)                                                  CON10530
      IF(CYCF(1).EQ.0.) CYCF(1)=100.                                    CON10540
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      CYCF(2)=XCON(16)*DTR                                              CON10550
      IF(CYCF(2).EQ.0.) CYCF(2)=-.8726646                               CON10560
      CYCF(3)=XCON(17)*P01DTR                                           CON10570
      IF(CYCF(3).EQ.0.) CYCF(3)=DTR                                     CON10580
      FLOCK=XCON(18)                                                    CON10590
      T1MS=XCON(19)*DTR                                                 CON10600
      T1TS=T1MS*TRIND                                                   CON10610
      RDPIN=CYCF(1)/(100.*CYCF(3))                                      CON10620
      ALGE1=XCON(27)*RDPIN*DTR                                          CON10630
      ALGE2=XCON(28)*RDPIN**2*DTR                                       CON10640
C                                                                       CON10650
C     SET UP VALUES FOR LATERAL CYCLIC                                  CON10660
C                                                                       CON10670
      CYCL(1)=XCON(29)                                                  CON10680
      IF(CYCL(1).EQ.0.) CYCL(1)=100.                                    CON10690
      CYCL(2)=XCON(30)*DTR                                              CON10700
      IF(CYCL(2).EQ.0.) CYCL(2)=-.8726646                               CON10710
      CYCL(3)=XCON(31)*P01DTR                                           CON10720
      IF(CYCL(3).EQ.0.) CYCL(3)=DTR                                     CON10730
      XLOCK=XCON(32)                                                    CON10740
      T2MS=XCON(33)*DTR                                                 CON10750
      T2TS=-T2MS*TRIND                                                  CON10760
      CYPWIC=XCON(41)*CYCL(1)/(100.*CYCL(3))*DTR                        CON10770
C                                                                       CON10780
C     SET UP VALUES FOR PEDAL                                           CON10790
C                                                                       CON10800
      PEDA(1)=XCON(43)                                                  CON10810
      IF(PEDA(1).EQ.0.) PEDA(1)=100.                                    CON10820
      PEDA(2)=XCON(44)*DTR                                              CON10830
      IF(PEDA(2).EQ.0.) PEDA(2)=-.8726646                               CON10840
      PEDA(3)=XCON(45)*P01DTR                                           CON10850
      IF(PEDA(3).EQ.0.) PEDA(3)=DTR                                     CON10860
      TCLOCK=XCON(46)                                                   CON10870
      T2TS=XCON(47)*DTR                                                 CON10880
C                                                                       CON10890
C     MISC. VALUES                                                      CON10900
C                                                                       CON10910
      PCGMAX=XCON(13)*DTR                                               CON10920
      PCGDEO=XCON(14)                                                   CON10930
      RUOIND=XCON(48)                                                   CON10940
      FIMAST=XCON(63)                                                   CON10950
      RETURN                                                            CON10960
      END                                                               CON10970
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      SUBROUTINE CON2 (XCON,XLNK,KONFIG,RUDIND)                          CON20010
      DATA DTR/ .1745329E-01/                                            CON20020
      DIMENSION  XCON(63),XLNK(16)                                       CON20030
      XLNK(12)=XCON(25)                                                  CON20040
      XLNK(13)=XCON(26)                                                  CON20050
      IF(KONFIG.NE.1) GO TO 10                                           CON20060
      XLNK(2)=1.                                                         CON20070
      IF(RUDIND.EQ.0.) GO TO 11                                          CON20080
      RUDIND=1.                                                          CON20090
      XLNK(2)=XCON(58)                                                   CON20100
   11 DD=DTR*RUDIND                                                      CON20110
      XLNK(1)=XCON(57)*DD                                                CON20120
      XLNK(3)=XCON(59)*DD*DTR                                            CON20130
      RETURN                                                             CON20140
   10 XLNK(1)=XCON(24)                                                   CON20150
      XLNK(2)=XCON(40)                                                   CON20160
      XLNK(3)=XCON(9)                                                    CON20170
      DO 13 I=1,3                                                        CON20180
      IF(XLNK(I).EQ.0.) XLNK(I)=1.                                       CON20190
   13 CONTINUE                                                           CON20200
      IF(KONFIG.EQ.3) GO TO 12                                           CON20210
      XLNK(4)=XCON(23)                                                   CON20220
      XLNK(5)=XCON(22)                                                   CON20230
      XLNK(6)=XCON(55)                                                   CON20240
      XLNK(7)=XCON(54)                                                   CON20250
      RETURN                                                             CON20260
   12 XLNK(4)=XCON(37)                                                   CON20270
      XLNK(5)=XCON(51)                                                   CON20280
      XLNK(6)=XCON(36)                                                   CON20290
      XLNK(7)=XCON(50)                                                   CON20300
      XLNK(8)=XCON(39)                                                   CON20310
      XLNK(9)=XCON(53)                                                   CON20320
      XLNK(10)=XCON(38)                                                  CON20330
      XLNK(11)=XCON(52)                                                  CON20340
      XLNK(14)=XCON(60)                                                  CON20350
      XLNK(15)=XCON(61)                                                  CON20360
      XLNK(16)=XCON(62)*DTR                                              CON20370
      RETURN                                                             CON20380
      END                                                                CON20390
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      SUBROUTINE CURVET                                                 CURV0010
      COMMON /TOPLOT/ AH(3),AL(3),EXIT,ICON(49),IPSN,                   CURV0020
     1                NPART,NVARA,NVARB,NVARC,NSCALE                   CURV0030
     1                ,NVARS,NPRINT,NTIME                              CURV0040
      COMMON /PLOTD/  HEAD(9,267)                                       CURV0050
      DIMENSION A(266),NC(266),AMP(266),PHI(266),C(266),SUM1(266),      CURV0060
     I          SUM2(266),SUM3(266),SUM4(256),CDEF(266),NUMC(266)      CURV0070
      REAL*8 X,Y,B,S1,S2,S3,S4,S5,SUM1,SUM2,SUM3,SUM4,                  CURV0080
     I       DIFF1,DIFF2,DIFF3,DIFF5,DIFF6,DENOM,CON1,CON2,CON3,DIFF7   CURV0090
      CALL TIMEX (TUSED,TDELT,TLEFT)                                    CURV0100
      DTR=.174532925E-01                                                CURV0110
      DTRR=57.2957795                                                   CURV0120
      TWOPI=6.283185307                                                 CURV0130
C         INITIALIZE VARIABLE SUMS                                      CURV0140
      DO 10 I=1,254                                                     CURV0150
      NC(I)=0                                                           CURV0160
      SUM1(I)=0.                                                        CURV0170
      SUM2(I)=0.                                                        CURV0180
      SUM3(I)=0.                                                        CURV0190
      SUM4(I)=0.                                                        CURV0200
   10 CONTINUE                                                          CURV0210
C         READ CODES FOR VARIABLES TO BE FIT                            CURV0220
      READ (5,900) (NC(I),I=1,NVARA)                                    CURV0230
C         SKIP TRANSIENT POINTS                                         CURV0240
      DO 11 I=1,NVARC                                                   CURV0250
      READ (3) JPSN,T,A                                                 CURV0260
   11 CONTINUE                                                          CURV0270
      TSTART=T                                                          CURV0280
C         CHANGE INPUT CPS TO RAD/SEC AND INITIALIZE TIME SUMS          CURV0290
      OMEGA=AL(1)*TWOPI                                                 CURV0300
      S1=0.                                                             CURV0310
      S2=0.                                                             CURV0320
      S3=0.                                                             CURV0330
      S4=0.                                                             CURV0340
      S5=0.                                                             CURV0350
      KOUNT=0                                                           CURV0360
  998 READ (3,END=999) JPSN,T,A                                         CURV0370
      IF(T.GT.9.E+07) GO TO 999                                         CURV0380
      OT=OMEGA*T                                                        CURV0390
      X=SIN(OT)                                                         CURV0400
      Y=COS(OT)                                                         CURV0410
C         COMPUTE SUMS WHICH ARE CONSTANT WRT VARIABLES AND COUNT POINTSCURV0420
      S1=S1+X                                                           CURV0430
      S2=S2+Y                                                           CURV0440
      S3=S3+X*X                                                         CURV0450
      S4=S4+Y*Y                                                         CURV0460
      S5=S5+X*Y                                                         CURV0470
      KOUNT=KOUNT+1                                                     CURV0480
C         COMPUTE SUMS DEPENDENT UPON EACH VARIABLE                     CURV0490
      DO 12 J=1,NVARA                                                   CURV0500
      I=NC(J)                                                           CURV0510
      B=A(I)                                                            CURV0520
      SUM1(I)=SUM1(I)+B                                                 CURV0530
      SUM2(I)=SUM2(I)+B*X                                               CURV0540
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      SUM3(I)=SUM3(I)+B*Y                                                    CURV0550
      SUM4(I)=SUM4(I)+B*B                                                    CURV0560
   12 CONTINUE                                                               CURV0570
      GO TO 998                                                              CURV0580
C         COMPUTE INTERMEDIATE VARIABLES                                     CURV0590
  999 DIFF1=KDUNT*S3-S1**2                                                   CURV0600
      DIFF2=KDUNT*S4-S2**2                                                   CURV0610
      DIFF3=KDUNT*S5-S1*S2                                                   CURV0620
      DENOM=DIFF1*DIFF2-DIFF3**2                                             CURV0630
      CALL WROT                                                              CURV0640
      WRITE (6,9D1) TSTART,AL(1)                                             CURV0650
C         COMPUTE AMPLITUDE, PHASE ANGLE, CONSTANT, AND RESIDUE              CURV0660
      DO 13 J=1,NVARA                                                        CURV0670
      I=NC(J)                                                                CURV0680
      DIFF5=KDUNT*SUM2(I)-S1*SUM1(I)                                         CURV0690
      DIFF6=KOUNT*SUM3(I)-S2*SUM1(I)                                         CURV0700
      CON1=(DIFF5*DIFF2-DIFF6*DIFF3)/DENOM                                   CURV0710
      CON2=(DIFF1*DIFF6-DIFF5*DIFF3)/DENOM                                   CURV0720
      AMP(I)=DSQRT(CON1**2+CON2**2)                                          CURV0730
      PHI(I)=DATAN2(CON2,CON1)*DTRR                                          CURV0740
      CON3=(SUM1(I)-CON1*S1-CON2*S2)/KOUNT                                   CURV0750
      DIFF7    =CON1*(CON1*S3-2.*SUM2(I)+2.*CON2*S5+2.*CON3*S1)              CURV0760
     1         +CON2*(CON2*S4-2.*SUM3(I)+2.*CON3*S2)                         CURV0770
     2         +CON3*(KDUNT*CON3-2.*SUM1(I))+SUM4(I)                         CURV0780
      C(I)=CON3                                                              CURV0790
      CDEF(I)=DSQRT(1.-DIFF7/(SUM4(I)-SUM1(I)**2/KOUNT))                     CURV0800
      WRITE (6,902) (HEAD(K,I),K=1,9),AMP(I),PHI(I),C(I), CDEF(I)           CURV0810
   13 CONTINUE                                                               CURV0820
      IF(NVAR8.EQ.0) GO TO 18                                                CURV0830
      CALL WROT                                                              CURV0840
      WRITE (6,9D3)                                                          CURV0850
C         AMPLITUDE AND PHASE ANGLE COMPARISONS                              CURV0860
      DO 1DO I=1,NVAR8                                                       CURV0870
      READ (5,9DD) NNUM,ND,(NUMC(J),J=1,NNUM)                                CURV0880
      Q1=1./AMP(ND)                                                          CURV0890
      Q2=PHI(ND)                                                             CURV0900
      DO 15 K=1,NNUM                                                         CURV0910
      J=NUMC(K)                                                              CURV0920
      RATIO=AMP(J)*Q1                                                        CURV0930
      DIFF=PHI(J)-Q2                                                         CURV0940
      WRITE (6,904) (HEAD(L,J),L=1,9),(HEAD(L,ND),L=1,9),RATIO,DIFF          CURV0950
   15 CONTINUE                                                               CURV0960
  100 CONTINUE                                                               CURV0970
   18 KLIN=AL(2)+.1                                                          CURV0980
      IF(KLIN.EQ.0) GO TO 101                                                CURV0990
      CALL WROT                                                              CURV1000
      WRITE (6,9D8)                                                          CURV1010
      DO 16 J=1,KLIN                                                         CURV1020
      READ (5,90D) NDEP,NIN1,NIN2                                            CURV1030
      SIN2=SIN((PHI(NIN1)-PHI(NIN2))*DTR)                                    CURV1040
      IF(ABS(SIN2).LT..0001) GO TO 17                                        CURV1050
      SIN1=SIN((PHI(NIN1)-PHI(NDEP))*DTR)                                    CURV1060
      SIN3=SIN((PHI(NDEP)-PHI(NIN2))*DTR)                                    CURV1070
      XK1=AMP(NDEP)/SIN2                                                     CURV1080
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      XK2=XK1*SIN3                                                      CURV1090
      XK3=XK1*SIN1                                                      CURV1100
      BK=XK2/AMP(NIN1)                                                  CURV1110
      CK=XK3/AMP(NIN2)                                                  CURV1120
      DK=C(NDEP)-BK*C(NIN1)-CK*C(NIN2)                                  CURV1130
      WRITE (6,906) (HEAD(K,NDEP),K=1,9),(HEAD(K,NIN1),K=1,9),BK,       CURV1140
     1              (HEAD(K,NIN2),K=1,9),CK,DK                         CURV1150
      GO TO 16                                                          CURV1160
   17 WRITE (6,907) (HEAD(K,NIN1),K=1,9),(HEAD(K,NIN2),K=1,9)           CURV1170
   16 CONTINUE                                                          CURV1180
  101 CALL TIMEX (TUSED,TDELT,TLEFT)                                    CURV1190
      WRITE (6,905) TDELT,TUSED                                         CURV1200
      RETURN                                                            CURV1210
  900 FORMAT (1415)                                                     CURV1220
  901 FORMAT (1HO//1H ,32X,'LEAST SQUARES CURVE FIT STARTING AFTER',    CURV1230
     1         F7.3,' SECONDS MANEUVER TIME'//1H ,23X,                  CURV1240
     1        'F(T) = AMPLITUDE*SIN(OMEGA*T + PHASE ANGLE) + CONSTANT'  CURV1250
     2        10X,'WITH OMEGA =',F6.3,' CPS'//                          CURV1260
     3        1H ,20X,'VARIABLE',23X,'AMPLITUDE',6X,                    CURV1270
     4        'PHASE ANGLE (DEGREES)',7X,'CONSTANT',11X,'COEF OF CORR') CURV1280
  902 FORMAT (1HO,6X,9A4,4(6X,G15.5))                                   CURV1290
  903 FORMAT (1HO//,1H ,48X,'AMPLITUDE AND PHASE ANGLE COMPARISONS'//   CURV1300
     1        1H ,39X,'VARIABLES',39X,'AMPLITUOE RATIO',3X,             CURV1310
     2        'PHASE ANGLE DIFFERENCE')                                 CURV1320
  904 FORMAT (1HO,7X,9A4,'/',9A4,2(7X,G15.5))                           CURV1330
  905 FORMAT (1HO,10X,F10.3,'  MINUTES USED IN CURVE FITTING',          CURV1340
     1     F10.3,'  MINUTES TOTAL COMPUTING TIME')                     CURV1350
  906 FORMAT (1HO,30X,'A',10X,9A4/                                      CURV1360
     1        1H ,30X,'B',10X,9A4,10X,G15.5/                            CURV1370
     2        1H ,30X,'C',10X,9A4,10X,G15.5/                            CURV1380
     3        1H , 69X,'CONSTANT',10X,G15.5)                            CURV1390
  907 FORMAT (1HO,10X,'THE PHASE ANGLE DIFFERENCE BETWEEN ',9A4,' AND ',CURV1400
     1        9A4/1H ,10X,'IS A MULTIPLE OF 180 DEGREES. THEREFORE, NO VCURV1410
     2ARIABLE CAN BE EXPRESSED AS A LINEAR FUNCTION OF THEM.')          CURV1420
  908 FORMAT (1HO//1H ,35X,'VARIABLE ''A'' AS A LINEAR COMBINATION OF VACURV1430
     1RIABLES ''B'' AND ''C''.'//1H ,56X,'A = KB*B + KC*C + KD'//1H ,   CURV1440
     2    27X,'VARIABLE',22X,'NAME',28X,'COEFFICIENT'/)                 CURV1450
      END                                                               CURV1460
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      SUBROUTINE C81L                                                   C81L0010
C                    LIBRARY UPDATING                                   C81L0020
C                    ****************                                   C81L0030
      COMMON /TOPLOT/ AH(3),AL(3),EXIT,ICOM(49),IPSN,                   C81L0040
     1                NPART,NVARA,NVARB,NVARC,NSCALE                    C81L0050
     1                ,NVARS,NPRINT,NTIME                               C81L0060
      DIMENSION A(266)                                                  C81L0070
C                                                                       C81L0080
C        READ DATA CARD IN C81-11 DRIVER...                             C81L0090
C             NPART = 8     (TO GET IN HERE)                           C81L0100
C             NSCALE=       (TO SPECIFY WHICH LIBRARY PATH)            C81L0110
C                                                                       C81L0120
C                                                                       C81L0130
C         NPATH = 0             TO DUMP TIME HISTORY DATA ON TAPE 9     C81L0140
C                  READ SINGLE TIME-HISTORY FROM (3),                   C81L0150
C                 WRITE TIME HISTORY ON 9                               C81L0160
C                 NPATH = 1 IS FOR LAST JOB   THIS TERMINATES TAPE 9    C81L0170
C                                                                       C81L0180
C         NPATH = 2    IS FOR PULLING DATA FROM 9 AND WRITING IT ON 3   C81L0190
C                                                                       C81L0200
C                                                                       C81L0210
C                                                                       C81L0220
C             TO PULL A SPECIFIC IPSN FOR RE-PLOTTING (NPATH=2),        C81L0230
C             USE COMMENT CARDS WHICH WERE ON DECK WHEN T-H WAS MADE     C81L0240
C             ******** DO NOT CHANGE IPSN ON FIRST COMMENT CARD ********C81L0250
C             ************************************************************C81L0260
C                                                                       C81L0270
      CALL TIMEX (TUSED,TDELT,TLEFT)                                    C81L0280
      NPATH = NSCALE                                                    C81L0290
      NPSN=0                                                            C81L0300
      WRITE(6,202)                                                      C81L0310
      IF(NPATH.LT.0.OR.NPATH.GT.2) GO TO 130                            C81L0320
      IF(NPATH.EQ.2) GO TO 100                                          C81L0330
C         TRANSFER T-H FROM 3 TO 9                                      C81L0340
  203 READ (3) JPSN,T,A                                                 C81L0350
   25 WRITE(9,21) JPSN,T,A                                              C81L0360
      IF(T.LT.9999.E+04) GO TO 203                                      C81L0370
      WRITE(6,204) JPSN                                                 C81L0380
      IF(NPATH.EQ.0) GO TO 207                                          C81L0390
      T=8888888.E+01                                                    C81L0400
      WRITE (9,21) IPSN,T,A                                             C81L0410
      ENDFILE 9                                                         C81L0420
  207 REWIND 9                                                          C81L0430
      GO TO 600                                                         C81L0440
  100 READ (5,1011) IPSN,ICOM                                           C81L0450
C                    SEARCH OLD MASTER FOR T-H TO PLOT                  C81L0460
  110 READ (8,21) JPSN,T,A                                              C81L0470
      IF(8888.E+04.LT.T.AND.T.LT.9999.E+04) GO TO 140                   C81L0480
      IF(NPSN.EQ.JPSN) GO TO 115                                        C81L0490
      NPSN=JPSN                                                         C81L0500
      WRITE (6,205) NPSN                                                C81L0510
  115 IF(IPSN.NE.JPSN) GO TO 110                                        C81L0520
C           WRITE T-H ON TAPE 3                                         C81L0530
  120 WRITE (3) JPSN,T,A                                                C81L0540
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      IF(T.LT.9999.E+04) GO TO 110                                          C81L0550
      WRITE (6,206) NPSN                                                    C81L0560
      ENDFILE 3                                                             C81L0570
      REWIND 8                                                              C81L0580
      GO TO 600                                                             C81L0590
  140 WRITE(6,14)                                                           C81L0600
      GO TO 600                                                             C81L0610
  130 WRITE(6,13)                                                           C81L0620
  600 CALL TIMEX (TUSED,TDELT,TLEFT)                                        C81L0630
      WRITE(6,601) TDELT                                                    C81L0640
      RETURN                                                                C81L0650
   13 FORMAT (' NSCALE HAS ILLEGAL VALUE')                                  C81L0660
   14 FORMAT(30H IPSN INDICATED NOT ON LIBRARY )                            C81L0670
   21 FORMAT (I9,2E12.5/(10E12.5))                                          C81L0680
  202 FORMAT (1H1,18X,12HPROGRAM C81L/14X,20HTIME HISTORY LIBRARY //        C81L0690
     1          48H       ON          PULLED FROM         PUT ON         / C81L0700
     2          48H  LIBRARY TAPE     LIBRARY TAPE     SCRATCH TAPE    )  C81L0710
  204 FORMAT(34X,I12)                                                       C81L0720
  205 FORMAT(I14)                                                           C81L0730
  206 FORMAT (18X,I12)                                                      C81L0740
  601 FORMAT(1H /24H TIME USED WITHIN C81L =, F5.2,5H MIN.)                 C81L0750
 1011 FORMAT (2X,I8,15A4/17A4/17A4)                                         C81L0760
      END                                                                   C81L0770
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      SUBROUTINE DAMPER                                                 DAMP0010
      COMMON /STRIAB/ D(21),DT(21),E(79),F(10),X(10),                   DAMP0020
     1                DL,DM,DN,DX,DY,DZ,IX,IY,IZ,PD(10,11),            DAMP0030
     2                DTR,EPD,ERR(10),KM1,RHO,                          DAMP0040
     3                R12,SPD(6,6,3),XBW(21),XEL(14),                   DAMP0050
     4                XER(7),XFC(28),XFN(7),XFS(35),                    DAMP0060
     5                XGN(7),XIT(21),XMR(49),XTR(49),                   DAMP0070
     6                XWG(21),YMR(21),YTR(21),YWG(21),                  DAMP0080
     7                YEL(21),YFN(21),BLCG,DAMP,DEPD(10),               DAMP0090
     8                EPDS,EPDX(10),MASS,QSV1,TMRS,TTRS,                DAMP0100
     9                WLCG,XCON(63),XJET(14),XMIN,AYEFP,                DAMP0110
     A                BETAES(2),CNPCD,DHADQ,DYBDR,GUESS,                DAMP0120
     B                NPASS,PDPHI(10,11),STACG,TZERO,                   DAMP0130
     C                XMAST,DHADAQ,DQDCDL,DTRRSQ,DYBDBR,                DAMP0140
     D                ENGRPM,MXPASS,PSD30P,TRIND1,XLIMIT                DAMP0150
      XLIMIT=.5*XLIMIT                                                  DAMP0160
      IF(XLIMIT.LT.XMIN) XLIMIT=XMIN                                    DAMP0170
      EPD=.5*XLIMIT                                                     DAMP0180
      IF(EPD.LT..1745329E-03) EPD=.1745329E-03                          DAMP0190
      DO 2 I=1,9                                                        DAMP0200
      DEPD(I)=EPD*EPDX(I)                                               DAMP0210
    2 CONTINUE                                                          DAMP0220
      DEPD(10)=-EPD                                                     DAMP0230
      RETURN                                                            DAMP0240
      END                                                               DAMP0250
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      BLOCK DATA                                                                DAT00D1D
      COMMON /METER/ PARM(1D,6),PARM1(10,6),PARM2(10,6),PARM3(10,6),    DAT0D02D
     1               PARM4(1D,6),PARM5(1D),PARM6(10,6),PARM7(1D,2)      DATDD030
      COMMON /PLOTO/  PLOT10(9,7),PLOT27(9),PLOT11(9,7),PLOT28(9),      DATDD04D
     1                PLOT12(9,7),PLOT29(9),PLOT13(9,7),PLOT3D(9),      DATDD050
     2                PLOT14(9,7),PLOT31(9),PLOT15(9,7),PLOT32(9),      DAT0D06D
     1                PLOT16(9,7),PLOT33(9),PLOT17(9,7),PLOT34(9),      DAT0D07D
     2                PLOT18(9,6),PLOTC(9,5),                           DAT0D08D
     3               DPLOT(9,6),PLOTE(9,6),PLOTF(9,6),PLOTG(9,5),       DAT0D090
     4               PLOTH(9,6),PLOTI(9,6),PLOTJ(9,6),PLOTK(9,5),       DAT0D1DD
     5               PLOTL(9,7),PLOTM(9,7),                             DAT0011D
     6                PLOT19(9,7),PLOT2D(9,7),PLOT21(9,7),              DAT0D120
     7                PLOT22(9,7),PLOT23(9,7),PLOT24(9,7),              DAT00130
     7                PLOT25(9,7),PLOT26(9,7),                          DAT00140
     5                                    PLOTN(9,6),PLOTO(9,5),       DAT00150
     6               PLOTP(9,6),PLOTQ(9,6),PLOTR(9,6),PLOTS(9,5),       DAT00160
     7               PLOTT(9,6),PLOTU(9,6),PLOTV(9,6),PLOTW(9,5),       DAT0D17D
     8               PLOTX(9,6),PLOTY(9,6),PLOTZ(9,6),PLOTO(9)          DAT0D18D
      DATA PARM/ '      ROTOR COLLECTIVE PITCH   (DEGREES)   WING ANGLE DDAT00190
     1F ATTACK        (DEGREES)              F/A CYCLIC PITCH   (DEGREES) DAT00200
     2       BODY Z-FORCE (+DOWN)     (LBS)              LAT CYCLIC PITCDAT00210
     3H   (DEGREES)         BODY X-FORCE (+FWD)      (LBS)   '/          DAT00220
      DATA PARM1 /                                                 '      FOAT00230
     4/A FLAPPING       (DEGREES)   ELEVATOR ANGLE OF ATTACK    (DEGREESDAT0024D
     5)            LAT FLAPPING       (DEGREES)             BODY Z-FORCE DAT00250
     6(+DOWN) (LBS)               THRUST                (LBS)             DAT0D260
     7 BODY X-FORCE (+FWD)  (LBS)   '/                                    DAT0027D
      DATA PARM2/                  '              H-FORCE              (LBSDAT00280
     8)     FIN ANGLE OF ATTACK          (DEGREES)   RUDDER ANGLE OF ATTADAT0029D
     9CK      (DEGREES)             Y-FORCE               (LBS)          BODAT0D300
     AOY Y-FORCE (+RIGHT)     (LBS)             BODY Y-FORCE (+RIGHT)  (LDAT00310
     8BS)   '/                                                            DAT00320
      DATA PARM3 /                                                        DAT00330
     B     '            HORSEPOWER                              BODY X-FORCE (DAT00340
     C+FWD)       (LBS)             BODY X-FORCE (+FWD)     (LBS)        DAT0D350
     D     RPM                              HELICOPTER EULER ANGLE YAW  (DDAT0D36D
     EEGREES)             MAST TILT ANGLE     (DEGREES) '/                DAT00370
      DATA PARM4 /                                          '              DAT00380
     F        PITCH(DEGREES)            BLADE INERTIA   (SLUG-FT-SQ)     DAT0039D
     G                    ROLL (DEGREES)       JET THRUST, LEFT SIDE     DAT00400
     H  (LBS)                RATE OF CLIMB     (FT/SEC)                  DAT00410
     I.RIGHT SIDE     (LBS)   '/                                          DAT00420
      DATA PARM5 /           '                FORWARD SPEED     (KNOTS)  '/DAT0D43D
      DATA PARM6/ '      PCT CONTROL USED  COLLECTIVE                     DAT00440
     1GRDSS WEIGHT       (LBS)                                F/A CYCLIC  DAT00450
     2             ENGINE RPM                                            LADAT00460
     3T CYCLIC                      C.G. STATION LINE  (IN)     '/        DAT00470
      DATA PARM7/                                                '        DAT00480
     4            PEDAL                                  WATER LINE    (IN) DAT00490
     5   '/                                                               DAT00500
      DATA PLOT10 / ' Q VELOCITY, TPP1, DEG/SEC           P VELOCITY, TPDAT00510
     1P1, DEG/SEC           U VELOCITY, MAST1 AXES, FT/SEC       DMEGA-DODAT00520
     2T, RDTOR1, DEG/SEC/SEC      BETA-2DOT,BLADE1,ROTOR1,DEG/SEC/SEC RODAT00530
     3TOR1 THRUST, LB                    F/A FLAPPING, MAST1/TPP1, DEG    DAT00540
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4    */                                                                    DAT00550
 DATA PLOT27                                                               DAT00560
4 /* LATERAL FLAPPING, MAST1/TPP1, DEG  */                                DAT00570
 DATA PLOT11 / ' V VELOCITY, MAST1 AXES, FT/SEC       OMEGA, ROTOR1,DATD0580
1DEG/SEC              BETA-DOT, BLADE1, ROTOR1, DEG/SEC    ROTOR1 HDAT00590
2-FORCE, LB                  W VELOCITY, MAST1 AXES, FT/SEC       AZOAT00600
3IMUTH LOC., BLADE1, ROTOR1, DEG    BETA, BLADE1, ROTOR1, DEG        DAT00610
4    */                                                                   DAT00620
 DATA PLOT28                                                               DATDD63D
4 /* ROTOR1 Y-FORCE, LB                 */                                DAT00640
 DATA PLOT12 / ' ROTOR1 COLLEC, FROM CONTROLS, DEG    ROTOR1 F/A CYCDAT00650
1, FROM CONTROLS, DEG  ROTOR1 LAT CYC, FROM CONTROLS, DEG  ROTOR1 CDAT00660
2ONING, DEG                  MAST1 TILT, DEG                         RODAT00670
3TOR1 TORQUE, FT-LB                ROTOR1 OTHER COLLEC., DEG        DAT00680
4    */                                                                   DAT00690
 DATA PLOT29                                                               DAT00700
4 /* ROTOR1 OTHER F/A CYC., DEG         */                                DAT00710
 DATA PLOT13 / ' ROTOR1 OTHER LAT CYC., DEG           ROTOR1 INDUCEDDAT00720
1 VELOCITY, FT/SEC      ROTOR1 RPM                          ROTOR1 HDAT00730
2ORSEPOWER                   ROTOR1 UPPER FLAPPING LIMIT, DEG     RODAT00740
3TOR1 F/A HUBSPRING, FT-LB/DEG      ROTOR1 TOTAL COLLECTIVE, DEG     DAT00750
4    */                                                                   DAT00760
 DATA PLOT30                                                               DAT00770
4 /* ROTOR1 TOTAL F/A CYCLIC, DEG       */                                DAT00780
 DATA PLOT14 / ' ROTOR1 TOTAL LAT CYCLIC, DEG         ROTOR1 LOWER FDAT00790
1LAPPING LIMIT, DEG     ROTOR1 LAT HUBSPRING, FT-LB/DEG      Q VELOCIDAT00800
2TY, TPP2, DEG/SEC           P VELOCITY, TPP2, DEG/SEC           U DATDDB10
3VELOCITY, MAST2 AXES, FT/SEC       OMEGA-DOT, ROTOR2, DEG/SEC/SEC  DAT00820
4    */                                                                   DATDDB30
 DATA PLOT31                                                               DAT00840
4 /* BETA-2DOT,BLADE1,ROTOR2,DEG/SEC/SEC*/                               DAT00850
 DATA PLOT15 / ' ROTOR2 THRUST, LB                    F/A FLAPPING, DAT00860
1MAST2/TPP2, DEG        LATERAL FLAPPING, MAST2/TPP2, DEG    V VELOCIDAT00870
2TY, MAST2 AXES, FT/SEC      OMEGA, ROTOR2, DEG/SEC                  BEDATDDB80
3TA-DOT, BLADE1, ROTOR2, DEG/SEC    ROTOR2 H-FORCE, LB               DATDD89D
4    */                                                                   DAT0D900
 DATA PLOT32                                                               DAT00910
4 /* W VELOCITY, MAST2 AXES, FT/SEC     */                                DAT0D92D
 DATA PLOT 3 / ' AZIMUTH LOC., BLADE1, ROTOR2, DEG    BETA, BLADE1, DATD0930
1ROTOR2, DEG             ROTOR2 Y-FORCE, LB                   ROTOR2 CDATD0940
2OLLEC, FROM CONTROLS, DEG    ROTOR2 F/A CYC, FROM CONTROLS, DEG  RODATD0950
3TOR2 LAT CYC, FROM CONTROLS, DEG  ROTOR2 CONING, DEG                  DATD0960
4    */                                                                   DAT0D97D
 DATA PLOT33                                                               DATDD98D
4 /* MAST2 TILT, DEG                    */                                DAT00990
 DATA PLOT17 / ' ROTOR2 TORQUE, FT-LB                 ROTOR2 OTHER COATD1000
1OLLEC., DEG             ROTOR2 OTHER F/A CYC., DEG           ROTOR2 OOAT01D10
2THER LAT CYC., DEG          ROTOR2 INDUCED VELOCITY, FT/SEC      RODAT01020
3TOR2 RPM                          ROTOR2 HORSEPOWER                  DAT01030
4    */                                                                   DAT01D40
 DATA PLOT34                                                               DAT01050
4 /* ROTOR2 UPPER FLAPPING LIMIT, DEG   */                                DATD1D60
 DATA PLOT18 / ' ROTOR2 F/A HUBSPRING, FT-LB/DEG      ROTOR2 TOTAL CDAT01D7D
1OLLECTIVE, DEG          ROTOR2 TOTAL F/A CYCLIC, DEG         ROTOR2 IDAT01D8D
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2OTAL LAT CYCLIC, DEG        RDTOR2 LOWER FLAPPING LIMIT, OEG    ROOAT01090
3TOR2 LAT HUBSPRING, FT-LB/DEG    '/                                 OAT01100
 DATA PLOTC /                                                        DAT01110
A ' X-COMP VELOCITY, FIXED AXES, FT/SEC Y-COMP VELOCITY, FIXED AXE DAT01120
B, FT/SEC Z-COMP VELOCITY, FIXED AXES, FT/SEC TOTAL DISTANCE FLOWN,DAT01130
C FT              AIR SPEED, KTS                    '/              OAT01140
 DATA DPLOT/  ' HEADING ANGLE, OEG                  X-COMP DISP., FDAT01150
1IXED AXES, FT        Y-COMP OISP., FIXED AXES, FT        Z-COMP DIOAT01160
2SP., FIXED AXES, FT        ALTITUDE, FT                        GRODAT01170
3UND SPEED, KTS                '/                                 DAT01180
 DATA PLOTE /                ' CLIMB ANGLE, DEG                  DAT01190
4   U-DOT ACCEL., BODY AXES, FT/SEC/SEC V-DOT ACCEL., BODY AXES, FTDAT01200
5/SEC/SEC W-DOT ACCEL., BODY AXES, FT/SEC/SEC P-DOT ACCEL, BODY AXEDAT01210
6S, DEG/SEC/SEC Q-DOT ACCEL, BODY AXES, DEG/SEC/SEC'/           DAT01220
 DATA PLOTF /                                ' R-DOT ACCEL, BODAT01230
7DY AXES, DEG/SEC/SEC COLLEC. BODWT. ACCEL., DEG/SEC/SEC  U VELOCITDAT01240
8Y, BODY AXES, FT/SEC       V VELOCITY, BDOY AXES, FT/SEC       W VDAT01250
9ELOCITY, BODY AXES, FT/SEC       P VELOCITY, BODY AXES, DEG/SEC   DAT01260
A  '/                                                               OAT01270
 DATA PLOTG /                                                       DAT01280
A ' O VELOCITY, BODY AXES, DEG/SEC       R VELOCITY, BOOY AXES, DEG/DAT01290
BSEC       COLLEC. BODWT. VELOCITY, OEG/SEC     YAW VELOCITY, FIXED/BDAT01300
CODY, DEG/SEC    PITCH VELOCITY, FIXED/BODY, DEG/SEC'/              DAT01310
 OATA PLOTH/  ' ROLL VELOCITY, FIXED/BODY, DEG/SEC  YAW ANGLE, FIXEDAT01320
1D/BODY, DEG          PITCH ANGLE, FIXED/BDOY, DEG        ROLL ANGLDAT01330
2E, FIXED/BODY, DEG         COLLECTIVE STICK POSITION, PCT      F/ADAT01340
3 CYCLIC STICK POSITION, PCT      '/                                DAT01350
 OATA PLOTI /                ' LEFT WING ANGLE OF ATTACK, DEG    DAT01360
4   RIGHT WING ANGLE OF ATTACK, DEG     ELEVATOR ANGLE OF ATTACK, DDAT01370
5EG       FIN ANGLE OF ATTACK, DEG            BODY YAW WRT. FLIGHT DAT01380
6PATH, DEG       C.G. STATION LINE LOCATION, IN.     '/             DAT01390
 DATA PLOTJ /                                ' X-COMP GUST VELDAT01400
7., BODY AXES, FT/SEC X-COMP G-S, BODY AXES              LATERAL CDAT01410
8YCLIC STICK POSITION, PCT  LEFT WING COEFFICIENT OF LIFT       RIGDAT01420
94T WING COEFFICIENT OF LIFT      ELEVATOR COEFFICIENT OF LIFT      DAT01430
A  '/                                                               DAT01440
 DATA PLOTK /                                                       OAT01450
A ' FIN COEFFICIENT OF LIFT             BODY PITCH WRT. FLIGHT PATHOAT01460
B, DEG     C.G. BUTT LINE LOCATION, IN.        Y-COMP GUST VEL., BODDAT01470
CY AXES, FT/SEC Y-COMP G-S, BOOY AXES              '/               DAT01480
 DATA PLOTL/  ' PEDAL POSITION, PCT                 LEFT WING COEFFOAT01490
1ICIENT OF DRAG       RIGHT WING COEFFICIENT OF DRAG       ELEVATOR DAT01500
2COEFFICIENT OF DRAG        FIN COEFFICIENT OF DRAG             C.GOAT01510
3. WATER LINE LOCATION, IN.       Z-COMP GUST VEL., BOOY AXES, FT/SOAT01520
4EC'/                                                               DAT01530
 DATA PLOTM /                ' Z-COMP G-S, BODY AXES             DAT01540
4   RIGHT/CENTER JET THRUST, LB         ENGINE TORQUE SUPPLIED, FT-DAT01550
5LB       TOTAL HORSEPOWER REQUIRED          LEFT JET THRUST, LB  DAT01560
6              SHAFT HORSEPOWER                   ROTOR BRAKE TORDAT01570
7QUE APPLIED, FT-LB  '/                                             OAT01580
 DATA PLOT19 / ' AZIMUTH LOC., BLADE1, RDTOR1, OEG   AZIMUTH LOC., DAT01590
1BLADE2, RDTOR1, DEG   AZIMUTH LOC., BLADE3, RDTOR1, DEG   AZIMUTH DAT01600
2LOC., BLADE4, ROTOR1, DEG   AZIMUTH LOC., BLADE5, ROTOR1, DEG   AZDAT01610
3IMUTH LOC., BLADE6, RDTOR1, DEG   AZIMUTH LOC., BLADE7, ROTOR1, DEDAT01620
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4G  '/                                                                  0AT01630
 DATA PLOT20 / ' BETA-2DOT,BLADE1,ROTOR1,DEG/SEC/SEC BETA-2DOT,BLADDATO1640
1E2,ROTOR1,DEG/SEC/SEC BETA-2DOT,BLADE3,ROTOR1,DEG/SEC/SEC BETA-2DODAT01650
2T,BLADE4,ROTOR1,DEG/SEC/SEC BETA-2DOT,BLADE5,ROTOR1,DEG/SEC/SEC BEDAT0166D
3TA-2DOT,BLADE6,ROTOR1,DEG/SEC/SEC BETA-2DOT,BLADE7,ROTOR1,DEG/SEC/DATD1670
4SEC'/                                                                  0AT01680
 DATA PLOT21 / ' BETA-DOT, BLADE1, ROTOR1, DEG/SEC   BETA-DOT, BLADDATD1690
1E2, ROTOR1, DEG/SEC   BETA-DOT, BLADE3, ROTOR1, DEG/SEC   BETA-DOTDATO170D
2, BLADE4, ROTOR1, DEG/SEC   BETA-DOT, BLADE5, ROTOR1, DEG/SEC   BEDATD1710
3TA-DOT, BLADE6, ROTOR1, DEG/SEC   BETA-DOT, BLADE7, ROTOR1, DEG/SEDATO1720
4C  '/                                                                  DAT01730
 DATA PLOT22 / ' BETA, BLADE1, ROTOR1, DEG           BETA, BLADE2, OAT01740
1ROTOR1, DEG           BETA, BLADE3, ROTOR1, DEG           BETA, BLOAT01750
2ADE4, ROTOR1, DEG           BETA, BLADE5, ROTOR1, DEG           BEOAT01760
3TA, BLADE6, ROTOR1, DEG           BETA, BLADE7, ROTOR1, DEG       DAT01770
4   '/                                                                  DAT0178D
 DATA PLOT23 / ' AZIMUTH LOC., BLADE1, ROTOR2, DEG   AZIMUTH LOC., DAT01790
1BLADE2, ROTOR2, DEG   AZIMUTH LOC., BLADE3, ROTOR2, DEG   AZIMUTH DAT01800
2LOC., BLADE4, ROTOR2, DEG   AZIMUTH LOC., BLADE5, ROTOR2, DEG   AZDAT01810
3IMUTH LOC., BLADE6, ROTOR2, DEG   AZIMUTH LOC., BLADE7, ROTOR2, DEOAT01820
4G  '/                                                                  DAT01830
 DATA PLOT24 / ' BETA-2DOT,BLADE1,ROTOR2,DEG/SEC/SEC BETA-2DOT,BLADDATD1840
1E2,ROTOR2,DEG/SEC/SEC BETA-2DOT,BLADE3,ROTOR2,DEG/SEC/SEC BETA-2DODATD1850
2T,BLADE4,ROTOR2,DEG/SEC/SEC BETA-2DOT,BLADE5,ROTOR2,DEG/SEC/SEC BEDAT01860
3TA-2DOT,BLADE6,ROTOR2,DEG/SEC/SEC BETA-2DOT,BLADE7,ROTOR2,DEG/SEC/DAT01870
4SEC'/                                                                  DAT01880
 DATA PLOT25 / ' BETA-DOT, BLADE1, ROTOR2, DEG/SEC   BETA-DOT, BLADDAT01890
1E2, ROTOR2, DEG/SEC   BETA-DOT, BLADE3, ROTOR2, DEG/SEC   BETA-DOTDAT0190D
2, BLADE4, ROTOR2, DEG/SEC   BETA-DOT, BLADE5, ROTOR2, DEG/SEC   BEDAT01910
3TA-DOT, BLADE6, ROTOR2, DEG/SEC   BETA-DOT, BLADE7, ROTOR2, DEG/SEDAT01920
4C  '/                                                                  DAT01930
 DATA PLOT26 / ' BETA, BLADE1, ROTOR2, DEG           BETA, BLADE2, OAT01940
1ROTOR2, DEG           BETA, BLADE3, ROTOR2, DEG           BETA, BLDATD1950
2ADE4, ROTOR2, DEG           BETA, BLADE5, ROTOR2, DEG           BEDATD196D
3TA, BLADE6, ROTOR2, DEG           BETA, BLADE7, ROTOR2, DEG       DAT01970
4   '/                                                                  0AT01980
 DATA PLOTN /                                        ' TOTAL X-FORCE 00AT01990
7N C.G., LB          X-FORCE FROM RIGHT WING, LB          X-FORCE FOAT02000
8ROM LEFT WING, LB          X-FORCE FROM ELEVATOR, LB          X-FDAT02010
9JRCE FROM FUSELAGE, LB          X-FORCE FROM RIGHT JET, LB       DAT02020
A  '/                                                                   DAT02030
 DATA PLOTO /                                                           DAT02040
A ' X-FORCE FROM LEFT/CENTER JET, LB    X-FORCE FROM RDTOR1, LB    0AT02050
B        X-FORCE FROM ROTOR2, LB              X-FORCE FROM WEAPDN FDAT02060
CIRE, LB        X-FORCE FROM FIN, LB              '/                DAT02070
 DATA PLOTP/  ' X-FORCE FROM WEIGHT, LB             TOTAL Y-FORCE 00AT02080
1N C.G., LB          Y-FORCE FROM FUSELAGE, LB          Y-FORCE FDAT02090
2ROM RIGHT JET, LB          Y-FORCE FROM LEFT/CENTER JET, L'    Y-FDAT02100
3ORCE FROM RDTOR1, LB             '/                                DAT02110
 DATA PLOTQ /                    ' Y-FORCE FROM ROTOR2, LB          DAT02120
4   Y-FORCE FROM WEAPON FIRE, LB        Y-FORCE FROM FIN, LB       DATD2130
5         Y-FORCE FROM WEIGHT, LB              TOTAL Z-FORCE ON C.G.0AT02140
6, LB          Z-FO' CE FROK RIGHT WING, LB        '/               DAT02150
 OATA PLOTR /                                       ' Z-FORCE FROM LEDAT02160
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7FT WING, LB           Z-FORCE FROM ELEVATOR, LB           Z-FORCE FDAT02170
8ROM FUSELAGE, LB           Z-FORCE FROM RIGHT JET, LB           Z-FDAT02180
9ORCE FROM LEFT/CENTER JET, LB     Z-FORCE FROM ROTOR1, LB            DAT02190
A  */                                                                 DAT02200
 DATA PLOTS /                                                         DAT02210
A ' Z-FORCE FROM ROTOR2, LB              Z-FORCE FROM WEAPON FIRE, LDAT02220
BB         Z-FORCE FROM WEIGHT, LB              TOTAL ROLL MOM ON C.GDAT02230
C., FT-LB        ROLL MOM FROM RIGHT WING, LB        '/             DAT02240
 DATA PLOTT/  ' ROLL MOM FROM LEFT WING, FT-LB       ROLL MOM FROM EDAT02250
1LEVATOR, FT-LB        ROLL MOM FROM FUSELAGE, FT-LB        ROLL MOM DAT02260
2FROM RIGHT JET, FT-LB       ROLL MOM FROM LEFT/CENTR JET, FT-LB ROLDAT02270
3L MOM FROM ROTOR1 FORCES, FT-LB '/                                  DAT02280
 DATA PLOTU /                ' ROLL MOM FROM ROTOR2 FORCES, FT-LDAT02290
4B  ROLL MOM FROM WEAPON FIRE, FT-LB     ROLL MOM FROM FIN, FT-LB    DAT02300
5          ROLL MOM FROM ROTOR1 TORQUE, FT-LB  ROLL MOM FROM ROTOR2 DAT02310
6TORQUE, FT-LB  TOTAL PITCH MOM ON C.G., FT-LB      '/               DAT02320
 DATA PLOTV /                                      ' PITCH MOM FROM DAT02330
7RIGHT WING, FT-LB     PITCH MOM FROM LEFT WING, FT-LB     PITCH MOMDAT02340
8 FROM ELEVATOR, FT-LB       PITCH MOM FROM FUSELAGE, FT-LB       PITDAT02350
9CH MOM FROM RIGHT JET, FT-LB      PITCH MOM FROM LEFT/CENT JET, FT-DAT02360
ALB'/                                                                DAT02370
 DATA PLOTW /                                                        DAT02380
A ' PITCH MOM FROM ROTOR1 FORCES, FT-LB PITCH MOM FROM ROTOR2 FORCEDAT02390
BS, FT-LB PITCH MOM FROM WEAPON FIRE, FT-LB    PITCH MOM FROM FIN, FDAT02400
CT-LB           PITCH MOM FROM ROTOR1 TORQUE, FT-LB'/                DAT02410
 DATA PLOTX/  ' PITCH MOM FROM ROTOR2 TORQUE, FT-LB TOTAL YAW MOM ODAT02420
1N C.G., FT-LB         YAW MOM FROM RIGHT WING, FT-LB       YAW MOM FDAT02430
2ROM LEFT WING, FT-LB        YAW MOM FROM ELEVATOR, FT-LB         YAWDAT02440
3 MOM FROM FUSELAGE, FT-LB        '/                                 DAT02450
 DATA PLOTY /                    ' YAW MOM FROM RIGHT JET, FT-LB     DAT02460
4    YAW MOM FROM LEFT/CENT JET, FT-LB    YAW MOM FROM ROTOR1 FORCES,DAT02470
5 FT-LB    YAW MOM FROM ROTOR2 FORCES, FT-LB    YAW MOM FROM WEAPON FDAT02480
6IRE, FT-LB      YAW MOM FROM FIN, FT-LB             '/              DAT02490
 DATA PLOTZ /                                      ' YAW MOM FROM RODAT02500
7TOR1 TORQUE, FT-LB    YAW MOM FROM ROTOR2 TORQUE, FT-LB    ROTOR1 F/DAT02510
8A FLAPPING MOMENT, FT-LB    ROTOR1 LAT FLAPPING MOMENT, FT-LB    ROTDAT02520
9OR2 F/A FLAPPING MOMENT, FT-LB    ROTOR2 LAT FLAPPING MOMENT, FT-LBDAT02530
A  */                                                                DAT02540
 DATA PLOTO /                                                        DAT02550
A ' NOT USED                              '/                         DAT02560
 END                                                                 DAT02570
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      BLOCK DATA                                                        DAT10010
      COMMON/LDISK/LOCATE(120)                                          DAT10020
      COMMON /KVARTR/ KVAR(10)                                          DAT10030
      COMMON /TAB/ CY41(110),CY42(99),CX41(149),CX42(120),CX43(120),    DAT10040
     1             CX44(120),CX45(120),CX46(120),CX47(108)            DAT10050
     2             ,K(11),L(17)                                       DAT10060
      DATA LOCATE/119,116,113,110,107,103,96,89,82,75,120,117,114,111,  DAT10070
     1           108,104,97,90,83,76,105,100,98,93,91,86,84,79,77,72,   DAT10080
     2           70,69,68,67,66,65,64,63,62,61,20,22,27,29,34,36,41,    DAT10090
     3           43,48,50,3,6,9,12,15,19,26,33,40,47,2,5,8,11,14,18,    DAT10100
     4           25,32,39,46,1,4,7,10,13,17,24,31,38,45,16,21,23,28,    DAT10110
     5           30,35,37,42,44,49,51,52,53,54,55,56,57,58,59,60,       DAT10120
     6           101,99,94,92,87,85,80,78,73,71,118,115,112,109,106,    DAT10130
     7           102,95,88,81,74/                                       DAT10140
      DATA KVAR/1,2,3,4,5,6,7,8,9,10,11/                                DAT10150
C     LIFT TABLE (COMPOSITE) AIRFOIL = 64A210   JUNE 9,1967             DAT10160
      DATA CY41/          0.,.4,.5,.6,.7,.75,.8,.9,1.,                  DAT10170
     1    0.,2.,4.,6.,8.,10.,11.,12.,13.,14.,15.,16.,                   DAT10180
     2    21.,39.,49.,129.,147.,161.,172.5 ,180.,                       DAT10190
     3    9*0.,                                                         DAT10200
     4    .205,     .228,     .25,      .27,      .285,     .308,       DAT10210
     5    .325,     2*.395,                                           DAT10220
     6    .390,     .455,     .472,     .518,     .555,     .575,       DAT10230
     7    .585,     2*.575,                                           DAT10240
     8    .560,     .663,     .58,      .742,     .75,      .765,       DAT10250
     9    .720,     2*.650,                                           DAT10260
     A    .750,     .872,     2*.9,               .833,     .805,       DAT10270
     B    .760,     2*.695,                                           DAT10280
     C    .948,     1.095,    1.082,    1.015,    .885,     .835,       DAT10290
     D    .792,     2*.722,                                           DAT10300
     E    1.05,     1.195,    1.17,     1.062,    .912,     .845,       DAT10310
     F    .810,     2*.738,                                           DAT10320
     G    1.155,    1.245,    1.253,    1.1,      .935,     .850,       DAT10330
     H    .820,     2*.740,                                           DAT10340
     I    1.28,     1.24,     1.285,    1.112,    .945,     .840,       DAT10350
     J    .818,     2*.738                                            / DAT10360
      DATA CY42/ 1.295,1.186,1.222,1.08,.955,.832,                      DAT10370
     1    .808,     2*.725,                                           DAT10380
     2    1.19,     1.087,    1.14,     1.038,    .955,     .82,        DAT10390
     3    .79,      2*.713,                                           DAT10400
     4    1.012,    .977,     1.06,     .991,     .955,     .80,        DAT10410
     5    .77,      2*.698,                                           DAT10420
     6    .8,       .83,      3*.85,                        .71,        DAT10430
     7    .68,      2*.64,                                            DAT10440
     8    18*1.18,                                                    DAT10450
     9    18*-1.,                                                     DAT10460
     A     9*-.62,                                                    DAT10470
     B     9*-.78,                                                    DAT10480
     C     9*0.                                                       / DAT10490
C     DRAG TABLE (COMPOSITE) AIRFOIL = 64A210   JUNE 9,1967           DAT10500
      DATA CX41/     0.,.2,.3,.4,.5,.6,.7,.75,.8,.85,.9,1.,           DAT10510
     1    -180.,-175.,-170.,-165.,-160.,-140.,-120.,-110.,-100.,      DAT10520
     2    -90.,-80.,-70.,-60.,-50.,-30.,-21.,-16.,-15.,               DAT10530
     3    -14.,-13.,-12.,-11.,-10.,-9.,-8.,-7.,-6.,-5.,               DAT10540
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4     -4.,-3.,-2.,-1.,0.,1.,2.,3.,4.,5.,6.,7.,8.,                          DAT10550
5     9.,10.,11.,12.,13.,14.,15.,16.,21.,30.,50.,                          DAT10560
6     60.,70.,80.,90.,100.,110.,120.,140.,160.,165.,                       DAT10570
7     170.,175.,180.,                                                      DAT10580
8     4*.022 ,                                  2*.01 ,                    DAT10590
9     6*.01 ,                                                              DAT10600
A     4*.077 ,                                  .05  ,   .0  ,             DAT10610
B     .060  ,   .055,     2*.056 ,              2*.055,                    DAT10620
C     4*.132 ,                                  .095 ,   .10 ,             DAT10630
D     .13   ,   .12 ,     2*.126 ,              2*.12 ,                    DAT10640
E     4*.217 ,                                  .196 ,   .20 ,             DAT10650
F     .236  ,   .226,     2*.232 ,              2*.226,                    DAT10660
G     4*.302 ,                                  .26  ,   .265 ,            DAT10670
H     .3    ,   .29 ,     2*.296 ,              2*.29 ,                    DAT10680
I     4*.977 ,                                  .992 ,   1.01 ,            DAT10690
J     1.04  ,   1.03,     2*1.036,              2*1.03                     DAT10700
 DATA CX42/     4*1.652,                        2*1.61,                    DAT10710
1     1.65  ,   1.64  ,   2*1.646,              2*1.64 ,                   DAT10720
2     4*1.847,                                  1.81  ,  1.82 ,            DAT10730
3     1.85  ,   1.84  ,   2*1.846,              2*1.84 ,                   DAT10740
4     4*2.002,                                  1.955 ,  1.96 ,            DAT10750
5     2.    ,   1.99  ,   2*1.996,              2*1.99 ,                   DAT10760
6     4*2.022,                                  1.98  ,  1.985,            DAT10770
7     2.02  ,   2.01  ,   2*2.016,              2*2.01 ,                   DAT10780
8     4*1.962,                                  1.915 ,  1.92 ,            DAT10790
9     1.96  ,   1.95  ,   2*1.956,              2*1.95 ,                   DAT10800
A     4*1.812,                                  1.798 ,  1.8  ,            DAT10810
B     1.845 ,   1.835 ,   2*1.841,              2*1.835,                   DAT10820
C     4*1.662,                                  1.604 ,  1.62 ,            DAT10830
D     1.65  ,   1.64  ,   2*1.646,              2*1.64 ,                   DAT10840
E     4*1.296,                                  1.34  ,  1.345,            DAT10850
F     1.39  ,   1.38  ,   2*1.386,              2*1.38 ,                   DAT10860
G     4*0.562,                                  .51   ,  .52  ,            DAT10870
H     .57   ,   .56   ,   2*.566 ,              2*.56  ,                   DAT10880
I     4*0.332,                                  .29   ,  .295 ,            DAT10890
J     .33   ,   .32   ,   2*.324 ,              2*.34                      DAT10900
 DATA CX43/     .202,.209,.213,.216,            .2721 ,  .2788,            DAT10910
1     .27   ,   .259  ,   .262 ,   .279,        .282  ,  .292 ,            DAT10920
2     .166  ,   .177  ,   .1825,   .188 ,       .2685 ,  .2755,            DAT10930
3     .258  ,   .246  ,   .249 ,   .267,        .271  ,  .283 ,            DAT10940
4     .130  ,   .145  ,   .1525,   .160 ,       .2635 ,  .2715,            DAT10950
5     .246  ,   .233  ,   .237 ,   .256,        .259  ,  .273 ,            DAT10960
6     .072  ,   .0855 ,   .0938,   .101 ,       .26   ,  .268 ,            DAT10970
7     .234  ,   .221  ,   .224 ,   .244,        .248  ,  .2635,            DAT10980
8     .027  ,   .032  ,   .0345,   .037 ,       .212  ,  .233 ,            DAT10990
9     .222  ,   .208  ,   .211 ,   .232,        .237  ,  .254 ,            DAT11000
A     .018  ,   .0212 ,   .023 ,   .0245 ,      .164  ,  .199 ,            DAT11010
B     .21   ,   .196  ,   .199 ,   .220,        .225  ,  .244 ,            DAT11020
C     .015  ,   .0163 ,   .0169,   .0175 ,      .117  ,  .165 ,            DAT11030
D     .198  ,   .183  ,   .187 ,   .209,        .214  ,  .235 ,            DAT11040
E     .01338 ,  .01413,   .0145,   .01488,      .0715 ,  .131 ,            DAT11050
F     .186  ,   .171  ,   .174 ,   .197,        .203  ,  .225 ,            DAT11060
G     .01175,   .01200 ,  .01213,  .01225,      .0365 ,  .0885,            DAT11070
H     .174  ,   .158  ,   .161 ,   .185,        .191  ,  .215 ,            DAT11080
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     I    .01113,   .01126 ,  .01132,   .01138,   .02525,   .0595,      DAT11090
     J    .162    ,  .146   ,  .149 ,   .173.     .18    ,  .206     /  DAT11100
      DATA CX44/     4*.0105,                     .01875,   .0395,      0AT11110
     1    .151    ,  .133   ,  .136 ,   .161  ,  .169   ,  .196  ,     DAT11120
     2    4*.01025,                               .01475,   .0252,      0AT11130
     3    .13     ,  .108   ,  .123 ,   .143  ,  .157   ,  .187  ,     DAT11140
     4    4*.01 ,                                 .012   ,  .0175,      0AT11150
     5    .109    ,  .079   ,  .09  ,   .124  ,  .146   ,  .177  ,     DAT11160
     6    4*.01 ,                                 .0102  ,  .013 ,      DAT11170
     7    .081    ,  .0495  ,  .05625,  .08    ,  .135   ,  .1675 ,     DAT11180
     8    4*.01 ,                                 .009   ,  .0105,      DAT11190
     9    .053    ,  .022   ,  .025 ,   .04   ,  .123   ,  .158  ,     DAT11200
     A    4*.01 ,                                 .00825,   .009 ,      DAT11210
     B    .031    ,  .011   ,  .01425,  .024   ,  .055   ,  .148  ,     DAT11220
     C    4*.01 ,                                 .008   ,  .00825,     DAT11230
     D    .01     ,  .00825 ,  .01325,  .02325,  .0435  ,  .1375 ,     DAT11240
     E    4*.01 ,                                 2*.008,               DAT11250
     F    2*.009  ,             .02175,  2*.046,                       DAT11260
     G    4*.01 ,                                 2*.008,               DAT11270
     H    .0085   ,  .009   ,  .062 ,   .085   ,  .086  ,  .1    ,     DAT11280
     I    4*.01 ,                                 2*.008,               0AT11290
     J    .01     ,  .012   ,  .0955 ,  2*.117,                  .11  /  0AT11300
      DATA CX45/     4*.01,                       .008   ,  .0082 ,     DAT11310
     1    .016    ,  .028   ,  .1235 ,  2*.146,                  .127  ,  DAT11320
     2    4*.01025,                               .00825,   .009  ,     DAT11330
     3    .033    ,  .05    ,  .139  ,  2*.162,                  .144  ,  DAT11340
     4    4*.0105 ,                               .009   ,  .0105 ,     DAT11350
     5    .055    ,  .088   ,  .153  ,  2*.177,                  .1615 ,  DAT11360
     6    .01113  ,  .01126,   .01132,  .01138,  .01025,   .01325,      DAT11370
     7    .085    ,  .11    ,  .168  ,  .191  ,  .193   ,  .179  ,     DAT11380
     8    .01175  ,  .01200,   .01213,  .01225,  .012   ,  .0174 ,     DAT11390
     9    .111    ,  .128   ,  .183  ,  .205  ,  .208   ,  .195  ,     DAT11400
     A    .01338  ,  .01413,   .0145 ,  .01488,  .01475,   .025  ,     DAT11410
     B    .131    ,  .149   ,  .198  ,  .22   ,  .224   ,  .213  ,     DAT11420
     C    .015    ,  .0163  ,  .0169 ,  .0175 ,  .0185  ,  .039  ,     DAT11430
     D    .15     ,  .162   ,  .212  ,  .234  ,  .239   ,  .231  ,     DAT11440
     E    .018    ,  .0212  ,  .023  ,  .0245 ,  .025   ,  .0595 ,     DAT11450
     F    .169    ,  .178   ,  .227  ,  .249  ,  .255   ,  .248  ,     0AT11460
     G    .027    ,  .032   ,  .0345 ,  .037  ,  .036   ,  .0885 ,     0AT11470
     H    .191    ,  .2     ,  .2415 ,  .263  ,  .27    ,  .264  ,     DAT11480
     I    .072    ,  .0855  ,  .0938 ,  .101  ,  .0705  ,  .131  ,     0AT11490
     J    .213    ,  .22    ,  .257  ,  .277  ,  .286   ,  .282    /  DAT11500
      DATA CX46/     .130,.145,.1525,  .160  ,  .117   ,  .166  ,     0AT11510
     1    .232    ,  .238   ,  .271  ,  .291 ,  .301   ,  .299 ,      DAT11520
     2    .166    ,  .177   ,  .1825 ,  .188  ,  .162   ,  .201  ,     0AT11530
     3    .251    ,  .258   ,  .286  ,  .306 ,  2*.3165,               DAT11540
     4    .202    ,  .209 ,     .213,   .216,  .209   ,  .237  ,      DAT11550
     5    .272    ,  .282   ,  .301  ,  .32  ,  2*.332 ,               DAT11560
     6    4*.332 ,                                .29    ,  .295  ,     DAT11570
     7    .33     ,  .32    ,  2*.324 ,           2*.34  ,               DAT11580
     8    4*.562 ,                                .51    ,  .52   ,     DAT11590
     9    .57     ,  .56    ,  2*.566 ,           2*.56  ,               DAT11600
     A    4*1.296,                                1.34   ,  1.345 ,     DAT11610
     B    1.39    ,  1.38   ,  2*1.386,           2*1.38 ,               DAT11620
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      C    4*1.662,                                  1.604 ,  1.62  ,     DAT11630
      D    1.65  ,  1.64  ,  2*1.646,                2*1.64 ,             DAT11640
      E    4*1.812,                                  1.798 ,  1.80  ,     DAT11650
      F    1.845 ,  1.835 ,  2*1.841,                2*1.835,             DAT11660
      G    4*1.962,                                  1.915 ,  1.92  ,     DAT11670
      H    1.96  ,  1.95  ,  2*1.956,                2*1.95 ,             DAT11680
      I    4*2.022,                                  1.98  ,  1.985 ,     DAT11690
      J    2.02  ,  2.01  ,  2*2.016,                2*2.01               /DAT11700
       DATA CX47/    4*2.002,                       1.955 ,  1.96  ,     DAT11710
     1     2.    ,  1.99  ,  2*1.996,                2*1.99,              DAT11720
     2     4*1.847,                                  1.81  ,  1.82  ,     DAT11730
     3     1.85  ,  1.84  ,  2*1.846,                2*1.84,              DAT11740
     4     4*1.652,                                  2*1.61,              DAT11750
     5     1.65  ,  1.64  ,  2*1.646,                2*1.64,              DAT11760
     6     4*.977 ,                                  .992  ,  1.01  ,     DAT11770
     7     1.04  ,  1.03  ,  2*1.036,                2*1.03,              DAT11780
     8     4*.302 ,                                  .26   ,  .265  ,     DAT11790
     9     .30   ,  .29   ,  2*.296 ,                2*.29 ,              DAT11800
     A     4*.217 ,                                  .196  ,  .2    ,     DAT11810
     B     .236  ,  .226  ,  2*.232 ,                2*.226,              DAT11820
     C     4*.132 ,                                  .095  ,  .1    ,     DAT11830
     D     .13   ,  .12   ,  2*.126 ,                2*.12 ,              DAT11840
     E     4*.077 ,                                  .05   ,  .03   ,     DAT11850
     F     .06   ,  .055  ,  2*.056 ,                2*.055,              DAT11860
     G     4*.022 ,                                  2*.01 ,              OAT11970
     H      6*.01/                                                        DAT11880
      DATA K/1,1,1,1,2,3,4,5,7,8,9/                                      DAT11890
      DATA L/1,1,2,2,3,3,4,4,5,5,6,7,8,9,10,11,12/                       DAT11900
      END                                                                DAT11910
```

```
      SUBROUTINE DET                                                    DET00010
      COMMON /STBO/ UX,UY,UO,VO,T,A(9,2),N,NS                           DET00020
      DOUBLE PRECISION C,UO,VO,UO,VO,UX,UY,T,A,XM,B,XR,YO,XO            DET00030
      N1=N-1                                                            DET00040
      K=0                                                               DET00050
      UO=1.                                                             DET00060
      VO=0.                                                             DET00070
      DO 57 L=1,N1                                                      DET00080
      J=K+L                                                             DET00090
      JN=J+N                                                            DET00100
      J1=J+1                                                            DET00110
      K=K+N                                                             DET00120
      IF(UY.NE.0.) GO TO 1                                              DET00130
      IF(A(J,1))43,42,43                                                DET00140
   42 DO 44 I=J1,K                                                      DET00150
      IF(A(I,1))45,44,45                                                DET00160
   44 CONTINUE                                                          DET00170
      GO TO 113                                                         DET00180
   45 UO=-UO                                                            DET00190
      IM=I-J                                                            DET00200
      DO 46 I=J,NS,N                                                    DET00210
      IMM=I+IM                                                          DET00220
      B=A(I,1)                                                          DET00230
      A(I,1)=A(IMM,1)                                                   DET00240
   46 A(IMM,1)=B                                                        DET00250
   43 UO=UO*A(J,1)                                                      DET00260
      XO=-1./A(J,1)                                                     DET00270
      DO 47  I=J1,K                                                     DET00280
      IF(A(I,1).NE.0. ) A(I,1) = A(I,1)*XO                              DET00290
   47 CONTINUE                                                          DET00300
      DO 80 M=JN,NS,N                                                   DET00310
      IF(A(M,1))60,80,60                                                DET00320
   60 MJ=M-J                                                            DET00330
      DO 41 I=J1,K                                                      DET00340
      IF(A(I,1))49,41,49                                                DET00350
   49 IC=MJ+I                                                           DET00360
      A(IC,1)= A(IC,1)+A(I,1)*A(M,1)                                    DET00370
   41 CONTINUE                                                          DET00380
   80 CONTINUE                                                          DET00390
      GO TO 57                                                          DET00400
    1 IF(A(J,1). NE. 0..OR. A(J,2). NE. 0. ) GO TO 16                   DET00410
      DO 7  I=J1,K                                                      DET00420
      IF( A(I,1). NE. 0..OR. A(I,2) .NE. 0. ) GO TO 15                  DET00430
    7 CONTINUE                                                          DET00440
      GO TO 113                                                         DET00450
   15 UO=-UO                                                            DET00460
      VO=-VO                                                            DET00470
      IM=I-J                                                            DET00480
      DO 19 I=J,NS,N                                                    DET00490
      IMM=I+IM                                                          DET00500
      DO 19 M=1,2                                                       DET00510
      B=A(I,M)                                                          DET00520
      A(I,M)=A(IMM,M)                                                   DET00530
   19 A(IMM,M)=B                                                        DET00540
```

```
   16 C=UD*A(J,1)-VD*A(J,2)                                          DET00550
      VD=UD*A(J,2)+VD*A(J,1)                                         DET00560
      UD=C                                                           DET00570
      IF(A(J,1))21,22,21                                             DET00580
   22 XD=0.                                                          DET00590
      YD=1./A(J,2)                                                   DET00600
      GO TO 23                                                       DET00610
   21 XR=A(J,2)/    A(J,1)                                           DET00620
      XM=(1.+XR*XR)*A(J,1)                                           DET00630
      XD=-1./XM                                                      DET00640
      YD=XR/XM                                                       DET00650
   23 DO 25 I=J1,K                                                   DET00660
   37 B=XD*A(I,1) -YD* A(I,2)                                        DET00670
      A(I,2)= XD*A(I,2)+YD*A(I,1)                                    DET00680
    3 A(I,1)= B                                                      DET00690
   25 CONTINUE                                                       DET00700
      DO 81 M=JN,NS,N                                                DET00710
      IF( A(M,1).EQ.0..AND.A(M,2) .EQ. 0. ) GO TO 81                 DET00720
      MJ=M-J                                                         DET00730
      DO 27 I=J1,K                                                   DET00740
      IF( A(I,1).EQ.0..AND. A(I,2) .EQ. 0. ) GO TO 27                DET00750
      IC=MJ+I                                                        DET00760
      A(IC,1)=A(IC,1)+A(I,1)*A(M,1)-A(I,2)*A(M,2)                    DET00770
      A(IC,2)=A(IC,2)+A(I,1)*A(M,2)+A(I,2)*A(M,1)                    DET00780
   27 CONTINUE                                                       DET00790
   81 CONTINUE                                                       DET00800
   57 CONTINUE                                                       DET00810
      IF(UY)56,55,56                                                 DET00820
  113 UO=0.                                                          DET00830
   55 JO=UO*A(NS,1)                                                  DET00840
   14 VO=0.                                                          DET00850
      RETURN                                                         DET00860
   56 UO=UO*A(NS,1)-VO*A(NS,2)                                       DET00870
      VO=UO*A(NS,2)+VO*A(NS,1)                                       DET00880
      RETURN                                                         DET00890
      END                                                            DET00900
```

```
      SUBROUTINE DISK (GDISK)                                                DISK0010
      DIMENSION GDISK(120)                                                   DISK0020
C         DISPLAY GUST VELOCITY DISTRIBUTION ON ROTOR (IF ANY VELOCITY       DISK0030
C              IS NON-ZERO AND IF WHOLE ROTOR IS NOT SUBJECT TO THE          DISK0040
C              SAME VELOCITY)                                                DISK0050
      DISK1=GDISK(119)                                                       DISK0060
      DO 227 J=1,120                                                         DISK0070
      IF(ABS(GDISK(J)).GT.0.5.AND.GDISK(J).NE.DISK1) GO TO 228               DISK0080
  227 CONTINUE                                                               DISK0090
      RETURN                                                                 DISK0100
  228 WRITE(6,229) GDISK                                                     DISK0110
      RETURN                                                                 DISK0120
  229 FORMAT( 1H1,10X,30H GUST VELOCITIES ON ROTOR DISK, 10X,4H FWD//        DISK0130
     1    30X,F4.0,16X,F4.0,16X,F4.0//32X,F4.0,14X,F4.0,14X,F4.0//          DISK0140
     2    34X,F4.0,12X,F4.0,12X,F4.0//36X,F4.0,10X,F4.0,10X,F4.0//          DISK0150
     3    38X,F4.0, 8X,F4.0, 8X,F4.0//10X,F4.0,26X,F4.0, 6X,F4.0,           DISK0160
     4     6X,F4.0,26X,F4.0/14X,F4.0,68X,F4.0/18X,F4.0,20X,F4.0,            DISK0170
     5     8X,F4.0, 4X,F4.0,20X,F4.0/22X,F4.0,52X,F4.0/26X,F4.0,            DISK0180
     6    14X,F4.0, 2X,F4.0, 2X,F4.0,14X,F4.0/30X,F4.0,36X,F4.0/            DISK0190
     7    34X,F4.0, 8X,3F4.0,8X,F4.0/38X,F4.0,20X,F4.0/42X,5F4.0/           DISK0200
     8    42X,2F8.0/10X,10F4.0,4X,10F4.0/42X,2F8.0/                         DISK0210
     9    42X,5F4.0/38X,F4.0,20X,F4.0/34X,F4.0, 8X,3F4.0,8X,F4.0/           DISK0220
     A    30X,F4.0,36X,F4.0/26X,F4.0,14X,F4.0, 2X,F4.0, 2X,F4.0,            DISK0230
     B    14X,F4.0/22X,F4.0,52X,F4.0/18X,F4.0,20X,F4.0, 4X,F4.0,            DISK0240
     C     4X,F4.0,20X,F4.0/14X,F4.0,68X,F4.0/10X,F4.0,26X,F4.0,            DISK0250
     D     6X,F4.0, 6X,F4.0,26X,F4.0//38X,F4.0, 8X,F4.0, 8X,F4.0//          DISK0260
     E    36X,F4.0,10X,F4.0,10X,F4.0//34X,F4.0,12X,F4.0,12X,F4.0//          DISK0270
     F    32X,F4.0,14X,F4.0,14X,F4.0//30X,F4.0,16X,F4.0,16X,F4.0//          DISK0280
     G    50X,4H AFT)                                                       DISK0290
      END                                                                    DISK0300
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      SUBROUTINE DOGS (RX,RY,RZ,FX,FY,FZ,ROLL,PITCH,YAW)                DOGS0010
C         COMPUTE VECTOR CROSS PRODUCT  L = R X F                       DOGS0020
      ROLL=RY*FZ-RZ*FY                                                  DOGS0030
      PITCH=RZ*FX-RX*FZ                                                 DOGS0040
      YAW=RX*FY-RY*FX                                                   DOGS0050
      RETURN                                                            DOGS0060
      END                                                               DOGS0070
```

```
      SUBROUTINE DOROT (N)                                              DOR00010
      COMMON /ANDOIT/ A1,B1,XK,XY,VI2,VI4,APDM,APFM,ARDM,ARFM,          DOR00020
     1                AYFM,ROTJ,XK43,XLIM,CBFAC,                       DOR00030
     2                GDISK(120),NOPSI,TANA1,TANB1,                    DOR00040
     3                TANT1,TANT2,DCAFXK,IPRINT,NORAOL,                DOR00050
     4                SHEARL(12),SHEARD(12),SHEARR(12),                DOR00060
     5                XMOML(12),XMOMD(12)                              DOR00070
     6                ,APDS,ARDS,PFAC,RFAC,APDBS,ARDBS                 DOR00080
      COMMON /ROMAN/  ZZ,VXS(2),VYS(2),VZS(2),BETA(12,2),              DOR00090
     *                T,PCC(2),CDSE(7,7,2),BETAN(2),BETAX(2),BETAZ(2), DOR00100
     *                AIB(2),APDD,ARDD,AYDD,AIR(2),                    DOR00110
     1                DPSI(12,2),DTRR,NPSI(2),ZZTR,                    DOR00120
     2                BETAD(12,2),BNPSI(2),                            DOR00130
     3                COND2,GMAXV,RATE1,RATE2,STOP2,                   DOR00140
     4                THROT(2),TRIND,XGUST,BETAZD(2),GMAXV1,           DOR00150
     5                GMAXV2,GMAXV3,GUSTYP,HNPSIR(2),                  DOR00160
     6                HUBKPS,HUBKRS,HUBTPS,HUBTRS,                     DOR00170
     7                KONFIG,LNGTH1,PILGH1,PSIREF(2),                  DOR00180
     8                START2,XMOMLI(12,2),                             DOR00190
     9                R(2),OR(2),T1(2),                                DOR00200
     A                T2(2),TZR(2),XMA(2),                             DOR00210
     B                XMB(2),AIBP(2),AIBR(2),                          DOR00220
     C                APDR(2),ARDR(2),PSID(2),                         DOR00230
     D                XSTAH(2),YSTAH(2),                               DOR00240
     F                HUBKPR(2),HUBKRR(2)                              DOR00250
     F                ,AZETAR(2),YZETAR(2)                             DOR00260
      COMMON /MANARO/ I,V,INO,NWAG,APBMT,ARBMT,AYBMT,BETAD(2),TDELT,    DOR00270
     1                BETAE(2),HGUSTE,HGUSTF,HGUSTW,VGUSTE,            DOR00280
     2                VGUSTW,VGUSTF,GFWD,GLAT,GVERT,                   DOR00290
     3                VXB,VZB,APD,VYB,ARD,AYD,                         DOR00300
     4                COLSTK,CYSTK1,CYSTK2,PEDAL,AYE,                  DOR00310
     5                APE,ARE,A1M,B1M,A1TR,B1TR,                       DOR00320
     6                XAR(2),YAR(2),ZAR(2),                            DOR00330
     7                VIR(2),ZETAR(2),HFORCE(2),                       DOR00340
     8                THRUST(2),TORQUE(2),YFORCE(2)                    DOR00350
      COMMON /STANRO/ J,W,ITM,VHS(2),LINK,QELE,VROT(2),                 DOR00360
     1                VSNO,YFIN(2),ZFEL(2),A1BAL(2),                   DOR00370
     2                B1BAL(2),COND1,SWING,PILGH2,PWGEL1,              DOR00380
     3                B(2),PMOM(2),RMOM(2)                             DOR00390
      COMMON /ROSTAR/ AM(2),CT,PI,XB(2),ALT,ADR(2),EXH(2),             DOR00400
     1                NXR(2),RBH(2),SWC(2),UHS,CDHB(2),LROT(2),        DOR00410
     2                RAIB(2),RTRP(2),TAIR(14),CDNEK(2),OCAFR(2),FVIND, DOR00420
     *                NVARD,                                           DOR00430
     3                SWKR1(2),SWKR2(2),TIP1B(2),TIP3B(2),             DOR00440
     4                TWIST(20,2),CLRADK(2),DELTA3(2),                 DOR00450
     5                LAMBDA(2),UPGUST,URGUST,UTGUST,WROTOR,           DOR00460
     6                ER(2),ERX(2),                                    DOR00470
     7                XLIMAX(2),XLIMIN(2)                              DOR00480
      COMMON /TOPLOT/ AH(3),AL(3),EXIT,ICOM(49),IPSN,                   DOR00490
     1                NPART,NVARA,NVARB,NVARC,NSCALE                   DOR00500
     1                ,NVARS,NPRINT,NTIME                              DOR00510
      COMMON /FORY/   Y(4,150)                                          DOR00520
      COMMON/LOISK/LOCATE(120)                                          DOR00530
      DATA TWOPI,D45,D105,D255,D315 /6.2831853,.78539816,1.8325957,     DOR00540
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     1           4.4505896,5.4977871/                                    DDR00550
      DIMENSION HUBKS(2,2),JFLAP(7)                                     DDR00560
      EQUIVALENCE (HUBKS(1,1),HUBKPS)                                   DDR00570
      REAL LAM,MRCP,MRSP,MRCPSB,MRCPCB,LNGTH1,LAMBDA                    DDR00580
      REAL NOPSI2                                                       DDR00590
      LOGICAL NRIGID                                                    DDR00600
      NRIGID=.TRUE.                                                     DDR00610
      IF(BETAX(N).EQ.BETAN(N)) NRIGID=.FALSE.                           DDR00620
      IJ = 1                                                            DDR00630
      ADXMOM = 0.0                                                      DDR00640
      PSIDSQ = PSID(N)**2                                               DDR00650
      NOPSI2=2./NOPSI                                                   DDR00660
      IF(LINK.LT.4) GO TO 9                                             DDR00670
      DO 10 L=1,NOPSI                                                   DDR00680
      JFLAP(L)=0                                                        DDR00690
      IF(NRIGID) GO TO 5                                                DDR00700
      BETA(L,N)=BETAZ(N)                                                DDR00710
      BETAD(L,N)=BETAZD(N)                                              DDR00720
      GO TO 10                                                          DDR00730
    5 CONTINUE                                                          DDR00740
      IF(BETA(L,N).LT.BETAN(N)) GO TO 2                                 DDR00750
      IF(BETA(L,N).LT.BETAX(N)) GO TO 10                                DDR00760
      JFLAP(L)=1                                                        DDR00770
      DBETA=BETAX(N)-BETA(L,N)                                          DDR00780
      DBETAD=0.                                                         DDR00790
      IF(BETAD(L,N).GT.0.) DBETAD=-BETAD(L,N)                           DDR00800
      GO TO 3                                                           DDR00810
    2 CONTINUE                                                          DDR00820
      JFLAP(L)=-1                                                       DDR00830
      DBETA=BETAN(N)-BETA(L,N)                                          DDR00840
      DBETAD=0.                                                         DDR00850
      IF(BETAD(L,N).LT.0.) DBETAD=-BETAD(L,N)                           DDR00860
    3 CONTINUE                                                          DDR00870
      DO 4 K=1,NOPSI                                                    DDR00880
      BETA(K,N)=COSE(K,L,N)*DBETA+BETA(K,N)                             DDR00890
      BETAD(K,N)=COSE(K,L,N)*DBETAD+BETAD(K,N)                          DDR00900
    4 CONTINUE                                                          DDR00910
   10 CONTINUE                                                          DDR00920
    9 CONTINUE                                                          DDR00930
      DO 40 L=1,NOPSI                                                   DDR00940
      PSIR=PSIREF(N)+DPSI(L,N)                                          DDR00950
      IF(PSIR.GE.TWOPI) PSIR=PSIR-TWOPI                                 DDR00960
      VXOR=VIR(N)                                                       DDR00970
      IF((PSIR.GT.D45.AND.PSIR.LT.D105).OR.                             DDR00980
     1   (PSIR.GT.D255.AND.PSIR.LT.D315))                               DDR00990
     2   VXOR=VXOR+XY*SIN(6.*(PSIR-D45))                                DDR01000
      SPSI=SIN(PSIR)                                                    DDR01010
      CPSI=COS(PSIR)                                                    DDR01020
      IF(LINK.EQ.4) GO TO 27                                            DDR01030
      IF(NRIGID) GO TO 26                                               DDR01040
      BETA(L,N)=BETAZ(N)                                                DDR01050
      BETAD(L,N)=BETAZD(N)                                              DDR01060
      GO TO 27                                                          DDR01070
   26 CONTINUE                                                          DDR01080
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```
      BETA(L,N)=BETAZ(N)-ATAN(TANA1*CPSI+TANB1*SPSI)                    DORD1090
      BETAD(L,N)=-(COS(BETAZ(N)-BETA(L,N)))**2*(PFAC*CPSI+RFAC*SPSI)   DORD1100
   27 CONTINUE                                                         DORD1110
      SBFAC=SPSI*COS(APFM)*SIN(ARFM)+CPSI*SIN(APFM)                    DORD1120
      SBETA=SIN(BETA(L,N)+BETAE(N))                                    DORD1130
      CBETA=COS(BETA(L,N)+BETAE(N))                                    DORD1140
      CBOR=OR(N)*CBETA                                                 DORD1150
      RDDTR=R(N)*(BETAD(L,N)-ARDS*SPSI-APDS*CPSI)                      DORD1160
      BETA1=BETA(L,N)-BETAZ(N)                                         DORD1170
      TZPDT=TZR(N)-ATAN(TANT1*SPSI+TANT2*CPSI)-BETA1*DELTA3(N)         DORD1180
      SHEARL(L)=0.                                                     DORD1190
      SHEARD(L)=0.                                                     DORD1200
      SHEARR(L)=0.                                                     DORD1210
      XMOML(L)=0.                                                      DORD1220
      XMOMD(L)=0.                                                      DORD1230
      XKLAM= 1.333333+XK43*CPSI                                        DORD1240
      MRCP=VXS(N)*CPSI-VYS(N)*SPSI                                     DORD1250
      MRSP=VXS(N)*SPSI+VYS(N)*CPSI                                     DORD1260
      MRCPSB=MRCP*SBETA                                                DORD1270
      MRCPCB=MRCP*CBETA                                                DORD1280
      STORE=1.                                                         DORD1290
      JLOCL=(PSIR+D45)/.52359878                                       DORD1300
      IF(JLOCL.GT.12) JLOCL=1                                          DORD1310
      JLOC=10*JLOCL-9                                                  DORD1320
      IF(IPRINT.EQ.0)  GO TO 55                                        DORD1330
      PSI=PSIR*DTRR                                                    DORD1340
      IF(IJ.EQ.2) GO TO 53                                             DORD1350
      IJ = 2                                                           DORD1360
      WRITE (6,50)                                                     DORD1370
   50 FORMAT('1')                                                      DORD1380
      GO TO 52                                                         DORD1390
   53 WRITE (6,51)                                                     DORD1400
   51 FORMAT (1H ,///)                                                 DORD1410
      IJ = 1                                                           DORD1420
   52 WRITE (6,424) PSI,VXS(N),VYS(N),VZS(N),XK,SBETA,CBETA,BDOTR      DORD1430
      IF(CLRADK(N).LT.0.) GO TO 55                                     DORD1440
      IJ=1                                                             DORD1450
      WRITE (6,425)                                                    DORD1460
   55 XR=1.+XB(N)                                                      DORD1470
      DO 30 K=1,NDRADL                                                 DORD1480
      XR=XR-XB(N)                                                      DORD1490
      IF(XR.LT..7) VXOR=VIR(N)                                         DORD1500
      LAM=LAMBDA(N)+VXOR*(1.-XKLAM*XR)                                 DORD1510
      RR=XR*R(N)                                                       DORD1520
      IF(GUSTYP.LT.1.) GO TO 13                                        DORD1530
      AGUSTR=0.                                                        DORD1540
      HGUSTR=0.                                                        DORD1550
      YGUSTR=0.                                                        DORD1560
      VGUSTR=0.                                                        DORD1570
      XRR=-RR*CPSI                                                     DORD1580
      YRR=RR*SPSI*ROTJ                                                 DORD1590
      CALL RATS (XRR,YRR,0.,AYFM,APFM,ARFM,STA,BL,TV,1)                DORD1600
      XSTARE=SQRT((XSTAH(N)+STA)**2+(YSTAH(N)+BL)**2)-XGUST            DORD1610
      IF(XSTARE.LE.0.) GO TO 600                                       DORD1620
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      IF(GUSTYP.EQ.10.0.OR.GUSTYP.EQ.12.) GO TO 11                      OORO1630
      IF(XSTARE.LE.START2) GO TO 601                                    OORO1640
      IF(XSTARE.GE.STOP2) GO TO 602                                     OORO1650
       AGUSTR=GMAXV3+XSTARE*RATE2                                       OORO1660
      GO TO 605                                                         OORO1670
  601 IF(XSTARE.GE.LNGTH1) GO TO 604                                    OORO1680
      AGUSTR=XSTARE*RATE1                                               OORO1690
      GO TO 605                                                         OORO1700
  604 AGUSTR=GMAXV1                                                     OORO1710
      GO TO 605                                                         OORO1720
  60? AGUSTR=GMAXV                                                      OORO1730
  605 IF(GUSTYP.EQ.11.) GO TO 606                                       OORO1740
      GO TO 607                                                         OORO1750
   11 IF(XSTARE.LE.START2) GO TO 608                                    OORO1760
      IF(XSTARE.GE.STOP2) GO TO 600                                     OORO1770
      AGUSTR=GMAXV2*(SIN((XSTARE-START2)*PILGH2))**2                    OORO1780
      GO TO 612                                                         OORO1790
  608 IF(XSTARE.GE.LNGTH1) GO TO 600                                    OORO1800
      AGUSTR=GMAXV1*(SIN(XSTARE*PILGH1))**2                             OORO1810
  612 IF(GUSTYP.EQ.12.) GO TO 606                                       OORO1820
  607 CONTINUE                                                          OORO1830
      CALL RATS (0.,0.,AGUSTR,AYFM,APFM,ARFM,HGUSTR,YGUSTR,VGUSTR,-1)   OORO1840
      GO TO 609                                                         OORO1850
  606 CONTINUE                                                          OORO1860
      CALL RATS (AGUSTR,0.,0.,AYFM,APFM,ARFM,HGUSTR,YGUSTR,VGUSTR,-1)   OORO1870
  609 YGUSTR=YGUSTR*ROTJ                                                OORO1880
  600 IF(STORE.LE.0.) GO TO 16                                          OORO1890
      GOISK(LOCATE(JLOC))=AGUSTR                                        OORO1900
      JLOC=JLOC+1                                                       OORO1910
   16 STORE=-STORE                                                      OORO1920
      UGUST=HGUSTR*CPSI-YGUSTR*SPSI                                     OORO1930
      UPGUST=UGUST*SBETA-VGUSTR*CBETA                                   OORO1940
      UTGUST=HGUSTR*SPSI+YGUSTR*CPSI                                    OORO1950
      URGUST=UGUST*CBETA+VGUSTR*SBETA                                   OORO1960
   13 CONTINUE                                                          OORO1970
      UP=LAM*CBETA-XR*BDOTR-MRCPSB+UPGUST                               OORO1980
      UT=XR*CBOR+MRSP-UTGUST                                            OORO1990
      UR=URGUST-LAM*SBETA-MRCPCB                                        OORO2000
      TZTW=TZPDT-TWIST(K,N)                                             OORO2010
      UIPSQ=UR**2+UT**2                                                 OORO2020
      UIP=SQRT(UIPSQ)                                                   OORO2030
      U=SQRT(UP**2+UIPSQ)                                               OORO2040
      GAMMA=ABS(ATAN(UT/UR))                                            OORO2050
      SGAM=SIN(GAMMA)**2                                                OORO2060
      CGAM=1.-SGAM                                                      OORO2070
      IF(CLRAOK(N).GE.0.) GO TO 17                                      OORO2080
      SGAM=1.                                                           OORO2090
      CGAM=0.                                                           OORO2100
      U=SQRT(UP**2+UT**2)                                               OORO2110
   17 CONTINUE                                                          OORO2120
      CGAMCT=CGAM*U*ABS(COS(TZTW))                                      OORO2130
      UPT=UP*SGAM                                                       OORO2140
      UPR=UP*CGAM                                                       OORO2150
      PHI=0.                                                            OORO2160
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      IF(UT.NE.0..OR.UPT.NE.0.) PHI=ATAN2(UPT,UT)                          DORO2170
      USGAM=U*SGAM                                                         DORO2180
      XMACN=USGAM*VSND                                                     DORO2190
      XMACR=U*CGAM*VSND                                                    DORO2200
      PHIR=0.                                                              DORO2210
      IF(UR.NE.0..OR.UPR.NE.0.) PHIR=ATAN2(UPR,UR)                         DORO2220
      IF(RR.GT.EXH(N)) GO TO 14                                            DORO2230
      ALF=0.                                                               DORO2240
      CL=0.                                                                DORO2250
      CD=CDHB(N)                                                           DORO2260
      CLR=0.                                                               DORO2270
      CDR=CD                                                               DORO2280
      GO TO 15                                                             DORO2290
   14 CONTINUE                                                             DORO2300
      ALF=TZTW+PHI                                                         DORO2310
      CALL CLCD (ALF,CL,CD,XMACN,EXIT,N)                                   DORO2320
      IF(EXIT.NE.0.) RETURN                                                DORO2330
      IF(CLRADK(N).GE.0.) CALL CLCD (PHIR,CLR,CDR,XMACR,EXIT,N)            DORO2340
      IF(EXIT.NE.0.) RETURN                                                DORO2350
      CLR=CLR*CLRADK(N)                                                    DORO2360
   15 CONTINUE                                                             DORO2370
      ALDADL=USGAM*(CL*UT+CD*UPT)+CGAMCT*(CLR*UR+CDR*UPR)                  DORO2380
      ALDADD=USGAM*(CD*UT-CL*UPT)                                          DORO2390
      ALDADR=CGAMCT*(CDR*UR-CLR*UPR)                                       DORO2400
      ALDLR=ALDADL*RR                                                      DORO2410
      ALDDR=ALDADD*RR                                                      DORO2420
      IF(K.NE.2) GO TO 20                                                  DORO2430
      SHEARL(L)=TIP38(N)*SHEARL(L)+TIP18(N)*ALDADL                         DORO2440
      SHEARD(L)=.375*SHEARD(L)+.125*ALDADD                                 DORO2450
      SHEARR(L)=.375*SHEARR(L)+.125*ALDADR                                 DORO2460
      XMOML(L)=TIP38(N)*XMOML(L)+TIP18(N)*ALDLR                            DORO2470
      XMOMD(L)=.375*XMOMD(L)+.125*ALDDR                                    DORO2480
   20 SHEARL(L)=SHEARL(L)+ALDADL                                           DORO2490
      SHEARD(L)=SHEARD(L)+ALDADD                                           DORO2500
      SHEARR(L)=SHEARR(L)+ALDADR                                           DORO2510
      XMOML(L)=XMOML(L)+ALDLR                                              DORO2520
      XMOMD(L)=XMOMD(L)+ALDDR                                              DORO2530
      IF(IPRINT.EQ.0) GO TO 30                                             DORO2540
      PHI=PHI*DTRR                                                         DORO2550
      ALF=ALF*DTRR                                                         DORO2560
      WRITE (6,407) XR,PHI,ALF,CL,CD,XMACN,VXOR,LAM,UT,UP                  DORO2570
      IF(CLRADK(N).LT.0.) GO TO 30                                         DORO2580
      GAMMA=GAMMA*DTRR                                                     DORO2590
      PHIR=PHIR*DTRR                                                       DORO2600
      WRITE (6,408) GAMMA,PHIR,CLR,CDR,XMACR,UR,UPR,UPT                    DORO2610
   30 CONTINUE                                                             DORO2620
      XMOML(L)=XMOML(L)*HNPSIR(N)                                          DORO2630
      BMOM=(HUBKPR(N)*CPSI**2+HUBKRR(N)*SPSI**2)*BETA1*NOPSI2              DORO2640
      PMOM(N)=PMOM(N)-BMOM*CPSI                                            DORO2650
      RMOM(N)=RMOM(N)-BMOM*SPSI                                            DORO2660
      AMFAC=(CBFAC*CBETA+SBFAC*SBETA)*NOPSI2                               DORO2670
      XMOM=XMOML(L)-BMOM-AM(N)*AMFAC                                       DORO2680
      CBETA2=(CBETA+HUBKS(1,N))*NOPSI2                                     DORO2690
      XMOM1=CBETA2*(ARDM*CPSI-APDM*SPSI)*CBETA                             DORO2700
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      XMOMLI(L,N)=XMOM*RAIB(N)+XMOM1-CBETA2*SBETA*PSIDSQ                 DOR02710
      XMOM2=XMOM+XMOM1* AIB(N)                                          DOR02720
      XMA(N)=XMA(N)+XMOM2*SPSI                                          DOR02730
      XMB(N)=XMB(N)+XMOM2*CPSI                                          DOR02740
      TORQUE(N)=TORQUE(N)+XMOMD(L)                                      DOR02750
      THRUST(N)=THRUST(N)+SHEARL(L)*CBETA-SHEARR(L)*SBETA               DOR02760
      SHLSRC=SHEARL(L)*SBETA+SHEARR(L)*CBETA                            DOR02770
      YFORCE(N)=YFORCE(N)-SHEARD(L)*CPSI-SHLSRC*SPSI                    DOR02780
      HFORCE(N)=HFORCE(N)+SHEARD(L)*SPSI-SHLSRC*CPSI                    DOR02790
      AOXMOM = AOXMOM +XMOML(L)                                         DOR02800
      IF(NRIGID) GO TO 40                                               DOR02810
      XMOMBH=XMOMLI(L,N)*RBH(N)                                         DOR02820
      PMOM(N)=PMOM(N)+XMOMBH*CPSI                                       DOR02830
      RMOM(N)=RMOM(N)+XMOMBH*SPSI                                       DOR02840
      XMOMLI(L,N)=0.                                                    DOR02850
   40 CONTINUE                                                          DOR02860
      OSQI=PSIDSQ*AIB(N)                                                DOR02870
      AOXMOM=AOXMOM/NOPSI                                               DOR02880
      DO 41 K=1,3                                                       DOR02890
      CBO=COS(BETAO(N))                                                 DOR02900
      SBO=SIN(BETAO(N))                                                 DOR02910
      CBOH=CBO+HUBKS(1,N)                                               DOR02920
      FBE=CONEK(N)*BETAE(N)-AOXMOM+CBOH*SBO*OSQI                        DOR02930
      FPBE=CONEK(N)+OSQI*(CBOH*CBO-SBO**2)                              DOR02940
      BETAE(N)=BETAE(N)-FBE/FPBE                                        DOR02950
      BETAO(N)=BETAZ(N)+BETAE(N)                                        DOR02960
   41 CONTINUE                                                          DOR02970
      IF(LINK.LT.4) RETURN                                              DOR02980
      DO 61 L=1,NOPSI                                                   DOR02990
      Y(I,7*N+L+99)=DOTX(COSE(1,L,N),I,XMOMLI(1,N),1,NOPSI)             DOR03000
   61 CONTINUE                                                          DOR03010
      IF(.NOT.NRIGID) RETURN                                            DOR03020
      DO 62 L=1,NOPSI                                                   DOR03030
      IF((Y(I,7*N+L+99)*JFLAP(L)).LE.0.) GO TO 62                       DOR03040
      PSIR=PSIREF(N)+OPSI(L,N)                                          DOR03050
      XMOMBH=Y(I,7*N+L+99)*RBH(N)                                       DOR03060
      PMOM(N)=PMOM(N)+XMOMBH*COS(PSIR)                                  DOR03070
      RMOM(N)=RMOM(N)+XMOMBH*SIN(PSIR)                                  DOR03080
      XMOMLI(L,N)=0.                                                    DOR03090
      JFLAP(L)=10                                                       DOR03100
   62 CONTINUE                                                          DOR03110
      DO 63 L=1,NOPSI                                                   DOR03120
      Y(I,7*N+L+99)=DOTX(COSE(1,L,N),1,XMOMLI(1,N),1,NOPSI)             DOR03130
      IF(JFLAP(L).NE.10) GO TO 63                                       DOR03140
      PSIR=PSIREF(N)+DPSI(L,N)                                          DOR03150
      XMOMBH=Y(I,7*N+L+99)*RBH(N)                                       DOR03160
      PMOM(N)=PMOM(N)+XMOMBH*COS(PSIR)                                  DOR03170
      RMOM(N)=RMOM(N)+XMOMBH*SIN(PSIR)                                  DOR03180
      Y(I,7*N+L+99)=0.                                                  DOR03190
   63 CONTINUE                                                          DOR03200
      RETURN                                                            DOR03210
  407 FORMAT (6X,10F12.5)                                               DOR03220
  408 FORMAT (24X,8F12.5)                                               DOR03230
  424 FORMAT (12X,     '  AZIMUTH        U-SHAFT      V-SHAFT      W-SHAFT  DOR03240
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      1       XK     SIN(BETA)    COS(BETA)      BETA DOT'//                    DORO3250
      2   12X,8F12.5/1HO,                                                       DORD3260
      3         9X,  'RAD.STA.      PHI          ALPHA          CL             CDDRD3270
      4D          MACH      LOCAL VI LOC. LAMBDA        UT          UP'//)     DORD3280
  425 FORMAT (13X,'RADIAL FLOW    GAMMA          PHI            CL              DORD3290
      1CD         MACH         UR            UPR          UPT'//)             DORD3300
       END                                                                      DORD3310
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      SUBROUTINE ELEC (GAIN)                                            ELEC0010
      COMMON /TRONIC/ UU(6),VV(6),TAU(22),DAMP(22),NUMRTS,GAINB,        ELEC0020
     1                INDEX,STGAIN(6),TSTAR,COELTD,SLOT(3,9)           ELEC0030
      GAIN=1                                                            ELEC0040
      IX=INC                                                            ELEC0050
      DO 20                TS                                           ELEC0060
      IX=IX                                                             ELEC0070
      U=UU(I                                                            ELEC0080
      V=VV(I)                                                           ELEC0090
      IF(V.EQ.0.) GO TO 15                                              ELEC0100
      IF(V.NE.-VV(I+1)) GO TO 18                                        ELEC0110
      Z=1./(U**2+V**2)                                                  ELEC0120
      TAU(IX)=Z                                                         ELEC0130
      DAMP(IX)=-2.*Z*U                                                  ELEC0140
      GAIN=GAIN/Z                                                       ELEC0150
      GO TO 20                                                          ELEC0160
   15 CONTINUE                                                          ELEC0170
      DAMP(IX)=-1./U                                                    ELEC0180
      GAIN=-GAIN*U                                                      ELEC0190
      GO TO 19                                                          ELEC0200
   18 CONTINUE                                                          ELEC0210
      DAMP(IX)=0.                                                       ELEC0220
   19 CONTINUE                                                          ELEC0230
      TAU(IX)=0.                                                        ELEC0240
   20 CONTINUE                                                          ELEC0250
      IF(NUMRTS.GE.3) RETURN                                            ELEC0260
      IX=IX+1                                                           ELEC0270
      TAU(IX)=0.                                                        ELEC0280
      DAMP(IX)=0.                                                       ELEC0290
      UU(3)=0.                                                          ELEC0300
      VV(3)=0.                                                          ELEC0310
      RETURN                                                            ELEC0320
      END                                                               ELEC0330
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      SUBROUTINE GUST (J)                                                GUST0010
      COMMON /STAMAN/ HL(2),XX,YY,AY1,GOV,KPD,QPC,QQQ,                   GUST0020
     1                RIY,APBG,ARBG,ASEP,AYBG,BWTC,                      GUST0030
     2              RC,BWTK,BWTM,CGBL,DPIX,DPIZ,                         GUST0040
     3                FHPT(2),R550,ALERT,AYDMX,DELT2,                    GUST0050
     4                DPIXZ,DTBWT,DWLCG,HDELT,HGUST,                     GUST0060
     5                HLTR1,HLTR2,ITORS,KTCTR,OMEGM,                     GUST0070
     6                PCDEL,QHRSA,RMASS,TRALT,TWOPI,VGUST,               GUST0080
     7                ISTOP,XAGUN,XAPYL,XARSP(2),YAGUN,                  GUST0090
     8                YARSP(2),YGUST,ZAGUN,ZAPYL,ZARSP(2),               GUST0100
     9                DELT2R,DSTACG,EIMAST,GPRELD,HLPYLD,                GUST0110
     A                IBRAKE,OMEGMD,QBRAKE,BETAZS(2),                    GUST0120
     B                PCGOED,PCGMAX,PCRATE,PDIDTR,RDELT1,                GUST0130
     C                RDELT2,RITORS,TRIND2                               GUST0140
      COMMON /MANAL/  Q,AP,PED,QWG,TZM,T1M,T2M,                          GUST0150
     1                TZT,T1T,T2T,ALEL,CZET,PSDD,                        GUST0160
     2                SZET,TAXL,TAXR,XAWG,XLNK(16),ZAWG,                 GUST0170
     3                ALCYP,ALFIN,ALLWG,ALRWG,CDELE,CDFIN,               GUST0180
     4                CDLWG,CDRWG,CLELE,CLFIN,CLLWG,CLRWG,CWING,         GUST0190
     5                CYCR1,CYCR2,CZET4,CZET6,CZET9,RANGE,               GUST0200
     6                SZET5,SZET7,SZET8,WGCOL,XAELE,XAFIN,               GUST0210
     7                XAFUS,XAJET,YAFIN,ZAELE,ZAFIN,ZAFUS,               GUST0220
     *                YAELE,YAFUS,YALWG,YARWG,YALJET,YARJET,             GUST0230
     8                ZAJET,ALECR1,ALGFPD,BOTTOM,CZET11,                 GUST0240
     9                CZET12,CZET13,EIZETA,HALFPI,SZET10,                GUST0250
     A                XAPYLD,YGUSTW,ZAPYLD,ZFLWG1,ZFRWG1                 GUST0260
     B                ,TZMS,T1MS,T2MS,TZTS,T1TS,T2TS,                    GUST0270
     C                CLOCK,FLOCK,XLOCK,TCLOCK                           GUST0280
      COMMON /ROMAN/  ZZ,VXS(2),VYS(2),VZS(2),BETA(12,2),                GUST0290
     *                T,PCC(2),COSE(7,7,2),BETAN(2),BETAX(2),BETAZ(2),   GUST0300
     *                AIB(2),APDD,AROD,AYDD,AIR(2),                      GUST0310
     1                DPSI(12,2),DTRR,NPSI(2),ZZTR,                      GUST0320
     2                BETAD(12,2),BNPSI(2),                              GUST0330
     3                COND2,GMAXV,RATE1,RATE2,STOP2,                     GUST0340
     4                THROT(2),TRIND,XGUST,BETAZD(2),GMAXV1,             GUST0350
     5                GMAXV2,GMAXV3,GUSTYP,HNPSIR(2),                    GUST0360
     6                HUBKPS,HUBKRS,HUBTPS,HUBTRS,                       GUST0370
     7                KONFIG,LNGTH1,PILGH1,PSIREF(2),                    GUST0380
     8                START2,XMOMLI(12,2),                               GUST0390
     9                RM,RTR,ORM,ORTR,T1MT,T1TT,                         GUST0400
     A                T2MT,T2TT,TZMT,TZTT,XMA1,XMA1T,                    GUST0410
     B                XMB1,XMB1T,AIBPM,AIBPT,AIBRM,AIBRT,                GUST0420
     C                APTD,APTTD,ARTD,ARTTD,PSD,PSDT,                    GUST0430
     D                XSTAHM,XSTAHT,YSTAHM,YSTAHT,                       GUST0440
     E                HUBKP,HUBKTP,HUBKR,HUBKTR                          GUST0450
     F                ,AZETA,AZETAT,VZETA,VZETAT                         GUST0460
      COMMON /MANARO/ I,V,IND,NWAG,APRMT,ARBMT,AYBMT,BETAO(2),TDELT,     GUST0470
     1                BETAE(2),HGUSTE,HGUSTF,HGUSTW,VGUSTE,              GUST0480
     2                VGUSTW,YGUSTF,GFWD,GLAT,GVERT,                     GUST0490
     3                VXB,VZB,APD,VYB,ARD,AYD,                           GUST0500
     4                COLSTK,CYSTK1,CYSTK2,PEDAL,AYE,                    GUST0510
     5                APE,ARE,A1M,B1M,A1TR,B1TR,                         GUST0520
     6                XAR(2),YAR(2),ZAR(2),                              GUST0530
     7                VIMR,VITR,ZETA,ZETATR,HMR,HTR,                     GUST0540
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      8                TMR,TTR,QMX,QTR,YMRF,YTRF                          GUST0550
       REAL LNGTH1                                                        GUST0560
       DIMENSION XSTA(7),AGUST(7)                                         GUST0570
       XSTA(1)=SQRT(XX**2+YY**2)-XGUST                                    GUST0580
       CALL RATS (XAR(1),YAR(1),ZAR(1),AYE,APE,ARE,STA,BL,TV,1)           GUST0590
       XSTAHM=XX+STA                                                      GUST0600
       YSTAHM=YY+BL                                                       GUST0610
       CALL RATS (XAR(2),YAR(2),ZAR(2),AYE,APE,ARE,STA,BL,TV,1)           GUST0620
       XSTAHT=XX+STA                                                      GUST0630
       YSTAHT=YY+BL                                                       GUST0640
       CALL RATS (XAFIN,YAFIN,ZAFIN,AYE,APE,ARE,STA,BL,TV,1)              GUST0650
       XSTA(2)=SQRT((XX+STA)**2+(YY+BL)**2)-XGUST                         GUST0660
       CALL RATS (XAELE,0.,ZAELE,AYE,APE,ARE,STA,BL,TV,1)                 GUST0670
       XSTA(3)=SQRT((XX+STA)**2+(YY+BL)**2)-XGUST                         GUST0680
       CALL RATS (XAWG,0.,ZAWG,AYE,APE,ARE,STA,BL,TV,1)                   GUST0690
       XSTAW=SQRT((XX+STA)**2+(YY+BL)**2)-XGUST                           GUST0700
       K=7                                                                GUST0710
       IF(QWG.LT.Q) K=4                                                   GUST0720
       DO 208 M=1,4                                                       GUST0730
       AGUST(M)=0.                                                        GUST0740
       AGUST(M+3)=0.                                                      GUST0750
       BILL=M                                                             GUST0760
       IF(QWG.LT.Q) BILL=2.                                               GUST0770
  208 XSTA(M+3)=XSTAW+(.5-.25*BILL)*CWING                                 GUST0780
       GUSTYP=J                                                           GUST0790
       IF(J.EQ.10.OR.J.EQ.12) GO TO 224                                   GUST0800
       DO 207 M=1,K                                                       GUST0810
       IF(XSTA(M).GE.LNGTH1) GO TO 100                                    GUST0820
       IF(XSTA(M).LE.0.) GO TO 207                                        GUST0830
       AGUST(M)=XSTA(M)*RATE1                                             GUST0840
       GO TO 207                                                          GUST0850
  100 IF(XSTA(M).GE.STOP2) GO TO 101                                      GUST0860
       IF(XSTA(M).LE.START2) GO TO 102                                    GUST0870
       AGUST(M)=GMAXV3+XSTA(M)*RATE2                                      GUST0880
       GO TO 207                                                          GUST0890
  101 AGUST(M)=GMAXV                                                      GUST0900
       GO TO 207                                                          GUST0910
  102 AGUST(M)=GMAXV1                                                     GUST0920
  207 CONTINUE                                                            GUST0930
       GO TO 232                                                          GUST0940
  224 DO 206 M=1,K                                                        GUST0950
       IF(XSTA(M).GT.0.0.AND.XSTA(M).LT.LNGTH1)                           GUST0960
      1    AGUST(M)=GMAXV1*(SIN(XSTA(M)*PILGH1))**2                      GUST0970
       IF(XSTA(M).GT.START2.AND.XSTA(M).LT.STOP2)                         GUST0980
      1    AGUST(M)=GMAXV2*(SIN((XSTA(M)-START2)*PILGH1))**2             GUST0990
  206 CONTINUE                                                            GUST1000
  232 BGUSTW=AGUST(4)                                                     GUST1010
       IF(K.EQ.7) BGUSTW=.25*(AGUST(4)+AGUST(5)+AGUST(6)+AGUST(7))        GUST1020
       IF(J.GT.10) GO TO 233                                              GUST1030
       CALL RATS (0.,0.,BGUSTW,AYE,APE,ARE,HGUSTW,YGUSTW,VGUSTW,-1)      GUST1040
       CALL RATS (0.,0.,AGUST(3),AYE,APE,ARE,HGUSTE,TV,VGUSTE,-1)        GUST1050
       CALL RATS (0.,0.,AGUST(2),AYE,APE,ARE,HGUSTF,YGUSTF,TV,-1)        GUST1060
       CALL RATS (0.,0.,AGUST(1),AYE,APE,ARE,HGUST,YGUST,VGUST,-1)       GUST1070
       RETURN                                                             GUST1080
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```
      CALL RATS (BGUSTW,0.,0.,AYE,APE,ARE,HGUSTW,YGUSTW,VGUSTW,-1)        GUST1090
      CALL RATS (AGUST(3),0.,0.,AYE,APE,ARE,HGUSTE,TV,VGUSTE,-1)         GUST1100
      CALL RATS (AGUST(2),0.,0.,AYE,APE,ARE,HGUSTF,YGUSTF,TV,-1)         GUST1110
      CALL RATS (AGUST(1),0.,0.,AYE,APE,ARE,HGUST,YGUST,VGUST,-1)        GUST1120
      RETURN                                                             GUST1130
      END                                                                GUST1140
```

```
      SUBROUTINE INIT                                                   INIT0010
      COMMON /FORCE/ A(71)                                              INIT0020
      COMMON /STRIMA/ AY,VH,AGW,DT1(2),DT2(2),IXZ,                      INIT0030
     1                QMR,XXD,YYD,ZZD,ALGF,APFP,AYFP,                  INIT0040
     2                CGWL,COLL(6),CYCF(3),CYCL(3),                    INIT0050
     3                DIST,KCIT(20),PEDA(3),QMAX,                      INIT0060
     4                QMRS,TIM_,TMAX,XCIT(20,6),ALGEZ,                 INIT0070
     5                ALGE1,ALGE2,CGSTA,CPWIC,DIXIZ,                   INIT0080
     6                DIYIX,DIZIY,DTZMT,DTZM1,DTZT1,FTKTS,             INIT0090
     *                HUBKM(2,2),HUBKI(2,2),                           INIT0100
     7                KREAD,PIU30,TSTAB(14),ZMAX2,ZMAX3,               INIT0110
     8                ASECDL,CYPWIC,GFARAT,PSD550,                     INIT0120
     9                PSIST?,QXBRAK,RUDIND,ZDELT1,ZDELT2               INIT0130
      COMMON /STAMAN/ HL(2),XX,YY,AY1,GOV,KPD,QPC,QQQ,                 INIT0140
     1                RIY,APBG,ARBG,ASEP,AYBG,BWTC,                    INIT0150
     2               RC,BWTK,BWTM,CGBL,DPIX,DPIZ,                      INIT0160
     3                FHPT(2),R550,ALERT,AYDMX,DELT2,                  INIT0170
     4                DPIXZ,DTBWT,DWLCG,HDELT,HGUST,                   INIT0180
     5                HLTR1,HLTR2,ITORS,KTCTR,DMEGM,                   INIT0190
     6                PCDEL,QMRSA,RMASS,TRALT,TWDPI,VGUST,             INIT0200
     7                ISTOP,XAGUN,XAPYL,XARSP(2),YAGUN,                INIT0210
     8                YARSP(2),YGUST,ZAGUN,ZAPYL,ZARSP(2),             INIT0220
     9                DELT2R,DSTACG,EIMAST,GPRELD,HLPYLD,              INIT0230
     A                IBRAKE,OMEGMD,QBRAKE,BETAZS(2),                  INIT0240
     B                PCGDED,PCGMAX,PCRATE,PO1DTR,RDELT1,              INIT0250
     C                RDELT2,RITORS,TRIND2                             INIT0260
      COMMON /MANAL/  Q,AP,PED,QWG,TZM,T1M,T2M,                        INIT0270
     1                TZT,T1T,T2T,ALEL,CZET,PSDD,                      INIT0280
     2                SZET,TAXL,TAXR,XAWG,XLNK(16),ZAWG,               INIT0290
     3                ALCYP,ALFIN,ALLWG,ALRWG,CDELE,CDFIN,             INIT0300
     4                CDLWG,CDRWG,CLELE,CLFIN,CLLWG,CLRWG,CWING,       INIT0310
     5                CYCR1,CYCR2,CZET4,CZET6,CZET9,RANGE,             INIT0320
     6                SZET5,SZET7,SZET8,WGCOL,XAELE,XAFIN,             INIT0330
     7                XAFUS,XAJET,YAFIN,ZAELE,ZAFIN,ZAFUS,             INIT0340
     *                YAELE,YAFUS,YALWG,YARWG,YALJET,YARJET,           INIT0350
     8                ZAJET,ALECR1,ALGFPD,BDTTOM,CZET11,               INIT0360
     9                CZET12,CZET13,EIZETA,HALFPI,SZET10,              INIT0370
     A                XAPYLD,YGUSTW,ZAPYLD,ZFLWG1,ZFRWG1               INIT0380
     B                ,TZMS,T1MS,T2MS,TZTS,T1TS,T2TS,                  INIT0390
     C                CLOCK,FLOCK,XLOCK,TCLOCK                         INIT0400
      COMMON /ROMAN/  ZZ,VXS(2),VYS(2),VZS(2),BETA(12,2),              INIT0410
     *                T,PCC(2),COSE(7,7,2),BETAN(2),BETAX(2),BETAZ(2), INIT0420
     *                AIB(2),APDD,ARDD,AYDD,AIR(2),                    INIT0430
     1                DPSI(12,2),DTRR,NPSI(2),ZZTR,                    INIT0440
     2                BETAD(12,2),BNPSI(2),                            INIT0450
     3                COND2,GMAXV,RATE1,RATE2,STOP2,                   INIT0460
     4                THROT(2),TRIND,XGUST,BETAZD(2),GMAXV1,           INIT0470
     5                GMAXV2,GMAXV3,GUSTYP,HNPSIR(2),                  INIT0480
     6                HUBKPS,HUBKRS,HUBTPS,HUBTRS,                     INIT0490
     7                KONFIG,LNGTH1,PILGH1,PSIREF(2),                  INIT0500
     8                START2,XMOMLI(12,2),                             INIT0510
     9                RM,RTR,ORM,ORTR,T1MT,T1TT,                       INIT0520
     A                T2MT,T2TT,TZMT,TZTT,XMA1,XMA1T,                  INIT0530
     B                XMB1,XMB1T,AIBPM,AIBPT,AIBRM,AIBRT,              INIT0540
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C                 APTD,APTTD,ARTD,ARTTD,PSD,PSDT,                       INITC550
D                 XSTAHM,XSTAHT,YSTAHM,YSTAHT,                          INITC560
E                 HUBKP,HUBKTP,HUBKR,HUBKTR                             INITC570
F                 ,AZETA,AZETAT,VZETA,VZETAT                            INITC580
      COMMON /MANARO/ I,V,IND,NWAG,APBMT,ARBMT,AYBMT,BETAO(2),TOELT,    INIT0590
     1                BETAE(2),HGUSTE,HGUSTF,HGUSTW,VGUSTE,             INIT0600
     2                VGUSTW,VGUSTF,GFWD,GLAT,GVERT,                    INIT0610
     3                VXB,VZB,APO,VYB,ARO,AYO,                          INIT0620
     4                COLSTK,CYSTK1,CYSTK2,PEDAL,AYE,                   INIT0630
     5                APE,ARE,A1M,B1M,A1TR,B1TR,                        INIT0640
     6                XAR(2),YAR(2),ZAR(2),                             INIT0650
     7                VIMR,VITR,ZETA,ZETATR,HMR,HTR,                    INIT0660
     8                TMR,TTR,QMX,QTR,YMRF,YTRF                         INIT0670
      COMMON /TOPLOT/ AH(3),AL(3),EXIT,ICOM(49),IPSN,                   INIT0680
     1                NPART,NVARA,NVARB,NVARC,NSCALE                    INIT0690
     1                ,NVARS,NPRINT,NTIME                               INIT0700
      COMMON /FORY/   Y(4,150)                                          INIT0710
      DATA HEAD1/ '   MAIN     FWD    RIGHT     TAIL      AFT     LEFT '/ INIT0720
      DATA  DTRR1/57.2957795/                                           INIT0730
      DATA DTR /.1745329E-01/                                           INIT0740
      DIMENSION HEAD1(2,6),PAR(191)                                     INIT0750
      DO 78 J=1,7                                                       INIT0760
      PAR(J+135)=0.                                                     INIT0770
      PAR(J+142)=Y(1,J+106)*DTRR1                                       INIT0780
      PAR(J+149)=Y(1,J+31)*DTRR1                                        INIT0790
      PAR(J+156)=Y(1,J+17)*DTRR1                                        INIT0800
      PAR(J+163)=0.                                                     INIT0810
      PAR(J+170)=Y(1,J+113)*DTRR1                                       INIT0820
      PAR(J+177)=Y(1,J+38)*DTRR1                                        INIT0830
      PAR(J+184)=Y(1,J+24)*DTRR1                                        INIT0840
   78 CONTINUE                                                          INIT0850
      DO 91 N=1,2                                                       INIT0860
      NPSIN=NPSI(N)                                                     INIT0870
      IF(NPSIN.EQ.0.) GO TO 91                                          INIT0880
      K=28*N+107                                                        INIT0890
      DO 90 J=1,NPSIN                                                   INIT0900
      K=K+1                                                             INIT0910
      PAR(K)=(Y(1,N+6)+DPSI(J,N))*DTRR1                                 INIT0920
      IF(PAR(K).GE.360.) PAR(K)=PAR(K)-360.                             INIT0930
      IF(PAR(K).LT.0.) PAR(K)=PAR(K)+360.                               INIT0940
   90 CONTINUE                                                          INIT0950
   91 CONTINUE                                                          INIT0960
      DO 79 J=1,3                                                       INIT0970
      JJ=4-J                                                            INIT0980
      PAR(J+70)=Y(1,J+89)                                               INIT0990
      PAR(J+76)=Y(1,J+14)                                               INIT1000
      PAR(J+82)=Y(1,J+75)                                               INIT1010
      PAR(J+85)=Y(1,JJ+78)*DTRR1                                        INIT1020
      PAR(J+89)=Y(1,J)                                                  INIT1030
      PAR(J+92)=Y(1,JJ+3)*DTRR1                                         INIT1040
      PAR(J+96)=Y(1,J+84)*DTRR1                                         INIT1050
      PAR(J+99)=Y(1,J+ 9)*DTRR1                                         INIT1060
   79 CONTINUE                                                          INIT1070
      PAR(1)=APTD*DTRR                                                  INIT1080
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PAR(2)=ARTD*DTRR                                                    INIT1090
PAR( 3)=VXS(1)                                                      INIT1100
PAR(4)=Y(1,84)*DTRR                                                 INIT1110
PAR(5)=Y(1,107)*DTRR                                                INIT1120
PAR(6)=TMR                                                          INIT1130
PAR(7)=A1M*DTRR                                                     INIT1140
PAR(8)=B1M*DTRR                                                     INIT1150
PAR( 9)=VYS(1)                                                      INIT1160
PAR(10)=Y(1,9)*DTRR                                                 INIT1170
PAR(11)=Y(1,32)*DTRR                                                INIT1180
PAR(12)=HMR                                                         INIT1190
PAR(13)=VZS(1)                                                      INIT1200
PAR(14)=Y(1,7)*DTRR                                                 INIT1210
PAR(15)=Y(1,18)*DTRR                                                INIT1220
PAR(16)=YMRF                                                        INIT1230
PAR(17)=TZM*DTRR                                                    INIT1240
PAR(18)=T1M*DTRR                                                    INIT1250
PAR(19)=T2M*DTRR                                                    INIT1260
PAR(20)=BETA0(1)*DTRR                                               INIT1270
PAR(21)=ZETA*DTRR                                                   INIT1280
PAR(22)=QMX                                                         INIT1290
PAR(31)=TZMT*DTRR                                                   INIT1300
PAR(32)=T1MT*DTRR                                                   INIT1310
PAR(33)=T2MT*DTRR                                                   INIT1320
PAR(23)=PAR(31)-PAR(17)                                             INIT1330
PAR(24)=PAR(32)-PAR(18)                                             INIT1340
PAR(25)=PAR(33)-PAR(19)                                             INIT1350
PAR(26)=VIMR                                                        INIT1360
PAR(27)=PSD*PIU30                                                   INIT1370
PAR(28)=QMX*PSD550                                                  INIT1380
PAR(29)=BETAX(1)*DTRR                                               INIT1390
PAR(30)=HUBKP*DTR                                                   INIT1400
PAR(34)=BETAN(1)*DTRR                                               INIT1410
PAR(35)=HUBKR*DTR                                                   INIT1420
PAR(36)=APTTD*DTRR                                                  INIT1430
PAR(37)=ARTTD*DTRR                                                  INIT1440
PAR(38)=VXS(2)                                                      INIT1450
PAR(39)=PAR(4)*GEARAT                                               INIT1460
PAR(40)=Y(1,114)*DTRR                                               INIT1470
PAR(41)=TTR                                                         INIT1480
PAR(42)=A1TR*DTRR                                                   INIT1490
PAR(43)=B1TR*DTRR                                                   INIT1500
PAR(44)=VYS(2)                                                      INIT1510
PAR(45)=PAR(10)*GEARAT                                              INIT1520
PAR(46)=Y(1,39)*DTRR                                                INIT1530
PAR(47)=HTR                                                         INIT1540
PAR(48)=VZS(2)                                                      INIT1550
PAR(49)=Y(1,8)*DTRR                                                 INIT1560
PAR(50)=Y(1,25)*DTRR                                                INIT1570
PAR(51)=YTRF                                                        INIT1580
PAR(52)=TZT*DTRR                                                    INIT1590
PAR(53)=T1T*DTRR                                                    INIT1600
PAR(54)=T2T*DTRR                                                    INIT1610
PAR(55)=BETAC(2)*DTRR                                               INIT1620
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      PAR(56)=ZETATR*DTRR                                              INIT1630
      PAR(57)=QTR                                                      INIT1640
      PAR(66)=TZTT*DTRR                                                INIT1650
      PAR(67)=T1TT*DTRR                                                INIT1660
      PAR(68)=T2TT*DTRR                                                INIT1670
      PAR(58)=PAR(66)-PAR(52)                                          INIT1680
      PAR(59)=PAR(67)-PAR(53)                                          INIT1690
      PAR(60)=PAR(68)-PAR(54)                                          INIT1700
      PAR(61)=VITR                                                     INIT1710
      PAR(62)=PAR(27)*GEARAT                                           INIT1720
      PAR(63)=QTR*PSD550*GEARAT                                        INIT1730
      PAR(64)=BETAX(2)*DTRR                                            INIT1740
      PAR(65)=HUBKTP*QTR                                               INIT1750
      PAR(69)=BETAN(2)*DTRR                                            INIT1760
      PAR(70)=HUBKTR*QTR                                               INIT1770
      PAR(74)=DIST                                                     INIT1780
      PAR(75)=V*FTKTS                                                  INIT1790
      PAR(76)=AYFP*DTRR                                                INIT1800
      PAR(80)=-PAR(79)                                                 INIT1810
      PAR(81)=VH*FTKTS                                                 INIT1820
      PAR(82)=APFP*DTRR                                                INIT1830
      PAR(89)=Y(1,89)*DTRR1                                            INIT1840
      PAR(96)=Y(1,14)*DTRR1                                            INIT1850
      PAR(103)=CDLSTK                                                  INIT1860
      PAR(104)=CYSTK1                                                  INIT1870
      PAR(105)=ALLWG*DTRR                                              INIT1880
      PAR(106)=ALRWG*DTRR                                              INIT1890
      PAR(107)=ALEL*DTRR                                               INIT1900
      PAR(108)=ALFIN*DTRR                                              INIT1910
      PAR(109)=AY*DTRR                                                 INIT1920
      PAR(110)=CGSTA                                                   INIT1930
      PAR(111)=HGUST                                                   INIT1940
      PAR(112)=-GFWD                                                   INIT1950
      PAR(113)=CYSTK2                                                  INIT1960
      PAR(114)=CLLWG                                                   INIT1970
      PAR(115)=CLRWG                                                   INIT1980
      PAR(116)=CLELE                                                   INIT1990
      PAR(117)=CLFIN                                                   INIT2000
      PAR(118)=AP*DTRR                                                 INIT2010
      PAR(119)=CGBL                                                    INIT2020
      PAR(120)=YGUST                                                   INIT2030
      PAR(121)=GLAT                                                    INIT2040
      PAR(122)=PEDAL                                                   INIT2050
      PAR(123)=CDLWG                                                   INIT2060
      PAR(124)=CDRWG                                                   INIT2070
      PAR(125)=CDELE                                                   INIT2080
      PAR(126)=CDFIN                                                   INIT2090
      PAR(127)=CGWL                                                    INIT2100
      PAR(128)=VGUST                                                   INIT2110
      PAR(129)=GVERT                                                   INIT2120
      PAR(130)=TAXR                                                    INIT2130
      PAR(131)=OMRS                                                    INIT2140
      PAR(132)=OMR*PSD550                                              INIT2150
      PAR(133)=TAXL                                                    INIT2160
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      PAR(134)=OMRS*PSD550                                                  INIT2170
      PAR(135)=QBRAKE                                                       INIT2180
      WRITE (3) IPSN,T,PAR,A,XMB1,XMA1,XMB1T,XMA1T                          INIT2190
      TIME, 191 PAR-S, 75 A-S = 267 TOTAL                                   INIT2200
      NTIME=NTIME+1                                                         INIT2210
      IF(NTIME.GE.NPRINT) NTIME=0                                           INIT2220
      IF(NTIME.NE.0) RETURN                                                 INIT2230
      CALL TIMEX(TUSED,DTIME,TLEFT)                                         INIT2240
      WRITE(6,80) T,TUSED                                                   INIT2250
      WRITE (6,81) (HEAD1(J,KONFIG),J=1,2),(PAR(J),J=1,35)                  INIT2260
      WRITE (6,81) (HEAD1(J,KONFIG+3),J=1,2),(PAR(J),J=36,70)               INIT2270
      WRITE(6,82) (PAR(J),J=71,82)                                          INIT2280
      WRITE(6,83) (PAR(J),J=83,102)                                         INIT2290
      WRITE(6,84) (PAR(J),J=103,129)                                        INIT2300
      WRITE(6,85) (PAR(J),J=130,135)                                        INIT2310
      CALL WRFM                                                             INIT2320
      WRITE (6,86)                                                          INIT2330
      WRITE (6,87) (HEAD1(J,KONFIG),J=1,2),(PAR(J),J=136,163)               INIT2340
      WRITE (6,87) (HEAD1(J,KONFIG+3),J=1,2),(PAR(J),J=164,191)             INIT2350
      RETURN                                                                INIT2360
   80 FORMAT (1H1,10X,F8.3,3X,'SECONDS MANEUVER TIME',10X,                  INIT2370
     1        F8.3,3X,'MINUTES ELAPSED COMPUTING TIME',10X,                 INIT2380
     2        'L8,FT,DEG,SEC UNITS')                                        INIT2390
   81 FORMAT (1HO,49X,2A4,'ROTOR SHAFT REFERENCE'/                          INIT2400
     1        28X,'O/A1',6X,'P/B1',37X,'PSI',7X,'BETA',7X,'FORCES'/         INIT2410
     2        14X,'VELOCITY ',2F10.3,6X,'U ',F8.3,                          INIT2420
     3        6X,'ACCEL     ',2F10.3,6X,'THRUST  ',F10.3/                   INIT2430
     4        14X,'LOCATION ',2F10.3,6X,'V ',F8.3,                          INIT2440
     5        6X,'VELOCITY ',2F10.3,6X,'H-FORCE ',F10.3/                    INIT2450
     6        49X,'W ',F8.3,                                                INIT2460
     7        6X,'LOCATION ',2F10.3,6X,'Y-FORCE ',F10.3/                    INIT2470
     8        7X,'FROM',7X,'COLLEC F/A CYC LAT CYC'/                        INIT2480
     9        7X,'CONTROLS ',3F8.3,3X,'CONING ',F8.3,                       INIT2490
     A        3X,'M.TILT ',F9.3,3X,'TORQ ',F9.2,                            INIT2500
     B        3X,'FLAP. LIM.',6X,'HUB SPRINGS'/                             INIT2510
     C        7X,'OTHER     ',3F8.3,3X,'IND. V ',F8.3,                      INIT2520
     D        3X,'RPM     ',F9.3,3X,'HP    ',F9.2,                        INIT2530
     E        3X,'UPPER ',F7.3,3X,'F/A ',F8.1/                              INIT2540
     F        7X,'TOTAL     ',3F8.3,57X,'LOWER ',F7.3,                      INIT2550
     G        3X,'LAT ',F8.1)                                               INIT2560
   82 FORMAT (1HO,58X,'GROUND REFERENCE'/                                   INIT2570
     1        38X,'X',9X,'Y',9X,'Z',24X,'SPEED (KTS)  FLT PATH ANGLES'/     INIT2580
     2        22X,'VELOCITY  ',3F10.3,'  DISTANCE ',F8.1,                   INIT2590
     3        '  AIR ',F7.2,'  HEADING ',F8.3/                              INIT2600
     4        22X,'LOCATION  ',3F10.3,'  ALTITUDE ',F8.1,                   INIT2610
     5        '  GND ',F7.2,'  CLIMB   ',F8.3)                              INIT2620
   83 FORMAT (1HO,57X,'FUSELAGE REFERENCE'/                                 INIT2630
     1        20X,'U',9X,'V',9X,'W',9X,'P',9X,'Q',9X,'R',                   INIT2640
     2        7X,'BODWT',5X,'EULER ANGLES FROM GROUND'/                     INIT2650
     3        5X,'ACCEL',5X,7F10.3,18X,'PSI',6X,'THETA',6X,'PHI'/           INIT2660
     4        5X,'VELOCITY  ',7F10.3,3X,'VELOCITY  ',3F10.3/                INIT2670
     5        88X,'LOCATION  ',3F10.3)                                      INIT2680
   84 FORMAT (1HO,6X,'CONTROLS (PCT)'/                                      INIT2690
     1        7X,'COLSTK',5X,F7.2,8X,'L. WING  R. WING',                    INIT2700
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     2        4X,'ELE',4X,'FIN/RUD  FUSELAGE',7X,'C.G. LOC (IN)',       INIT2710
     3        6X,'GUST (CG)   G-S'/                                     INIT2720
     4        7X,'F/A CYCSTK ',F7.2,'  ATK ',4F9.3,                     INIT2730
     5        '  ATKY ',F8.3,'  STA. LINE ',F7.2,                       INIT2740
     6        '  FWD  ',F5.1,'  FWD  ',F5.2/                            INIT2750
     7        7X,'LAT CYCSTK ',F7.2,'  CL  ',4F9.3,                     INIT2760
     8        '  ATKP ',F8.3,'  B. LINE   ',F7.2,                       INIT2770
     9        '  LAT  ',F5.1,'  LAT  ',F5.2/                            INIT2780
     A        7X,'PEDAL',6X,F7.2,'  CD  ',4F9.3,,17X,'W. LINE   ',F7.2, INIT2790
     B          '  VERT ',F5.1,'  VERT ',F5.2)                          INIT2800
  95 FORMAT (1HO,34X,'JET THRUST',13X,'ENGINE'/                         INIT2810
     1        35X,'RIGHT/CENTER ',F8.1,'  TORQUE   ',                   INIT2820
     2        F9.1,'  TOTAL HP RQD ',6X,F8.1/                          INIT2830
     3        35X,'LEFT',9X,F8.1,'  SHAFT HP ',F9.1,                   INIT2840
     4        '  ROTOR BRAKE TORQUE ',F8.1)                            INIT2850
  96 FORMAT (1H1)                                                       INIT2860
  97 FORMAT (1HO,59X,2A4,'ROTOR'//                                      INIT2870
     1        48X,'BLADE 1   BLADE 2   BLADE 3   BLADE 4   BLADE 5',    INIT2880
     2        3X, 'BLADE 6   BLADE 7'/                                  INIT2890
     3        18X,'AZIMUTH LOCATION          ',7F10.3/                  INIT2900
     4        18X,'FLAPPING ACCEL WRT MAST   ',7F10.3/                  INIT2910
     5        18X,'FLAPPING VELOCITY WRT MAST ',7F10.3/                 INIT2920
     6        18X,'FLAPPING LOCATION WRT MAST ',7F10.3)                 INIT2930
      END                                                               INIT2940
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      SUBROUTINE INRO (ZETAR,BH,BAIB,XMR,Q,B,N)                          INRO0010
      COMMON /STRIAB/ D(21),DT(21),E(79),F(10),X(10),                    INRO0020
     1                DL,DM,DN,DX,DY,DZ,IK,IY,IZ,PD(10,11),              INRO0030
     2                DTR,EPD,ERR(10),KM1,RHO,                           INRO0040
     3                R12,SPD(6,6,3),XBW(21),XEL(14),                    INRO0050
     4                XER(7),XFC(28),XFN(7),XFS(35),                     INRO0060
     5                XGN(7),XIT(21),XRM(49),XTR(49),                    INRO0070
C                  XMR MUST HAVE ITS NAME CHANGED HERE TO AVOID CONFLICT INRO0080
C                  WITH ARGUMENT                                        INRO0090
     6                XWG(21),YMR(21),YTR(21),YWG(21),                   INRO0100
     7                YEL(21),YFN(21),BLCG,DAMP,DEPD(10),                INRO0110
     8                EPDS,EPDX(10),MASS,QSV1,TMRS,TTRS,                 INRO0120
     9                WLCG,XCON(63),XJET(14),XMIN,AYEFP,                 INRO0130
     A                BETAES(2),CNPCD,DHADO,DYBDR,GUESS,                 INRO0140
     B                NPASS,PDPHI(10,11),STACG,TZERD,                    INRO0150
     C                XMAST,DHADAO,DODCOL,DTRRSO,DYBDBR,                 INRO0160
     D                ENGRPM,4XPASS,PSD30P,TRIND1,XLIMIT                 INRO0170
      COMMON /STAMAN/ HL(2),XX,YY,AY1,GOV,KPD,QPC,000,                   INRO0180
     1                RIY,APBG,ARBG,ASEP,AYBG,BWTC,                      INRO0190
     2              RC,BWTK,BWTM,CGBL,DPIX,DPIZ,                         INRO0200
     3                FHPT(2),R550,ALERT,AYDMX,DELT2,                    INRO0210
     4                OPIXZ,DTBWT,DWLCG,HDELT,HGUST,                     INRO0220
     5                HLTR1,HLTR2,ITORS,KTCTR,OMEGM,                     INRO0230
     6                PCDEL,QMRSA,RMASS,TRALT,TWOPI,VGUST,               INRO0240
     7                ISTOP,XAGUN,XAPYL,XARSP(2),YAGUN,                  INRO0250
     8                YARSP(2),YGUST,ZAGUN,ZAPYL,ZARSP(2),               INRO0260
     9                DELT2R,DSTACG,E1MAST,GPRELD,HLPYLD,                INRO0270
     A                IBRAKE,OMEGMD,QBRAKE,BETAZS(2),                    INRO0280
     B                PCGOED,PCGMAX,PCRATE,P01DTR,ROELT1,                INRO0290
     C                RDELT2,RITORS,TRIND2                               INRO0300
      COMMON /ROMAN/  ZZ,VXS(2),VYS(2),VZS(2),BETA(12,2),                INRO0310
     *                T,PCC(2),COSE(7,7,2),BETAN(2),BETAX(2),BETAZ(2),   INRO0320
     *                AIB(2),APDD,ARDO,AYDD,AIR(2),                      INRO0330
     1                DPSI(12,2),DTRR,NPSI(2),ZZTR,                      INRO0340
     2                BETAO(12,2),BNPSI(2),                              INRO0350
     3                COND2,GMAXV,RATE1,RATE2,STDP2,                     INRO0360
     4                THROT(2),TRIND,XGUST,BETAZD(2),GMAXV1,             INRO0370
     5                GMAXV2,GMAXV3,GUSTYP,HNPSIR(2),                    INRO0380
     6                HUBKPS,HUBKRS,HUBTPS,HUBTRS,                       INRO0390
     7                KONFIG,LNGTH1,PILGH1,PSIREF(2),                    INRO0400
     8                START2,XMOMLI(12,2),                               INRO0410
     9                R(2),OR(2),T1(2),                                  INRO0420
     A                T2(2),TZR(2),XMA(2),                               INRO0430
     B                XMB(2),AIBP(2),AIBR(2),                            INRO0440
     C                APDR(2),ARDR(2),PSIO(2),                           INRO0450
     D                XSTAH(2),YSTAH(2),                                 INRO0460
     E                HUBKPR(2),HUBKRP(2)                                INRO0470
     F                ,AZETAR(2),VZETAR(2)                               INRO0480
      COMMON /ROSTAR/ AM(2),CT,PI,XB(2),ALT,AOR(2),EXH(2),               INRO0490
     1                NXR(2),RBH(2),SWC(2),UHS,CDHB(2),LROT(2),          INRO0500
     2                RAIB(2),RTRP(2),TAIR(14),CONEK(2),OCAFR(2),FVIND,  INRO0510
     *                NVARD,                                             INRO0520D
     3                SWKR1(2),SWKR2(2),TIP18(2),TIP38(2),               INRO0530
     4                TWIST(20,2),CLRADK(2),DELTA3(2),                   INRO0540
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     5                LAMBDA(2),UPGUST,URGUST,UTGUST,WRDTDR,                 INRO0550
     6                ER(2),ERX(2),                                          INRO0560
     7                XLIMAX(2),XLIMIN(2)                                    INRO0570
      DIMENSION XMR(49),HUBKS(2,2),ZETAR(2),BH(2),BAIB(2),B(2)              INRO0580
     1         ,DROT(21,2)                                                   INRO0590
      EQUIVALENCE (HUBKS(1,1),HUBKPS),(DRDT(1,1),O(1))                      INRO0600
      VXS(N)=0.                                                             INRO0610
      VYS(N)=0.                                                             INRO0620
      VZS(N)=0.                                                             INRO0630
      LROT(N)=0                                                             INRO0640
      ARDR(N)=0.                                                            INRO0650
      APDR(N)=0.                                                            INRO0660
      AIBP(N)=0.                                                            INRO0670
      AIBR(N)=0.                                                            INRO0680
C         BETAZ = INPUT PRE-CONE ANGLE                                      INRO0690
C         BETAE = DEFLECTION FROM BETAZ DUE TO BLADE BENDING                INRO0700
C         BETAO = CONING ANGLE = BETAZ + BETAE                              INRO0710
      AZETAR(N)=0.                                                          INRO0720
      BETAZD(N)=0.                                                          INRO0730
      VZETAR(N)=0.                                                          INRO0740
      PSIREF(N)=0.                                                          INRO0750
      B(N)=XMR(1)                                                           INRO0760
      NXR(N)=XMR(2)                                                         INRO0770
      NPSI(N)=12                                                            INRO0780
      R(N)=XMR(4)                                                           INRO0790
      IF(R(N).NE.0.) GO TO 12                                               INRO0800
      R(N)=1.                                                               INRO0810
      B(N)=0.                                                               INRO0820
   12 CONTINUE                                                              INRO0830
      C=XMR(5)*R12                                                          INRO0840
      CONEK(N) = XMR(6)*DTRR                                                INRO0850
      BETAN(N)=XMR(7)*DTR                                                   INRO0860
      XARSP(N)=STACG-XMR(8)*R12                                             INRO0870
      YARSP(N)=XMR(9)*R12-BLCG                                              INRO0880
      ZARSP(N)=WLCG-XMR(10)*R12                                             INRO0890
      ZETAR(N)=XMR(11)*DTR                                                  INRO0900
      HL(N)=XMR(12)                                                         INRO0910
      FHPT(N)=XMR(16)                                                       INRO0920
      HUBKPR(N)=XMR(17)*DTRR                                                INRO0930
      HUBKRR(N)=XMR(18)*DTRR                                                INRO0940
      SWKR1(N)=XMR(19)*DTR                                                  INRO0950
      EXH(N)=XMR(21)                                                        INRO0960
      BETAZ(N)=XMR(22)*DTR                                                  INRO0970
      PCC(N)=XMR(23)                                                        INRO0980
      IF(N.EQ.2) PCC(N)=XMR(23)*TRIND                                       INRO0990
      DELTA3(N)=TAN(XMR(24)*DTR)                                            INRO1000
      COMB(N)=XMR(25)                                                       INRO1010
      CLRADK(N)=XMR(26)*TWOPI*C/(57.3*(C+4.*R(N)))                          INRO1020
      DCAFR(N)=XMR(27)                                                      INRO1030
      NRAD = NXR(N)                                                         INRO1040
      DO 11 I=1,NRAD                                                        INRO1050
      TWIST(I,N)=-XMR(I+28)*DTR                                             INRO1060
   11 CONTINUE                                                              INRO1070
      SWKR2(N)=SWKR1(N)                                                     INRO1080
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      DR(N)=PSID(N)*R(N)                                                INRO1090
      BETAZS(N)=BETAZ(N)                                                INRO1100
      BETAX(N)=2.*BETAZ(N)-BETAN(N)                                     INRO1110
      RTRP(N)=1./(TWOPI*RHO*R(N)**2)                                    INRO1120
      XB(N)=.05                                                         INRO1130
      IF(NRAD.NE.0) XB(N)=1./NRAD                                       INRO1140
      TIP18(N)=.125-.00625*NRAD                                         INRO1150
      TIP38(N)=3.*TIP18(N)                                              INRO1160
      AOR(N)=(EXH(N)/R(N))**2                                           INRO1170
      BH(N)=.5*B(N)                                                     INRO1180
      IF(XMR(16).NE.0.) XMR(15)=XMR(16)                                 INRO1190
      IH=20.*XMR(15)/R(N)                                               INRO1200
      RSQ=R(N)**2                                                       INRO1210
      HNPSI=2.*Q*C*R(N)*XB(N)                                           INRO1220
      R10=.015*RSQ                                                      INRO1230
C         R10 = IN * FT                                                 INRO1240
      R09=.233082IE-04*RSQ*R(N)                                         INRO1250
C         R09 = IN * FT * SEC**2                                        INRO1260
      DD=DROT(21,N)/R(N)                                                INRO1270
      AIB(N)=1307.511*DD                                                INRO1280
      CFX=2.052239*DD                                                   INRO1290
      RI=0.                                                             INRO1300
      RIWK=0.                                                           INRO1310
      K=21                                                              INRO1320
      RO=20.75                                                          INRO1330
      DO 57 I=1,20                                                      INRO1340
      K=K-1                                                             INRO1350
      RO=RO-1.                                                          INRO1360
      ROWK=RO*DROT(K,N)                                                 INRO1370
      CFX=CFX+RIWK+ROWK                                                 INRO1380
      AIB(N)=AIB(N)+RO*ROWK+RI*RIWK                                     INRO1390
      RI=RO-.5                                                          INRO1400
      RIWK=RI*DROT(K,N)                                                 INRO1410
      IF(K.EQ.IH) GO TO 58                                              INRO1420
   57 CONTINUE                                                          INRO1430
   58 CONTINUE                                                          INRO1440
      AM(N)=CFX*R10                                                     INRO1450
      AIB(N)=AIB(N)*R09                                                 INRO1460
      BAIB(N)=B(N)*AIB(N)                                               INRO1470
      AIR(N) =BH(N)*AIB(N)                                              INRO1480
      IF(B(N).LE.2.) AIR(N) =2.*AIB(N)                                  INRO1490
      RBH(N)=0.                                                         INRO1500
      IF(BH(N).NE.0.) RBH(N)=AIR(N)/BH(N)                               INRO1510
      RAIB(N)=0.                                                        INRO1520
      IF(AIR(N).NE.0.) RAIB(N)=1./AIR(N)                                INRO1530
      ECE=FHPT(N)*AM(N)/32.16                                           INRO1540
      CALL NOPSIO (HNPSI,BH,N)                                          INRO1550
      ECEI=ECE*RAIB(N)                                                  INRO1560
      HUBKS(1,N)=ECEI                                                   INRO1570
      HUBKS(2,N)=ECEI                                                   INRO1580
      IF(FHPT(N).EQ.0.) GO TO 48                                        INRO1590
      BETAZ(N)=0.                                                       INRO1600
      HUBKPR(N)=ECE*PSID(N)**2                                          INRO1610
      HUBKRR(N)=HUBKPR(N)                                               INRO1620
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 48 CONTINUE                                                              INR01630
    IF(B(N).EQ.0.) RETURN                                                 INR01640
    NPSIN=B(N)                                                            INR01650
    DO 10 I=1,NPSIN                                                       INR01660
    COSE(I,I,N)=1.                                                        INR01670
    IF(I.EQ.NPSIN) GO TO 10                                               INR01680
    I1=I+1                                                                INR01690
    DO 9 K=I1,NPSIN                                                       INR01700
    IF(ECE.NE.0.) GO TO 8                                                 INR01710
    COSE(I,K,N)=DCOS(6.283185307D00/NPSIN*(I-K))                          INR01720
    COSE(K,I,N)=COSE(I,K,N)                                               INR01730
    GO TO 9                                                               INR01740
  8 CONTINUE                                                              INR01750
    COSE(I,K,N)=0.                                                        INR01760
    COSE(K,I,N)=0.                                                        INR01770
  9 CONTINUE                                                              INR01780
 10 CONTINUE                                                              INR01790
    RETURN                                                                INR01800
    END                                                                   INR01810
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      SUBROUT(NE ITRIM(LPASS)                                                 ITRI0010
      COMMON /STRIAB/ D(21),DT(21),EI79),F(10),X(10),                         ITRI0020
     1                DL,DM,DN,DX,DY,DZ,IX,IY,IZ,PD(10,11),                  ITRI0030
     2                DTR,EPD,ERR(10),KM1,RHO,                               ITRI0040
     3                R12,SPDI6,6,3),XBWI21),XEL(14),                        ITRI0050
     4                XER(7),XFCI28),XFN(7),XFS(35),                         ITRI0060
     5                XGN(7),XITI21),XMR(49),XTRI49),                        ITRI0070
     6                XWG(21),YMR(21),YTR(21),YWGI21),                       ITRI0080
     7                YEL(21),YFNI21),BLCG,DAMP,DEPD(10),                    ITRI0090
     8                EPDS,EPDX(10),MASS,QSV1,TMRS,TTRS,                     ITRI0100
     9                WLCG,XCONI63),XJET(14),XMIN,AYEFP,                     ITRI0110
     A                BETAES(2),CNPCD,DHADQ,DYBDR,GUESS,                     ITRI0120
     B                NPASS,PDPHI(10,11),STACG,TZERO,                        ITRI0130
     C                XMAST,DHADAQ,DODCOL,OTRRSQ,DYBDBR,                     ITRI0140
     D                ENGRPM,MXPASS,PSD30P,TRIND1,XLIMIT                     ITRI0150
      COMMON /MANAL/   Q,AP,PED,QWG,TZM,T1M,T2M,                             ITRI0160
     1                 TZT,T1T,T2T,ALEL,CZET,PSDD,                           ITRI0170
     2                 SZET,TAXL,TAXR,XAWG,XLNKI16),ZAWG,                    ITRI0180
     3                 ALCYP,ALFIN,ALLWG,ALRWG,CDELE,CDFIN,                  ITRI0190
     4                 CDLWG,CDRWG,CLELF,CLFIN,CLLWG,CLRWG,CWING,            ITRI0200
     5                 CYCR1,CYCR2,CZET4,CZET6,CZET9,RANGE,                  ITRI0210
     6                 SZET5,SZET7,SZET8,WGCOL,XAFLE,XAFIN,                  ITRI0220
     7                 XAFUS,XAJET,YAFIN,ZAELE,ZAFIN,ZAFUS,                  ITRI0230
     *                 YAELF,YAFUS,YALWG,YARWG,YALJET,YARJET,                ITRI0240
     8                 ZAJET,ALECR1,ALGFPD,BOTTOM,CZET11,                    ITRI0250
     9                 CZET12,CZET13,EIZETA,HALFPI,SZET10,                   ITRI0260
     A                 XAPYLO,YGUSTW,ZAPYLD,ZFLWG1,ZFRWG1                    ITRI0270
     B                 ,TZMS,T1MS,T2MS,TZTS,T1TS,T2TS,                       ITRI0280
     C                 CLOCK,FLOCK,XLOCK,TCLOCK                              ITRI0290
      COMMON /MANARO/  (,V,(ND,NWAG,APBMT,ARBMT,AYBMT,BETAO(2),TDELT,        ITRI0300
     1                 BETAE(2),HGUSTE,HGUSTF,HGUSTW,VGUSTE,                 ITRI0310
     2                 VGUSTW,YGUSTF,GFWD,GLAT,GVERT,                        ITRI0320
     3                 VXB,VZB,APD,VYB,ARD,AYD,                              ITRI0330
     4                 COLSTK,CYSTK1,CYSTK2,PEDAL,AYE,                       ITRI0340
     5                 APE,ARE,A1M,B1M,A1TR,B1TR,                            ITRI0350
     6                 XAR(2),YARI2),ZARI2),                                 ITRI0360
     7                 VIMP,VITR,ZETA,ZETATR,HMR,HTR,                        ITRI0370
     8                 TMR,TTR,QMX,QTR,YMRF,YTRF                             ITRI0380
      COMMON /STANRO/  J,W,ITM,VHS(2),LINK,QELE,VROT(2),                     ITRI0390
     1                 VSND,YFIN(2),ZFEL(2),A1BALI2),                        ITRI0400
     2                 B1BAL(2),COND1,SWING,PILGH2,PWGEL1,                   ITRI0410
     3                 BM,BTR,PMOMM,PMOMT,RMOMM,RMOMT                        ITRI0420
      COMMON /TOPLOT/  AH(3),AL(3),EXIT,ICOMI49),IPSN,                       ITRI0430
     1                 NPART,NVARA,NVARB,NVARC,NSCALE                        ITRI0440
     1                 ,NVARS,NPRINT,NTIME                                   ITRI0450
      COMMON /FORY/    Y(4,150)                                              ITRI0460
      DIMENSION VAR(11)                                                      ITRI0470
      EQUIVALENCE (VARI1),COLSTK)                                            ITRI0480
      KOUNT=11                                                               ITRI0490
      IF(BTR.EQ.0.) KOUNT=9                                                  ITRI0500
      IF(BM.EQ.0.) KOUNT=7                                                   ITRI0510
      (F(XFC(23).NE.0.) KOUNT=7                                              ITRI0520
      IF(ITM.NE.0) KOUNT=7                                                   ITRI0530
      KM1=KOUNT-1                                                            ITRI0540
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      NPASS=0                                                                ITRI0550
      KPASS=-1                                                               ITRI0560
      CALL TIMEX (TUSED,DTIME,TLEFT)                                         ITRI0570
    5 NPASS=NPASS+1                                                          ITRI0580
      KPASS=KPASS+1                                                          ITRI0590
      IF(KPASS.EQ.LPASS) KPASS=0                                             ITRI0600
      IF(COND1.NE.0.) WRITE (6,210) NPASS                                    ITRI0610
      J=1                                                                    ITRI0620
      BETAE(1)=BETAES(1)                                                     ITRI0630
      BETAE(2)=BETAES(2)                                                     ITRI0640
      TMR=TMRS                                                               ITRI0650
      TTR=TTRS                                                               ITRI0660
      CALL AJACO8                                                            ITRI0670
      IF(EXIT.NE.0.) GO TO 61                                                ITRI0680
      BETAES(1)=BETAE(1)                                                     ITRI0690
      BETAES(2)=BETAE(2)                                                     ITRI0700
      TMRS=TMR                                                               ITRI0710
      TTRS=TTR                                                               ITRI0720
      DO 40 K=1,KM1                                                          ITRI0730
   40 PD(K,KOUNT)=-F(K)                                                      ITRI0740
      DO 71 K=1,KM1                                                          ITRI0750
      IF(ABS(F(K)).GT.DAMP) GO TO 72                                         ITRI0760
   71 CONTINUE                                                               ITRI0770
      CALL DAMPER                                                            ITRI0780
   72 CONTINUE                                                               ITRI0790
      DO 73 K=1,KM1                                                          ITRI0800
      IF(ABS(F(K)).GT.ERR(K)) GO TO 75                                       ITRI0810
   73 CONTINUE                                                               ITRI0820
      GO TO 170                                                              ITRI0830
   75 CONTINUE                                                               ITRI0840
      IF(KPASS.GT.0) GO TO 56                                                ITRI0350
      J=2                                                                    ITRI0860
      CALL JACOBI                                                            ITRI0870
      IF(EXIT.NE.0.) GO TO 61                                                ITRI0880
      IF(KOUNT.EQ.7)                                                         ITRI0890
     1   CALL RATS (Y(1,90),Y(1,91),Y(I,92),AYE,APE,ARE,VXB,VYB,VZB,-1)      ITRI0900
      IF(KOUNT.EQ.11) CALL PDZ(PD,AYEFP)                                     ITRI0910
      IF(COND1.NE.0.) CALL WRVP (2,VAR,KM1,PD,TAXL,TAXR)                     ITRI0920
      DO 47 I=1,KM1                                                          ITRI0930
      PD(I,10)=-PD(I,10)                                                     ITRI0940
   47 CONTINUE                                                               ITRI0950
   56 CONTINUE                                                               ITRI0960
      DO 48 J=1,KOUNT                                                        ITRI0970
      DO 48 I=1,KM1                                                          ITRI0980
   48 PDPHI(I,J)=PD(I,J)                                                     ITRI0990
      CALL SOLVE                                                             ITRI1000
      IF(EXIT.NE.0.) GO TO 10                                                ITRI1010
      CALL RATI(X,EPDX,XLIMIT,VAR)                                           ITRI1020
      DO 86 I=6,11                                                           ITRI1030
      IF(ABS(VAR(I)).GT.HALFPI) GO TO 61                                     ITRI1040
   86 CONTINUE                                                               ITRI1050
      IF(NPASS.LT.MXPASS)GO TO 5                                             ITRI1060
   61 EXIT=1.                                                                ITRI1070
  170 CONTINUE                                                               ITRI1080
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      CALL PARA (W,COND1)                                                ITRI1090
      RETURN                                                             ITRI1100
   10 CONTINUE                                                           ITRI1110
      WRITE (6,11)                                                       ITRI1120
      RETURN                                                             ITRI1130
   11 FORMAT (1HO,'THE PARTIAL DERIVATIVE MATRIX IS SINGULAR.'/          ITRI1140
     1           ' THIS IS PROBABLY CAUSED BY ONE OF THE CONTROLS BEING ITRI1150
     2UNCONNECTED.')                                                    ITRI1160
  210 FORMAT (1H1/1H ,50X,'***** START OF ITERATION 'I3,' *****')        ITRI1170
      END                                                                ITRI1180
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      SUBROUTINE ITRDT (N)                                                  ITR00010
      COMMON /ANDDIT/ A1,B1,XK,XY,VI2,VI4,APDM,APFM,ARDM,ARFM,              ITR00020
     1                AYFM,RDTJ,XK43,XLIM,CBFAC,                           ITR00030
     2                GDISK(120),NOPSI,TANA1,TANB1,                        ITR00040
     3                TANT1,TANT2,DCAFXK,IPRINT,NORADL,                    ITR00050
     4                SHEARL(12),SHEARO(12),SHEARR(12),                    ITR00060
     5                XMOML(12),XMOMO(12)                                  ITR00070
     6                ,APOS,AROS,PFAC,RFAC,APOBS,ARDBS                     ITR00080
      COMMON /ROMAN/  ZZ,VXS(2),VYS(2),VZS(2),BETA(12,2),                  ITR00090
     *                T,PCC(2),COSE(7,7,2),BETAN(2),BETAX(2),BETAZ(2),     ITR00100
     *                AIB(2),APDD,ARDO,AYDO,AIR(2),                        ITR00110
     1                DPSI(12,2),DTRR,NPSI(2),ZZTR,                        ITR00120
     2                BETAD(12,2),BNPSI(2),                                ITR00130
     3                COND2,GMAXV,RATE1,RATE2,STOP2,                       ITR00140
     4                THROT(2),TRIND,XGUST,BETAZD(2),GMAXV1,               ITR00150
     5                GMAXV2,GMAXV3,GUSTYP,HNPSIR(2),                      ITR00160
     6                HUBKPS,HUBKRS,HUBTPS,HUBTRS,                         ITR00170
     7                KONFIG,LNGTH1,PILGH1,PSIREF(2),                      ITR00180
     8                START2,XMOMLI(12,2),                                 ITR00190
     9                R(2),QR(2),T1(2),                                    ITR00200
     A                T2(2),TZR(2),XMA(2),                                 ITR00210
     B                XMB(2),AIBP(2),AIBR(2),                              ITR00220
     C                APDR(2),ARDR(2),PSID(2),                             ITR00230
     D                XSTAH(2),YSTAH(2),                                   ITR00240
     F                HUBKPR(2),HUBKRR(2)                                  ITR00250
     F                ,AZETAR(2),VZETAR(2)                                 ITR00260
      COMMON /MANARD/ I,V,IND,NWAG,APBMT,ARBMT,AYBMT,BETAO(2),TOELT,        ITR00270
     1                BETAF(2),HGUSTE,HGUSTF,HGUSTW,VGUSTE,                ITR00280
     2                VGUSTW,YGUSTF,GFWD,GLAT,GVERT,                       ITR00290
     3                VXB,VZB,APD,VYR,ARD,AYO-                             ITR00300
     4                COLSTK,CYSTK1,CYSTK2,PEDAL,AYE,                      ITR00310
     5                APE,ARE,A1M,B1M,A1TR,B1TR,                           ITR00320
     6                XAR(2),YAR(2),ZAR(2),                                ITR00330
     7                VIR(2),ZETAR(2),HFORCE(2),                           ITR00340
     8                THRUST(2),TORQUE(2),YFORCE(2)                        ITR00350
      COMMON /STANRD/ J,M,ITM,VHS(2),LINK,QELE,VROT(2),                     ITR00360
     1                VSND,YFIN(2),ZFEL(2),A1BAL(2),                       ITR00370
     2                B1BAL(2),COND1,SWING,PILGH2,PWGEL1,                  ITR00380
     3                B(2),PMOM(2),RMOM(2)                                 ITR00390
      COMMON /ROSTAR/ AM(2),CT,PI,XB(2),ALT,AOR(2),EXH(2),                  ITR00400
     1                NXR(2),RBH(2),SWC(2),UHS,CDHB(2),LROT(2),            ITR00410
     2                RAIB(2),RTRP(2),TAIR(14),CONFK(2),DCAFR(2),FVIND,    ITR00420
     *                NVARD,                                               ITR00430
     3                SWKR1(2),SWKR2(2),TIP18(2),TIP38(2),                 ITR00440
     4                TWIST(20,2),CLRADK(2),DELTA3(2),                     ITR00450
     5                LAMBDA(2),UPGUST,URGUST,UTGUST,WRDTOR,               ITR00460
     6                ER(2),ERX(2),                                        ITR00470
     7                XLIMAX(2),XLIMIN(2)                                  ITR00480
      COMMON /TOPLOT/ AH(3),AL(3),EXIT,ICOM(49),IPSN,                       ITR00490
     1                NPART,NVARA,NVARB,NVARC,NSCALE                       ITR00500
     1                ,NVARS,NPRINT,NTIME                                  ITR00510
      REAL LAMBDA                                                           ITR00520
      DIMENSION AA(12,5),HEAD(2),HEAD1(11,2),HEAD2(4,5)                     ITR00530
      EQUIVALENCE (AA(1,1),SHEARL(1))                                       ITR00540
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      DATA HEAD/ 4H*MAIN,4HTAIL/                                          ITR00550
      DATA HEAD1/' ROTOR FLAP CORRECTION EXCEEDS 90 DEGREES    ROTOR BAL ITR00560
     1ANCE EXCEEDS ALLOWABLE ERROR    '/                                  ITR00570
      DATA HEAD2/'   AIRLOAD LIFT    AIRLOAD DRAG     RADIAL DRAG  FLAPP ITR00580
     1ING MOMENT INPLANE MOMENT'/                                        ITR00590
      IF(BETAX(N).EQ.BETAN(N)) ITM=0                                      ITR00600
      KBAL=0                                                              ITR00610
      TZRN=TZR(N)                                                         ITR00620
      NITER=0                                                             ITR00630
  287 KK=2                                                                ITR00640
      IF(ITM.NE.0) GO TO 21                                               ITR00650
      IF(I.EQ.2.AND.LINK.EQ.4) GO TO 21                                   ITR00660
      IF(J.EQ.1.AND.LINK.EQ.2) GO TO 21                                   ITR00670
      KK=0                                                                ITR00680
      GO TO 288                                                           ITR00690
   22 KK=KK-1                                                             ITR00700
   21 CONTINUE                                                            ITR00710
      VIRS=VIR(N)                                                         ITR00720
      VIR(N)=0.                                                           ITR00730
      LAMBDA(N)=VZS(N)                                                    ITR00740
      IF(THRUST(N).EQ.0..OR.OR(N).EQ.0.) GO TO 289                        ITR00750
      CT=THRUST(N)*RTRP(N)                                                ITR00760
      CALL VIND (N,EXIT)                                                  ITR00770
      IF(EXIT.NE.0.) RETURN                                               ITR00780
  289 CONTINUE                                                            ITR00790
      DVIR=V(R(N)-VIRS                                                    ITR00800
      IF(ABS(DVIR).GT.FVIND) VIR(N)=VIR(N)+SIGN(FV(ND,DVIR)               ITR00810
      V(R(N) = .5*(VIR(N) + VIRS)                                         ITR00820
  288 CONTINUE                                                            ITR00830
      XY=SQRT(V(4+VIR(N)**2)-VI2                                          ITR00840
      XY=SQRT(AMAX1(0.,XY))*OCAFXK*VIR(N)                                 ITR00850
      ITER=-1                                                             ITR00860
   15 NITER=NITER+1                                                       ITR00870
      ITER=ITER+1                                                         ITR00880
      IF(ITER.EQ.4) ITER=0                                                ITR00890
      IF(ITM.EQ.0) GO TO 204                                              ITR00900
      NDA1=0                                                              ITR00910
      IF(XL(M.LT.XLIM(N(N)) XLIM=XLIMIN(N)                                ITR00920
      EPDD=.5*XLIM                                                        ITR00930
      EPDDR=1./EPDD                                                       ITR00940
      GO TO 25                                                            ITR00950
  204 NDA1=3                                                              ITR00960
   25 NDA1=NDA1+1                                                         ITR00970
      IF(LINK.EQ.4) GO TO 26                                              ITR00980
      TANA1=TAN(A1)                                                       ITR00990
      TANB1=TAN(B1)                                                       ITR01000
      COSB1=COS(B1)                                                       ITR01010
      PFAC=APOBS/((COS(A1))**2*COSB1)+PSID(N)*TANB1                       ITR01020
      RFAC=ARDBS/COSB1**2-PSID(N)*TANA1                                   ITR01030
      IF(LINK.EQ.3) GO TO 26                                              ITR01040
      BETAO(N)=BETAZ(N)+BETAE(N)                                          ITR01050
      TZR(N)=TZRN+BETAE(N)*PCC(N)                                         ITR01060
   26 CONTINUE                                                            ITR01070
      XMA(N)=0.                                                           ITR01080
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      XMB(N)=0.                                                          ITR01090
      PMOM(N)=0.                                                         ITR01100
      RMOM(N)=0.                                                         ITR01110
      THRUST(N)=0.                                                       ITR01120
      TORQUE(N)=0.                                                       ITR01130
      HFORCE(N)=0.                                                       ITR01140
      YFORCE(N)=0.                                                       ITR01150
      CALL DOROT(N)                                                      ITR01160
      IF(EXIT.NE.0.) RETURN                                              ITR01170
      THRUST(N)=THRUST(N)*BNPSI(N)                                       ITR01180
      TORQUE(N)=TORQUE(N)*BNPSI(N)                                       ITR01190
      HFORCE(N)=HFORCE(N)*BNPSI(N)                                       ITR01200
      YFORCE(N)=YFORCE(N)*BNPSI(N)                                       ITR01210
      XMA(N)=XMA(N)-AIBP(N)                                              ITR01220
      XMB(N)=XMB(N)+AIBR(N)                                              ITR01230
      IF(COND2.EQ.C.) GO TO 60                                           ITR01240
      DO 59 K=1,12                                                       ITR01250
      DO 58 L=1,5                                                        ITR01260
      IF(L.EQ.4) GO TO 58                                                ITR01270
      AA(K,L)=AA(K,L)*BNPSI(N)                                           ITR01280
   58 CONTINUE                                                           ITR01290
   59 CONTINUE                                                           ITR01300
      WRITE (6,106) ((HEAD2)M,K),M=1,4),(AA)M,K),M=1,12),K=1,5)          ITR01310
   60 CONTINUE                                                           ITR01320
      IF(COND1.LT.1.5) GO TO 67                                          ITR01330
      A1DEG=A1*DTRR                                                      ITR01340
      B1DEG=B1*DTRR                                                      ITR01350
      WRITE (6,104) N,NDA1,A1DEG,B1DEG,XMA)N),XMB)N)                     ITR01360
     1       ,PMOM(N),RMOM(N),AIBP(N),AIBR(N)                            ITR01370
   67 GO TO (64,61,62,1),NDA1                                            ITR01380
   64 BASEA=XMA(N)                                                       ITR01390
      BASEB=XMB)N)                                                       ITR01400
      IF(ABS(XMA(N)).LE.ERX(N).AND.ABS)XMB(N)).LE.ERX(N)) XLIM=EPDD      ITR01410
      IF(ABS(XMA(N)).GT.ER(N)) GO TO 66                                  ITR01420
      IF)ABS(XMB(N)).GT.ER(N)) GO TO 66                                  ITR01430
      KBAL=1                                                             ITR01440
      GO TO 1                                                            ITR01450
   66 CONTINUE                                                           ITR01460
      IF(ITER.GT.0) GO TO 68                                             ITR01470
      A1=A1+EPDD                                                         ITR01480
      GO TO 25                                                           ITR01490
   61 A1=A1-EPDD                                                         ITR01500
      B1=B1+EPDD                                                         ITR01510
      PDAA=(XMA(N)-BASEA)*EPDDR                                          ITR01520
      PDBA=(XMB(N)-BASEB)*EPDDR                                          ITR01530
      GO TO 25                                                           ITR01540
   62 B1=B1-EPDD                                                         ITR01550
      PDAB=(XMA(N)-BASEA)*EPDDR                                          ITR01560
      PDBB=(XMB(N)-BASEB)*EPDDR                                          ITR01570
      DENOM=PDAA*PDBB-PDAB*PDBA                                          ITR01580
   68 CONTINUE                                                           ITR01590
      XNA=BASEB*PDAB-BASEA*PDBB                                          ITR01600
      XNB=BASEA*PDBA-BASEB*PDAA                                          ITR01610
      A=999.                                                             ITR01620
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      IF(DENOM.EQ.0.) GO TO 70                                          ITR01630
      DA1=XNA/DENOM                                                     ITR01640
      DB1=XNB/DENOM                                                     ITR01650
      IF(COND1.GE.1.5) WRITE 16,105) PDAA,PDBA,PDAB,PDBB,DENOM,XNA,XNB, ITR01660
     1        DA1,DB1,EPDD,XLIM                                          ITR01670
   63 A=ABS(DA1)                                                        ITR01680
      BB=ABS(DB1)                                                       ITR01690
      IF(A.LT.XLIM.AND.BB.LT.XLIM) GO TO 65                             ITR01700
      IF(A.GT.PI.OR.BB.GT.PI) GO TO 70                                  ITR01710
      DA1=DA1*.5                                                        ITR01720
      DB1=DB1*.5                                                        ITR01730
      GO TO 63                                                          ITR01740
   65 A1=A1+DA1                                                         ITR01750
      B1=B1+DB1                                                         ITR01760
      KK=2                                                              ITR01770
      IF(NITER.LT.ITM) GO TO 15                                         ITR01780
      IF(KBAL.EQ.0) GO TO 70                                            ITR01790
      KBAL=2                                                            ITR01800
      NDA1=3                                                            ITR01810
      GO TO 25                                                          ITR01820
   70 JJ=1                                                              ITR01830
      IF(A.LT.XLIM.AND.BB.LT.XLIM) JJ=2                                 ITR01840
      WRITE(6,101) HEAD(N),(HEAD1(J,JJ),J=1,11)                         ITR01850
      EXIT=1.                                                           ITR01860
      RETURN                                                            ITR01870
    1 IF(KBAL.NE.2) GO TO 4                                             ITR01880
      K=J-1                                                             ITR01890
      WRITE 16,102) K                                                   ITR01900
      GO TO 3                                                           ITR01910
    4 CONTINUE                                                          ITR01920
      IF(KK.EQ.0) GO TO 2                                               ITR01930
      IF(LINK.LT.4) GO TO 22                                            ITR01940
    2 IF(ITM.EQ.0) GO TO 3                                              ITR01950
      IF(ABS(XMA(N)).GT.ER(N).OR.ABS(XMB(N)).GT.ER(N)) GO TO 297        ITR01960
    3 CONTINUE                                                          ITR01970
      TZR(N)=TZRN                                                       ITR01980
      RETURN                                                            ITR01990
  101 FORMAT (1HO,12A4)                                                 ITR02000
  102 FORMAT (1*CWARNING. THE PARTIAL DERIVATIVE MATRIX MAY BE IN ERROR*)ITR02010
  104 FORMAT (1HO,2I5,6G15.7/(11X,6G15.7/))                             ITR02020
  105 FORMAT (1HO,8G15.7)                                               ITR02030
  106 FORMAT (1HO,57X,4A4//6E20.5/6E20.5)                               ITR02040
      END                                                               ITR02050
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      SUBROUTINE IVAR (EXIT,LINK,TAXL,TAXR,PILGH2,AIM,BIM,AITR,BITR)     IVAR0010
      COMMON /STRIMA/ AY,VH,AGW,DT1(2),DT2(2),IXZ,                      IVAR0020
     1                QMR,XXD,YYD,ZZD,ALGF,APFP,AYFP,                   IVAR0030
     2                CGWL,COLL(6),CYCF(4),CYCL(3),                     IVAR0040
     3                DIST,KCIT(20),PEDA(3),QMAX,                       IVAR0050
     4                QMPS,TIME,TMAX,XCIT(20,6),ALGFZ,                  IVAR0060
     5                ALGF1,ALGF2,CGSTA,CPWIC,DIXIZ,                    IVAR0070
     6                DIYIX,DIZIY,DTZMT,DTZM1,DTZT1,ETKTS,              IVAR0080
     *                HUBKM(2,2),HUBKT(2,2),                            IVAR0090
     7                KREAD,PIU30,TSTAR(14),ZMAX2,ZMAX3,                IVAR0100
     8                ASECOL,CYPWIC,GEARAT,PSDSS,                       IVAR0110
     9                PSISTP,QXBRAK,RUDIND,ZDELT1,ZDELT2                IVAR0120
      COMMON /ROMAN/  ZZ,VXS(2),VYS(2),VZS(2),BETA(12,2),               IVAR0130
     *                T,PCC(2),COSE(7,7,2),BETAN(2),BETAX(2),BETAZ(2),  IVAR0140
     *                AIR(2),APDD,APDP,AYDD,AIR(2),                     IVAR0150
     1                DPSI(12,2),DTPR,NPSI(2),ZZTR,                     IVAR0160
     2                BETAD(12,2),BNPSI(2),                             IVAR0170
     3                CDN02,GMAXV,RATE),RATE2,STOP2,                    IVAR0180
     4                THROT(2),TRIND,XGOST,BETAZD(2),GMAXV1,            IVAR0190
     5                GMAXV2,GMAXV3,GUSTYP,HNPSIR(2),                   IVAR0200
     6                HUBKPS,HUBKRS,HUBTPS,HUBTRS,                      IVAR0210
     7                KONFIG,LNGTH1,PILGH1,PSIREF(2),                   IVAR0220
     8                START2,XMOMLI(12,2),                              IVAR0230
     9                RM,RTR,ORM,ORTR,TIMT,TITT,                        IVAR0240
     1                T2MT,T2TT,TZMT,TZTT,XMA),XMAIT,                   IVAR0250
     2                XMB1,XMBIT,AIRRM,AIRRT,AIBRM,AIBRT,               IVAR0260
     3                APTD,APTT),APTD,APTTD,PSD,PSDT,                   IVAR0270
     4                XSTAHM,XSTAHT,YSTAHM,YSTAHT,                      IVAR0280
     5                HUBKP,HUBKTP,HUBKR,HUBKTR                         IVAR0290
     6                ,AZETA,AZETAT,VZETA,VZETAT                        IVAR0300
      DATA DTR,HALFPI,PI,TWOPI /.174533E-01,1.570796,3.141593,6.283185/IVAR0310
      REAL LNGTH),LNGTH2                                                IVAR0320
      DIMENSION HUBK(2,2),TAX(2),PSID(2)                                IVAR0330
      EQUIVALENCE (HUBK(),1),HUBKP),(PSID(1),PSD)                       IVAR0340
      XDELIM(X1,X2,X3)=AMAX)(X1,AMIN1(X2,X3))                           IVAR0350
      TAX(1)=TAXL                                                       IVAR0360
      TAX(2)=TAXR                                                       IVAR0370
      DO 220 L=1,KREAD                                                  IVAR0380
      J=KCIT(L)                                                         IVAR0390
      IF(J.LT.1.OR.J.GT.31) GO TO 201                                   IVAR0400
      IF(LINK.EQ.1) GO TO 221                                           IVAR0410
      IF(J.EQ.13) GO TO 209                                             IVAR0420
      IF(J.EQ.14) GO TO 210                                             IVAR0430
      IF(J.EQ.21) GO TO 219                                             IVAR0440
      IF(J.EQ.22) GO TO 219                                             IVAR0450
      GO TO 220                                                         IVAR0460
  201 CONTINUE                                                          IVAR0470
      WRITE (6,102) J,(XCIT(L,K),K=1,6)                                 IVAR0480
      IF(J.GT.8) GO TO 221                                              IVAR0490
      GO TO (231,232,233,234,220,236,237,238),J                         IVAR0500
  231 DA=100./COLL(1)                                                   IVAR0510
      GO TO 239                                                         IVAR0520
  232 DA=100./CYCF(1)                                                   IVAR0530
      GO TO 239                                                         IVAR0540
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233 DA=100./CYCL(1)                                                    IVAR0550
    GO TO 239                                                          IVAR0560
234 DA=100./PEDA(1)                                                    IVAR0570
    GO TO 239                                                          IVAR0580
236 DA=DTR                                                             IVAR0590
    GO TO 239                                                          IVAR0600
237 DA=1./PIU30                                                        IVAR0610
239 XCIT(L,2)=XCIT(L,2)*DA                                             IVAR0620
    XCIT(L,5)=XCIT(L,5)*DA                                             IVAR0630
    IF(XCIT(L,3).EQ.0.) GO TO 220                                      IVAR0640
    IF(XCIT(L,4).GE.XCIT(L,3).AND.XCIT(L,6).GE.XCIT(L,4)) GO TO 220    IVAR0650
    XCIT(L,4)=9999.                                                    IVAR0660
    XCIT(L,6)=9999.                                                    IVAR0670
    GO TO 220                                                          IVAR0680
221 IF(J.GT.12) GO TO 222                                              IVAR0690
    XGUST=XCIT(L,1)                                                    IVAR0700
    GMAXV1=XCIT(L,2)                                                   IVAR0710
    LNGTH1=XCIT(L,3)                                                   IVAR0720
    START2=XCIT(L,4)+LNGTH1                                            IVAR0730
    LNGTH2=XCIT(L,5)                                                   IVAR0740
    GMAXV2=XCIT(L,6)                                                   IVAR0750
    STOP2=START2+LNGTH2                                                IVAR0760
    IF(J.EQ.10.OR.J.EQ.12) GO TO 223                                   IVAR0770
    RATE1=0.                                                           IVAR0780
    IF(LNGTH1.NE.0.) RATE1=GMAXV1/LNGTH1                               IVAR0790
    RATE2=0.                                                           IVAR0800
    IF(LNGTH2.NE.0.) RATE2=GMAXV2/LNGTH2                               IVAR0810
    GMAXV=GMAXV1+GMAXV2                                                IVAR0820
    GMAXV3=GMAXV1-START2*RATE2                                         IVAR0830
    GO TO 220                                                          IVAR0840
223 PILGH1=0.                                                          IVAR0850
    IF(LNGTH1.NE.0.) PILGH1=PI/LNGTH1                                  IVAR0860
    PILGH2=0.                                                          IVAR0870
    IF(LNGTH2.NE.0.) PILGH2=PI/LNGTH2                                  IVAR0880
    GO TO 220                                                          IVAR0890
222 K=J-12                                                             IVAR0900
    GO TO (220,220,211,212,213,214,215,216,220,220,280,220,220,220,    IVAR0910
   1       211,282,283,284,286),K                                      IVAR0920
209 XCIT(L,6)=XCIT(L,2)*OMR                                            IVAR0930
    GO TO 220                                                          IVAR0940
210 INDIC=XCIT(L,2)+.01                                                IVAR0950
    IF(INDIC.NE.2) GO TO 220                                           IVAR0960
    INDIC=XCIT(L,6)+.01                                                IVAR0970
    IF(INDIC.LT.1.OR.INDIC.GT.2) GO TO 2013                            IVAR0980
    XCIT(L,5)=TAX(INDIC)                                               IVAR0990
    XCIT(L,2)=1.                                                       IVAR1000
    GO TO 220                                                          IVAR1010
211 XCIT(L,2)=XCIT(L,2)*DTR                                            IVAR1020
    XCIT(L,3)=XCIT(L,3)/PEDA(3)                                        IVAR1030
    XCIT(L,4)=XCIT(L,4)/PEDA(3)                                        IVAR1040
    GO TO 220                                                          IVAR1050
212 IF(XCIT(L,2).EQ.0.) XCIT(L,2)=9999.                                IVAR1060
    XCIT(L,5)=0.                                                       IVAR1070
    IF(XCIT(L,4).NE.0.) XCIT(L,5)=XCIT(L,3)/XCIT(L,4)                  IVAR1080
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      GO TO 220                                                          IVAR1090
  213 XCIT(L,2)=XCIT(L,2)*DTR                                            IVAR1100
      XCIT(L,5)=XCIT(L,5)*DTR                                            IVAR1110
      XCIT(L,4)=HALFPI/(HALFP)-XCIT(L,5))                                IVAR1120
      XCIT(L,6)=-XCIT(L,6)*XCIT(L,4)/PIU30                               IVAR1130
      GO TO 220                                                          IVAR1140
  214 CONTINUE                                                           IVAR1150
      XCIT(L,2)=XCIT(L,2)/PIU30                                          IVAR1160
      PSISTP=XCIT(L,3)*DTR                                               IVAR1170
      QXBRAK=XCIT(L,1)                                                   IVAR1180
      GO TO 220                                                          IVAR1190
  215 CONTINUE                                                           IVAR1200
      XCIT(L,2)=XCIT(L,2)/CYCF(3)                                        IVAR1210
      XCIT(L,3)=XCIT(L,3)/CYCF(3)                                        IVAR1220
      XCIT(L,4)=XCIT(L,4)/CYCF(3)                                        IVAR1230
      XCIT(L,5)=XCIT(L,5)*DTR                                            IVAR1240
      GO TO 220                                                          IVAR1250
  217 CONTINUE                                                           IVAR1260
      XCIT(L,4)=XCIT(L,4)*DTR                                            IVAR1270
      XCIT(L,5)=XCIT(L,5)*DTR                                            IVAR1280
      GO TO 211                                                          IVAR1290
  218 CONTINUE                                                           IVAR1300
      IF(XCIT(L,6).EQ.0.) GO TO 217                                      IVAR1310
      XCIT(L,4)=AIM                                                      IVAR1320
      XCIT(L,5)=BIM                                                      IVAR1330
      GO TO 211                                                          IVAR1340
  219 CONTINUE                                                           IVAR1350
      IF(XCIT(L,6).EQ.0.) GO TO 217                                      IVAR1360
      XCIT(L,4)=AITR                                                     IVAR1370
      XCIT(L,5)=BITR                                                     IVAR1380
      GO TO 211                                                          IVAR1390
  216 XCIT(L,2)=XCIT(L,2)*TWOPI                                          IVAR1400
      XCIT(L,3)=XCIT(L,3)*XCIT(L,2)                                      IVAR1410
      K=XCIT(L,5)+.1                                                     IVAR1420
      IF(K.LT.1.OR.K.GT.5) GO TO 2013                                    IVAR1430
      GO TO (271,272,273,274,275),K                                      IVAR1440
  280 CONTINUE                                                           IVAR1450
      N=XCIT(L,1)+.1                                                     IVAR1460
      HUBKM(1,N)=1.E+20                                                  IVAR1470
      HUBKM(2,N)=1.E+20                                                  IVAR1480
      XCIT(L,3)=XCIT(L,3)/PIU30                                          IVAR1490
      DRPM=XCIT(L,4)/PIU30-XCIT(L,3)                                     IVAR1500
      XCIT(L,2)=XCIT(L,2)*DTRR                                           IVAR1510
      IF(DRPM.EQ.0.) GO TO 281                                           IVAR1520
      HUBKM(1,N)=(HUBK(N,1)-XCIT(L,2))/DRPM                              IVAR1530
      HUBKM(2,N)=(HUBK(N,2)-XCIT(L,2))/DRPM                              IVAR1540
  281 CONTINUE                                                           IVAR1550
      HUBKI(1,N)=XCIT(L,2)-HUBKM(1,N)*XCIT(L,3)                          IVAR1560
      HUBKI(2,N)=XCIT(L,2)-HUBKM(2,N)*XCIT(L,3)                          IVAR1570
      XCIT(L,3)=HUBK(N,1)                                                IVAR1580
      XCIT(L,4)=HUBK(N,2)                                                IVAR1590
      HUBK(N,1)=XDELIM(XCIT(L,3),XCIT(L,2),                              IVAR1600
     1                 HUBKM(1,N)*PSIO(N)+HUBKI(1,N))                    IVAR1610
      HUBK(N,2)=XDELIM(XCIT(L,3),XCIT(L,2),                              IVAR1620
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     1                    HUBKM(2,N)*PSID(N)+HUBKI(2,N))                    IVAR1630
      GO TO 220                                                             IVAR1640
  282 CONTINUE                                                              IVAR1650
      N=XCIT(L,1)+.1                                                        IVAR1660
      XCIT(L,5)=1.E+20                                                      IVAR1670
      XCIT(L,3)=XCIT(L,3)/PIU30                                             IVAR1680
      DRPM=XCIT(L,4)/PIU30-XCIT(L,3)                                        IVAR1690
      XCIT(L,2)=XCIT(L,2)*DTR                                               IVAR1700
      IF(DRPM.NE.0.) XCIT(L,5)=(BETAN(N)-XCIT(L,2))/DRPM                    IVAR1710
      XCIT(L,4)=XCIT(L,2)-XCIT(L,5)*XCIT(L,3)                               IVAR1720
      XCIT(L,3)=BETAN(N)                                                    IVAR1730
      XCIT(L,6)=0.                                                          IVAR1740
      GO TO 220                                                             IVAR1750
  283 CONTINUE                                                              IVAR1760
      IF(XCIT(L,5).LE.0..OR.XCIT(L,5).GT.15.) XCIT(L,5)=15.                 IVAR1770
      XCIT(L,6)=0.                                                          IVAR1780
      GO TO 220                                                             IVAR1790
  284 CONTINUE                                                              IVAR1800
      DO 285 K=3,5                                                          IVAR1810
      XCIT(L,K)=XCIT(L,K)*DTRR                                              IVAR1820
  285 CONTINUE                                                              IVAR1830
      IF(XCIT(L,6).LT..5) XCIT(L,6)=.5                                      IVAR1840
      XCIT(L,6)=XCIT(L,6)*DTR                                               IVAR1850
      GO TO 220                                                             IVAR1860
  286 CONTINUE                                                              IVAR1870
      IF(XCIT(L,3).LE.XCIT(L,1)) XCIT(L,3)=9999.                            IVAR1880
      IF(XCIT(L,5).LE.XCIT(L,3)) XCIT(L,5)=99999.                           IVAR1890
      GO TO 220                                                             IVAR1900
  271 CONTINUE                                                              IVAR1910
      XCIT(L,3)=XCIT(L,3)*100./COLL(1)                                      IVAR1920
      GO TO 220                                                             IVAR1930
  272 XCIT(L,3)=XCIT(L,3)*100./CYCF(1)                                      IVAR1940
      GO TO 220                                                             IVAR1950
  273 XCIT(L,3)=XCIT(L,3)*100./CYCL(1)                                      IVAR1960
      GO TO 220                                                             IVAR1970
  274 XCIT(L,3)=XCIT(L,3)*100./PEDAL(1)                                     IVAR1980
      GO TO 220                                                             IVAR1990
  275 CONTINUE                                                              IVAR2000
      XCIT(L,3)=XCIT(L,3)*DTR                                               IVAR2010
  220 CONTINUE                                                              IVAR2020
      RETURN                                                                IVAR2030
 2013 WRITE (6,2014) L,J                                                    IVAR2040
      EXIT=1.                                                               IVAR2050
      RETURN                                                                IVAR2060
  108 FORMAT (1H ,25X,I10,6F10.3)                                           IVAR2070
 2014 FORMAT (1HO,'CHECK PART 2 DATA CARD ',I2,' J CODE IS ',I2)            IVAR2080
      END                                                                   IVAR2090
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      SUBROUTINE JACOBI                                                 JAC00010
      COMMON /STRIAB/ D(21),DT(21),F(79),F(10),X(10),                   JAC00020
     1                DL,DM,DN,DX,DY,DZ,IX,IY,IZ,PD(10,11),            JAC00030
     2                DTR,EPD,ERR(10),KM1,KM0,                          JAC00040
     3                R12,SPD(6,6,3),XBW(21),XEL(14),                   JAC00050
     4                XFR(7),XFC(28),XFN(7),XFS(35),                    JAC00060
     5                XGN(7),XIT(21),XMR(49),XTR(49),                   JAC00070
     6                XWG(21),YMR(21),YTR(21),YWG(21),                  JAC00080
     7                YEL(21),YFN(21),BLCG,DAMP,DEPD(10),               JAC00090
     8                EPDS,EPDX(10),MASS,OSV1,TMRS,TTRS,                JAC00100
     9                WLCG,XCON(63),XJET(14),XMIN,AYEEP,                JAC00110
     A                BETAES(2),CNPCO,DHADO,DYBDR,GUESS,                JAC00120
     B                NPASS,PDPHI(10,11),STACG,TZERO,                   JAC00130
     C                XMAST,DHADAO,DODCOL,DTRRSQ,DYBDBR,                JAC00140
     D                ENGRDM,MXPASS,PSD30P,TRIND1,XLIMIT                JAC00150
      COMMON /MANARO/ I,V,IND,NWAG,APSMT,ARBMT,AYBMT,BETAO(2),TDELT,    JAC00160
     1                BETAE(2),HGUSTF,HGUSTF,HGUSTW,VGUSTF,             JAC00170
     2                VGUSTW,YGUSTF,GFWD,GLAT,GVERT,                    JAC00180
     3                VXB,VZB,APD,VYR,ARD,AYD,                          JAC00190
     4                COLSTK,CYSTK1,CYSTK2,PEDAL,AYE,                   JAC00200
     5                APE,ARE,B1M,B1M,B1TP,B1TR,                        JAC00210
     6                XAR(2),YAR(2),ZAR(2),                             JAC00220
     7                VIMR,VITR,ZETA,ZETATR,HMR,HTR,                    JAC00230
     8                TMR,TTR,OMX,OTR,YMRF,YTRF                         JAC00240
      COMMON /TOPLOT/ AH(3),AL(3),EXIT,ICOM(49),IPSN,                   JAC00250
     1                NPART,NVARA,NVARR,NVARC,NSCALE                    JAC00260
      COMMON /KVARTR/ KVAR(10)                                          JAC00270
      DIMENSION VAR(11)                                                 JAC00280
      EQUIVALENCE              (VAR (1),COLSTK)                         JAC00290
      DO 55 L=1,KM1                                                     JAC00300
      BETAE(1)=BETAES(1)                                                JAC00310
      BETAE(2)=BETAES(2)                                                JAC00320
      TMR=TMPS                                                          JAC00330
      TTR=TTPS                                                          JAC00340
      VAR(KVAR(L))=VAR(KVAR(L))+DEPD(L)                                 JAC00350
      IF(L.GT.1) VAR(KVAR(L-1))=VAR(KVAR(L-1))-DEPD(L-1)                JAC00360
      CALL AJACOB                                                       JAC00370
      IF(EXIT.NE.0.) RETURN                                             JAC00380
      IF(L.EQ.1) DODCOL=(.5*(OMX+OTR)-OSV1)/DEPD(1)                     JAC00390
      DO 41 K=1,KM1                                                     JAC00400
   41 PD(K,L  )=(F(K)+PD(K,KM1+1))/EPD                                  JAC00410
   55 CONTINUE                                                          JAC00420
      VAR(KVAR(KM1))=VAR(KVAR(KM1))-DEPD(KM1)                           JAC00430
      RETURN                                                            JAC00440
      END                                                               JAC00450
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      SUBROUTINE LAMODE (V,QWG,ZFW,SWING)                                LAMD0010
      COMMON /STRIAB/ D(21),DT(21),E(79),F(10),X(10),                    LAMD0020
     1                DL,DM,DN,DX,DY,DZ,IX,IY,IZ,PD(10,11),              LAMD0030
     2                DTR,EPD,ERR(10),KM1,RHO,                           LAMD0040
     3                R12,SPD(6,6,3),XBW(21),XEL(14),                    LAMD0050
     4                XER(7),XFC(28),XFN(7),XFS(35),                     LAMD0060
     5                XGN(7),XIT(21),XMR(49),XTR(49),                    LAMD0070
     6                XWG(21),YMR(21),YTR(21),YWG(21),                   LAMD0080
     7                YEL(21),YFN(21),BLCG,XDAMP,DEPD(10),               LAMD0090
                                                                         LAMD0100
                     DAMP MUST HAVE ITS NAME CHANGED HERE TO AVOID       LAMD0110
                     CONFLICT WITH COMMON /TRONIC/                       LAMD0120
                                                                         LAMD0130
     8                EPDS,EPDX(10),MASS,OSV1,TMAS,TTRS,                 LAMD0140
     9                WLCG,XCON(63),XJET(14),XMIN,AYEFP,                 LAMD0150
     A                BETAES(2),CNPCD,DHADQ,DYBDR,GUESS,                 LAMD0160
     B                NPASS,PDPHI(10,11),STACG,TZERO,                    LAMD0170
     C                XMAST,DHADAQ,DQDCDL,DTRRSQ,DYBDBR,                 LAMD0180
     D                ENGRPM,MXPASS,PSD3OP,TRIND1,XLIMIT                 LAMD0190
      COMMON /TRONIC/ UU(6),VV(6),TAU(22),DAMP(22),NUMRTS,GAINB,         LAMD0200
     1                INDEX,STGAIN(6),TSTAR,CDELTD,SLOT(3,9)             LAMD0210
      DIMENSION PLMODE(6),FLMODE(6),THLFDB(6),IZERON(6),                 LAMD0220
     1       FANG2(6),ROOOT(2,3),       ZLNT1(6),FANG1(6),ZLNT2(6)      LAMD0230
      DIMENSION UDSLOT(11,3),HEAD(2),KS(3),LS(2)                         LAMD0240
      DATA HEAD/'    NON-'/,KS/2,6,4/,LS/3,4/                            LAMD0250
      REAL IX,    IZ,MASS                                                LAMD0260
      COMPLEX ROOOT                                                      LAMD0270
      WRITE (6,556)                                                      LAMD0280
      DO 333 J=1,3                                                       LAMD0290
      DO 333 I=1,9                                                       LAMD0300
  333 SLOT(J,I)=0.0                                                      LAMD0310
      DO 806 I=1,4                                                       LAMD0320
      PLMODE(I)=.0                                                       LAMD0330
      FLMODE(I)=.0                                                       LAMD0340
      THLFDB(I)=.0                                                       LAMD0350
      IZERON(I)=0                                                        LAMD0360
  806 CONTINUE                                                           LAMD0370
      TSTAR=SWING/(2.*V)                                                 LAMD0380
      SLOT(1,2)=MASS                                                     LAMD0390
      SLOT(1,3)=-SPD(4,4,1)                                              LAMD0400
      SLOT(1,5)=-SPD(5,4,1)/V                                            LAMD0410
      SLOT(1,6)=-ZFW/V                                                   LAMD0420
      SLOT(1,9)=MASS-SPD(6,4,1)/V                                        LAMD0430
      SLOT(2,3)=-SPD(4,5,1)                                              LAMD0440
      SLOT(2,4)=IX/V                                                     LAMD0450
      SLOT(2,5)=-SPD(5,5,1)/V                                            LAMD0460
      SLOT(2,8)=-XFS(11)/V                                               LAMD0470
      SLOT(2,9)=-SPD(6,5,1)/V                                            LAMD0480
      SLOT(3,3)=-SPD(4,6,1)                                              LAMD0490
      SLOT(3,4)=SLOT(2,9)                                                LAMD0500
      SLOT(3,5)=-SPD(5,6,1)/V                                            LAMD0510
      SLOT(3,8)=IZ/V                                                     LAMD0520
      SLOT(3,9)=-SPD(6,6,1)/V                                            LAMD0530
      WRITE (6,557) HEAD(1)                                              LAMD0540
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      WRITE (6,555) ((SLOT(I,J),J=1,9),PD(2,3),PD(2,4),(SLOT(2,J),J=1,9),LAM00550
     1              PD(6,3),PD(6,4),(SLOT(3,J),J=1,9),PD(4,3),PD(4,4))    LAM00560
      WRITE (6,557) HEAD(2)                                               LAM00570
      DIV1=2.*OMG*V                                                       LAM00580
      DIV2=DIV1*SWING                                                     LAM00590
      CALL NDSLOT (DIV1,DIV2,TSTAR,PD,SLOT,1),KS,LS,UDSLOT,TSTAR)        LAM00600
      WRITE (6,555) UDSLOT                                                LAM00610
      WRITE(6,727)                                                        LAM00620
      CALL SRT                                                            LAM00630
      INDEX=6                                                             LAM00640
      CALL ELEC (GA(NB)                                                   LAM00650
      DO 807 I=1,NUMRTS                                                   LAM00660
      IF(UU(I).EQ..0.AND.VV(I).EQ..0) GO TO 899                           LAM00670
      IF(VV(I).EQ..0)GO TO 85)                                            LAM00680
      PLMODE(I)=6.2832/ABS(VV(I))                                         LAM00690
      FLMODE(I)=1./PLMODE(I)                                              LAM00700
   85 IF(UU(I).EQ.0.) GO TO 899                                           LAM00710
      THLFDB(I)=.69315/ABS(UU(I))                                         LAM00720
      GO TO 807                                                           LAM00730
  899 IZERON(I)=1                                                         LAM00740
  807 CONTINUE                                                            LAM00750
      DO 465 I=1,NUMRTS                                                   LAM00760
      IF(IZERON(I).NE.0) GO TO 465                                        LAM00770
      RELP=UU(I)*SLOT(1,2) +SLOT(1,3)                                     LAM00780
      ZPRT=VV(I)*SLOT(1,2)                                                LAM00790
      ROOT(1,1)=CMPLX(RELP,ZPRT)                                          LAM00800
      ROOT(1,2)=CMPLX(SLOT(1,9),.0)                                       LAM00810
      RELP= -( UU(I)*SLOT(1,5) +SLOT(1,6)          )                      LAM00820
      ZPRT= -VV(I))*SLOT(1,5)                                             LAM00830
      ROOT(1,3)=CMPLX(RELP,ZPRT)                                          LAM00840
      ROOT(2,1)= CMPLX(SLOT(2,3),.0)                                      LAM00850
      RELP = UU(I)*SLOT(2,8) +SLOT(2,9)                                   LAM00860
      ZPRT = VV(I)*SLOT(2,8)                                              LAM00870
      ROOT(2,2)=CMPLX(RELP,ZPRT)                                          LAM00880
      RELP =-((UU(I)**2 -VV(I)**2)*SLOT(2,4) +UU(I)*SLOT(2,5))            LAM00890
      ZPRT =-( 2.*UU(I)*VV(I)*SLOT(2,4) +VV(I)*SLOT(2,5))                 LAM00900
      ROOT(2,3)=CMPLX(RELP,ZPRT)                                          LAM00910
      CALL CONSOL (ROOT,RPRT(,ZPT),RPRT2,ZPT2)                            LAM00920
      ZLNT1(I)=SQRT( RPRT1*RPRT1+ZPT1*ZPT1)                               LAM00930
      IF(RPRT1.EQ..0) GO TO 463                                           LAM00940
      FANG1(I)=57.3*ATAN2(ZPT1,RPRT1)                                     LAM00950
      GO TO 464                                                           LAM00960
  463 FANG1(I)=90.                                                        LAM00970
  464 ZLNT2(I)=   SQRT((RPRT2*UU(I)+ZPT2*VV(I))**2 +(ZPT2*UU(I)-RPRT2*   LAM00980
     1(VV(I))**2)/(UU(I)**2+VV(I)**2)                                     LAM00990
      IF(RPRT2.EQ..0) GO TO 4645                                          LAM01000
      FANG2(I)=57.3*ATAN2((ZPT2*UU(I)-RPRT2*VV(I)),(RPRT2*UU(I)+ZPT2*VV(LAM01010
     1(I)))                                                               LAM01020
      GO TO 466                                                           LAM01030
 4645 FANG2(I)=90.                                                        LAM01040
  466 CONTINUE                                                            LAM01050
  465 CONTINUE                                                            LAM01060
      DO 828 I=1,NUMRTS                                                   LAM01070
      IF(VV(I).LT..0) GO TO 828                                           LAM01080
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      IF(IZERON(I).NE.0) GO TO 828                                      LAM01090
      WRITE(6,729)UU(I),VV(I),PLMODE(I),FLMODE(I),TMLFDB(I),ZLNT1(I),FANLAM01100
     1G1(I),ZLNT2(I),FANG2(I),COELTD                                    LAM01110
  828 CONTINUE                                                          LAM01120
      I=1                                                               LAM01130
      CALL MODE (PD,V,I)                                                LAM01140
      RETURN                                                            LAM01150
  727 FORMAT (1H0,58X,'CONTROLS FIXED'/7X,'R O O T S',46X,       'SIDE SLAM01160
     1LIP/ROLL ANG.',8X,'YAW ANG./ROLL ANG.'/5X,'REAL',8X,'IMAG.',8X,'PELAM01170
     2RIOD',5X,'FREQUENCY   T*HALF-ORL',6X,'MAGN.',9X,'PHASE',7X,'MAGN.'LAM01180
     3,8X,'PHASE',5X,'LEAD COEF.')                                      LAM01190
  729 FORMAT(1H ,10G13.5)                                               LAM01200
  556 FORMAT (1H1,60X,'LATERAL MODE')                                   LAM01210
  557 FORMAT (1H0,38X,A4,                                               LAM01220
     1         'DIMENSIONAL COEFFICIENTS OF CHARACTERISTIC EQUATIONS'   LAM01230
     2         /' BETA-S**2  BETA-S',6X,'BETA',9X,'PHI-S**2     PHI-S',LAM01240
     3         9X,'PHI',8X,'R-S**2',6X,'R-S',11X,'R',7X,              LAM01250
     4         'LAT CYCLIC   PEDAL')                                  LAM01260
  555 FORMAT (1H ,G10.2,10G12.5)                                        LAM01270
      END                                                               LAM01280
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      SUBROUTINE LMODE (V,OMG,XFW,ZFW,CW(NG,XAELE)                          LM000010
      COMMON /STR(AB/ D(21),DT(21),E(79),F(10),X(10),                       LM000020
     1                DL,DM,DN,DX,DY,DZ,IX,IY,IZ,PD(10,11),                 LM000030
     2                QTR,EPD,ERR(10),KM1,RHO,                              LM000040
     3                R12,SPD(6,6,3),XBW(21),XEL(14),                       LM000050
     4                XER(7),XFC(28),XFN(7),XFS(35),                        LM000060
     5                XGN(7),XIT(21),XMR(49),XTR(49),                       LM000070
     6                XWG(21),YMR(21),YTP(21),YWG(21),                      LM000080
     7                YEL(21),YFN(21),BLCG,XDAMP,DEPD(10),                  LM000090
                                                                            LM000100
     8              DAMP MUST HAVE ITS NAME CHANGED HERE TO AVOID           LM000110
     9              CONFLICT WITH COMMON /TRONIC/                           LM000120
                                                                            LM000130
     8                EPDS,EPDX(10),MASS,OSV1,TMRS,TTRS,                    LM000140
     9                WLCG,XCON(63),XJET(14),XMIN,AYEFP,                    LM000150
     A                BETAFS(2),CNPCO,DHADO,DYBDR,GUESS,                    LM000160
     B                NPASS,PDPHI(10,11),STACG,TZERO,                       LM000170
     C                XMAST,DHADAO,DODCOL,DTRRSQ,DYBDBR,                    LM000180
     D                ENGRPM,MXPASS,PSD30P,TRIND1,XLIMIT                    LM000190
      COMMON /STANRD/ J,W,ITM,VMS(2),LINK,QELE,VROT(2),                     LM000200
     1                VSND,YFIN(2),ZFEL(2),AIBAL(2),                        LM000210
     2                AIBAL(2),COND1,SWING,PILGH2,PWGELL,                   LM000220
     3                BM,BTR,PMOMM,PMOMT,RMOMM,RMOMT                        LM000230
      COMMON /TRONIC/ UU(6),VV(6),TAU(22),DAMP(22),NUMRTS,GAINB,            LM000240
     1                INDEX,STGAIN(6),TSTAR,QDELTD,SLOT(3,9)                LM000250
      REAL IY,MASS                                                          LM000260
      DIMENSION PLMODE(6),ELMODE(6),THLFDB(6),IZERON(6),                    LM000270
     1       FANG2(6),ROOOT(2,3),       ZLNT1(6),FANG1(6),ZLNT2(6)         LM000280
      DIMENSION QDSLOT(11,3),HEAD(3),KS(3),LS(2)                            LM000290
      DATA HEAD/'     NON-'/,KS/1,3,5/,LS/2,1/                              LM000300
      COMPLEX ROOOT                                                         LM000310
      WRITE (6,556)                                                         LM000320
      DO 706 I=1,6                                                          LM000330
      PLMODE(I)=.0                                                          LM000340
      ELMODE(I)=.0                                                          LM000350
      THLFDB(I)=.0                                                          LM000360
      IZERON(I)=0                                                           LM000370
  706 CONTINUE                                                              LM000380
      DO 783 I=1,3                                                          LM000390
      DO 783 J=1,9                                                          LM000400
      SLOT(I,J)=.0                                                          LM000410
  783 CONTINUE                                                              LM000420
      TSTAR=CW(NG/(2.*V)                                                    LM000430
      SLOT(1,2) = MASS                                                      LM000440
      SLOT(1,3)=-SPD(1,1,1)                                                 LM000450
      SLOT(1,6)=-SPD(2,1,1)                                                 LM000460
      SLOT(1,8)=-SPD(3,1,1)//                                               LM000470
      SLOT(1,9)=ZFW/V                                                       LM000480
      SLOT(2,3)=-SPD(1,2,1)                                                 LM000490
      CZADE=YFL(17)*QELE*XAELE*YWG(17)*PWGELL*YWG(18)*YEL(18)*DTRRSQ/       LM000500
     1      ((3.+YWG(19))*(3.+YEL(18))*(1.-(V*VSND)**2))                    LM000510
      SLOT(2,5)=MASS-CZADE                                                  LM000520
      SLOT(2,6)=-SPD(2,2,1)                                                 LM000530
      SLOT(2,8)=-(MASS*SPD(3,2,1)/V)                                        LM000540
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      SLOT(2,9)=-XFW/V                                                          LM000550
      SLOT(3,3)=-SPO(1,3,1)                                                     LM000560
      SLOT(3,5)=CZADE*XAELE                                                     LM000570
      SLOT(3,6)=-SPO(2,3,1)                                                     LM000580
      SLOT(3,7)=IY/V                                                            LM000590
      SLOT(3,8)=-SPO(3,3,1)/V                                                   LM000600
      WRITE (6,557) HEAD(1)                                                     LM000610
      WRITE (6,555) (SLOT(1,J),J=1,9),PD(1,2),PO(1,1),(SLOT(2,J),J=1,9),LM000620
     (              PD(3,2),PD(3,1),(SLOT(3,J),J=1,9),PD(5,2),PD(5,1)    LM000630
      WRITE (6,557) HEAD(2)                                                     LM000640
      DIV2=2.*OMG*V                                                             LM000650
      DIV1=DIV2*CWING                                                           LM000660
      CALL MDSLOT (DIV1,DIV2,TSTAR,PO,SLOT,3,KS,LS,UDSLOT,1.)                  LM000670
      WRITE (6,555) UDSLOT                                                      LM000680
      WRITE(6,727)                                                              LM000690
      CALL SRT                                                                  LM000700
      INDEX=6                                                                   LM000710
      CALL ELEC (GAINB)                                                         LM000720
      DO 707 I=1,NUMRTS                                                         LM000730
      IF(UU(I).EQ..0.AND.VV(I).EQ..0) GO TO 799                                 LM000740
      IF(VV(I).EQ..0)GO TO 751                                                  LM000750
      PLMODE(I)=6.2832/ABS(VV(I))                                               LM000760
      PLMODE(I)=1./PLMODE(I)                                                    LM000770
  751 IF(UU(I).EQ.0.) GO TO 799                                                 LM000780
      TMLEDA(I)=.69315/ABS(UU(I))                                               LM000790
      GO TO 707                                                                 LM000800
  799 IZERON(I)=1                                                               LM000810
  707 CONTINUE                                                                  LM000820
      DO 365 I=1,NUMRTS                                                         LM000830
      IF(IZERON(I).NE.0) GO TO 365                                              LM000840
      ROOT(1,1) =CMPLX(SLOT(2,3),.0)                                            LM000850
      RELP=UU(I)*SLOT(2,5) +SLOT(2,6)                                           LM000860
      ZPRT=VV(I)*SLOT(2,5)                                                      LM000870
      ROOT(I,2)= CMPLX(RELP,ZPRT)                                               LM000880
      RELP=SLOT(2,7)*(VV(I)+UU(I))*(VV(I)-UU(I))-SLOT(2,8)*UU(I)                LM000890
     (     -SLOT(2,9)                                                          LM000900
      ZPRT=-(2.*UU(I)*VV(I)*SLOT(2,7)+VV(I)*SLOT(2,8))                          LM000910
      ROOT(I,3)=CMPLX(RELP,ZPRT)                                                LM000920
      ROOT(2,1)=CMPLX(SLOT(3,3),.0)                                             LM000930
      RELP=SLOT(3,5)*UU(I)+SLOT(3,6)                                            LM000940
      ZPRT=VV(I)*SLOT(3,5)                                                      LM000950
      ROOT(2,2)=CMPLX(RELP,ZPRT)                                                LM000960
      RELP=-(SLOT(3,7)*( UU(I) *UU(I) -VV(I)*VV(I)) +SLOT(3,8)*UU(I))           LM000970
      ZPRT=-(SLOT(3,7)*2.* UU(I) *VV(I) +SLOT(3,8)*VV(I))                       LM000980
      ROOT(2,3)=CMPLX(RELP,ZPRT)                                                LM000990
      CALL COMSOL (ROOT,RPRT1,ZPT1,RPRT2,ZPT2)                                  LM001000
      ZLNT(I)=SQRT( RPRT1  **2 + ZPT1  **2)                                     LM001010
      IF(RPRT(  .EQ..0)GO TO 363                                                LM001020
      ANG1(I)=ATAN2(ZPT1,RPRT()/DTR                                             LM001030
      GO TO 364                                                                 LM001040
  363 ANG1(I)=-90.                                                              LM001050
  364 ZLNT2(I)= SQRT(RPRT2**2 +ZPT2**2)                                         LM001060
      IF(RPRT2.EQ..0)GO TO 3645                                                 LM001070
      ANG2(I)=ATAN2(ZPT2,RPRT2)/DTR                                             LM001080
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      GO TO 366                                                          LMOD1090
3645  FF  72(I)=FANG1(I)+90.                                             LMOD1100
 366 CONTINUE                                                            LMOD1110
 365 CONTINUE                                                            LMOD1120
      DO 728 I=1,NUMRTS                                                  LMOD1130
      IF(VV(I).LT..0) GO TO 728                                          LMOD1140
      IF(IZERON(I).NE.0)GO TO 728                                        LMOD1150
      WRITE(6,729) UU(I),VV(I),PLMODE(I),FLMODE(I),TMLFOR(I),ZLNT1(I),   LMOD1160
     1  FANG1(I),ZLNT2(I),FANG2(I),COELTD                                LMOD1170
 728 CONTINUE                                                            LMOD1180
      I=2                                                                LMOD1190
      CALL MODE (PD,V,I)                                                 LMOD1200
      RETURN                                                             LMOD1210
 727 FORMAT (1HO,58X,'CONTROLS FIXED'/7X,'R O O T S',46X,       'FWD.VELMOD1220
     1L/THETA',15X,'ALPHA/THETA',/5X,'REAL',8X,'IMAG.',8X,'PERIOD',5X,'FLMOD1230
     2REQUENCY   T-HALF-DBL',6X,'MAGN.',9X,'PHASE',7X,'MAGN.',8X,'PHASF'LMOD1240
     3,5X,'LEAD COEF.')                                                 LMOD1250
 729 FORMAT(1H ,10G13.5)                                                 LMOD1260
 556 FORMAT (1H1,57X,'LONGITUDINAL MODE')                                LMOD1270
 557 FORMAT (1HO,38X,A4,                                                 LMOD1280
     1       'DIMENSIONAL COEFFICIENTS OF CHARACTERISTIC EQUATIONS'      LMOD1290
     2       /3X,'U-S**2      U-S',11X,'U',6X,'ALPHA-S**2     ALPHA-S',  LMOD1300
     3       6X,'ALPHA     THETA-S**2    THETA-S',7X,'THETA',5X         LMOD1310
     4       'F/A CYCLIC   COLLEC.')                                    LMOD1320
 555 FORMAT (1H ,G10.2,10G12.5)                                          LMOD1330
      END                                                                LMOD1340
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      SUBROUTINE MANU                                                   MANU0010
      COMMON /FORCE/ XF,XFRWG,XFLWG,XFELE,XFFUS,XFRJET,                 MANU0020
     1               XFLJET,XFMR,XFTR,XFGUN,XFFIN,XFW,                  MANU0030
     2               YF,YFFUS,YFRJET,YFLJET,YFMR,YFTR,                  MANU0040
     3               YFGUN,YFFIN,YFW,                                   MANU0050
     4               ZF,ZFRWG,ZFLWG,ZFELE,ZFFUS,ZFRJET,                 MANU0060
     5               ZFLJET,ZFMR,ZFTR,ZFGUN,ZFW,                        MANU0070
     6               QL,LRWG,LLWG,LELF,LFUS,LRJET,LLJET,                MANU0080
     7               LMR,LTR,LGUN,LFIN,LQMR,LQTR,                       MANU0090
     8               QM,MRWG,MLWG,MELE,MFUS,MRJET,MLJET,                MANU0100
     9               MMR,MTR,MGUN,MFIN,MQMR,MQTR,                       MANU0110
     A               QN,NRWG,NLWG,NELE,NFUS,NRJET,NLJET,                MANU0120
     B               NMR,NTR,NGUN,NFIN,NQMR,NQTR                        MANU0130
      COMMON /STRIMA/ AY,VH,AGW,DT1(2),DT2(2),IXZ,                      MANU0140
     1               QMR,XXD,YYD,ZZD,ALGF,APFP,AYFP,                    MANU0150
     2               CGWL,COLL(6),CYCF(3),CYCL(3),                      MANU0160
     3               DIST,KCIT(20),PEDA(3),QMAX,                        MANU0170
     4               QMRS,TIMF,TMAX,XCIT(20,6),ALGEZ,                   MANU0180
     5               ALGE1,ALGE2,CGSTA,CPWIC,DIXIZ,                     MANU0190
     6               DIYIX,DIZIY,DTZMT,DTZM1,DTZT1,FTKTS,               MANU0200
     *               HUBKM(2,2),HUBKI(2,2),                             MANU0210
     7               KREAD,PIU30,TSTAB(14),ZMAX2,ZMAX3,                 MANU0220
     8               ASECOL,CYPWIC,GEARAT,PSD55D,                       MANU0230
     9               PSISTP,QXBRAK,RUDIND,ZDELT1,ZDELT2                 MANU0240
      COMMON /STAMAN/ HL(2),XX,YY,AV1,GOV,KPO,OPC,QQQ,                  MANU0250
     1               RIV,APBG,ARBG,ASEP,AVBG,BWTC,                      MANU0260
     2              RC,BWTK,BWTM,CGBL,DPIX,DPIZ,                        MANU0270
     3               FMPT(2),RSSO,ALEPT,AYDMX,DELT2,                    MANU0280
     4               DPIXZ,DTBWT,DWLCG,HDELT,HGUST,                     MANU0290
     5               HLTR1,HLTR2,ITORS,KTCTR,OMEGM,                     MANU0300
     6               PCDEL,QMRSA,RMASS,TRALT,TWOPI,VGUST,               MANU0310
     7               ISTOP,XAGUN,XAPYL,XARSP(2),YAGUN,                  MANU0320
     8               YARSP(2),YGUST,ZAGUN,ZAPYL,ZARSP(2),               MANU0330
     9               DELT2R,DSTACG,EIMAST,GPRELD,HLPYLD,                MANU0340
     A               IBRAKE,OMEGMD,QBRAKE,BETAZS(2),                    MANU0350
     B               PCGDED,PCGMAX,PCRATE,P01DTR,RDELT1,                MANU0360
     C               *DELT2,RITORS,TRIND2                               MANU0370
      COMMON /MANAL/  Q,AP,PED,QWG,TZM,T1M,T2M,                         MANU0380
     1               TZT,T1T,T2T,ALEL,CZET,PSDD,                        MANU0390
     2               SZET,TAXL,TAXR,XAWG,XLNK(16),ZAWG,                 MANU0400
     3               ALCYP,ALFIN,ALLWG,ALRWG,CDELE,CDFIN,               MANU0410
     4               COLWG,CORWG,CLELE,CLFIN,CLLWG,CLRWG,CWING,         MANU0420
     5               CYCR1,CYCR2,CZET4,CZET6,CZET9,RANGE,               MANU0430
     6               SZET5,SZET7,SZET8,WGCOL,XAELE,XAFIN,               MANU0440
     7               XAFUS,XAJET,YAFIN,ZAELE,ZAFIN,ZAFUS,               MANU0450
     *               YAELE,YAFUS,YALWG,YARWG,YALJET,YARJET,             MANU0460
     8               ZAJET,ALECR1,ALGFPD,BOTTOM,CZET11,                 MANU0470
     9               CZET12,CZET13,FIZETA,HALFPI,SZET10,                MANU0480
     A               XAPYLD,YGUSTW,ZAPYLD,ZFLWG1,ZFRWG1                 MANU0490
     B               ,TZMS,T1MS,T2MS,TZTS,T1TS,T2TS,                    MANU0500
     C               CLOCK,FLOCK,XLOCK,TCLOCK                           MANU0510
      COMMON /ROMAN/  ZZ,VXS(2),VYS(2),VZS(2),BETA(12,2),               MANU0520
     *               T,PCC(2),COSE(7,7,2),BETAN(2),BETAX(2),BETAZ(2),   MANU0530
     *               AIB(2),APDD,ARDD,AYDD,AIR(2),                      MANU0540
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     1               DPSI(12,2),DTRR,NPS)(2),ZZTR,                          MANU0550
     2               BETAD(12,2),BNPSI(2),                                  MANU0560
     3               COND2,GMAXV,RATE1,RATE2,STOP2,                         MANU0570
     4               THROT(2),TRIND,XGUST,BETAZD(2),GMAXV1,                 MANU0580
     5               GMAXV2,GMAXV3,GUSTYP,HNPSIR(2),                        MANU0590
     6               HUBKPS,HUBKRS,HUBTPS,HUBTRS,                           MANU0600
     7               KONFIG,LNGTH1,PILGH1,PSIREF(2),                        MANU0610
     8               START2,XMOMLI(12,2),                                   MANU0620
     9               RM,RTR,DRM,DRTR,T1MT,T1TT,                             MANU0630
     A               T2MT,T2TT,TZMT,TZTT,XMA1,XMA1T,                        MANU0640
     B               XMB1,XMB1T,A1BPM,A1BPT,A1BRM,A1BRT,                    MANU0650
     C               APTD,APTTD,ARTD,ARTTD,PSD,PSDT,                        MANU0660
     D               XSTAHM,XSTAHT,YSTAHM,YSTAHT,                           MANU0670
     E               HUBKP,HUBKTP,HUBKR,HUBKTR                              MANU0680
     F               ,AZETA,AZETAT,VZETA,VZETAT                             MANU0690
      COMMON /MANAPD/ I,V,IND,NMAG,APBMT,ARBMT,AYBMT,BETAO(2),TDELT,        MANU0700
     1               BETAE(2),HGUSTE,HGUSTF,HGUSTW,VGUSTE,                  MANU0710
     2               VGUSTW,VGUSTF,GFWD,GLAT,GVERT,                         MANU0720
     3               VXB,VZB,APD,VYB,ARD,AYD,                               MANU0730
     4               COLSTK,CYSTK1,CYSTK2,PEDAL,AYE,                        MANU0740
     5               APE,ARE,A1M,B1M,A1TR,B1TR,                             MANU0750
     6               XAR(2),YAR(2),ZAR(2),                                  MANU0760
     7               VIMR,VITR,ZETA,ZETATR,HMR,HTR,                         MANU0770
     8               TMR,TTR,OMX,QTR,YMRF,YTRF                              MANU0780
      COMMON /YDPLOT/ AH(3),AL(3),EXIT,ICOM(49),IPSN,                       MANU0790
     1               NPART,NVARA,NVARB,NVARC,NSCALE                         MANU0800
     1               ,NVARS,NPRINT,NTIME                                    MANU0810
      COMMON /FORY/ Y(4,150),OLD(4,2)                                       MANU0820
      COMMON /STAND/ J,W,(TM,VMS(2),LINK                                    MANU0830
      DATA FOURPI/12.56637/                                                 MANU0840
      REAL LP,   NP,IXZ,ITORS                                               MANU0850
      DIMENSION A(266),PSID(2),FLAP(2,2),HUBKS(2,2),HUBK(2,2),              MANU0860
     :          ARDR(2),APDR(2)                                             MANU0870
      EQUIVALENCE (A(1),Y(1,1)),(PSID(1),PSD),(FLAP(1,1),A1M),              MANU0880
     1     (ARDR(1),ARTD),(APDR(1),APTD)                                    MANU0890
     2          ,(HUBKS(1,1),HUBKPS),(HUBK(1,1),HUBKP)                      MANU0900
      XDEL1M(X1,X2,X3)=AMAX1(X1,AMIN1(X2,X3))                               MANU0910
                                                                            MANU0920
          PART 3. ELEVEN DEGREE OF FREEDOM MANEUVER SECTION                 MANU0930
                                                                            MANU0940
                        SYMBOL IDENTIFICATION                               MANU0950
                                                                            MANU0960
      Y(1, 1)  VXB      VELOCITY          X-COMPONENT      BODY REFERENCE   MANU0970
      Y(1, 2)  VYB      VELOCITY          Y-COMPONENT      BODY REFERENCE   MANU0980
      Y(1, 3)  VZB      VELOCITY          Z-COMPONENT      BODY REFERENCE   MANU0990
      Y(1, 4)  AYD      VELOCITY        YAW-COMPONENT      BODY REFERENCE   MANU1000
      Y(1, 5)  APD      VELOCITY      PITCH-COMPONENT      BODY REFERENCE   MANU1010
      Y(1, 6)  ARD      VELOCITY       ROLL-COMPONENT      BODY REFERENCE   MANU1020
      Y(1, 9)  PSD      VELOCITY        RPM-COMPONENT      TPP  REFERENCE   MANU1030
      Y(1,10)  AYE      EULER ANGLE     YAW-COMPONENT      FIXED TO BODY    MANU1040
      Y(1,11)  APE      EULER ANGLE   PITCH-COMPONENT      FIXED TO BODY    MANU1050
      Y(1,12)  ARE      EULER ANGLE    ROLL-COMPONENT      FIXED TO BODY    MANU1060
      Y(1,13)  DTBWT    DISP     DELTA TZM FROM BOBWT      ROTOR REFERENCE  MANU1070
      Y(1,14)  DTBWTD   VEL      DELTA TZM FROM BOBWT      ROTOR REFERENCE  MANU1080
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C     Y(1,15)  XX       DISPLACEMENT      X-COMPONENT      FIXED REFERENCE MANU1090
C     Y(1,16)  YY       DISPLACEMENT      Y-COMPONENT      FIXED REFERENCE MANU1100
C     Y(1,17)  ZZ       DISPLACEMENT      Z-COMPONENT      FIXED REFERENCE MANU1110
C     Y(1,76)  VXBD     ACCELERATION      X-COMPONENT      BODY REFERENCE  MANU1120
C     Y(1,77)  VYBD     ACCELERATION      Y-COMPONENT      BODY REFERENCE  MANU1130
C     Y(1,78)  VZBD     ACCELERATION      Z-COMPONENT      BODY REFERENCE  MANU1140
C     Y(1,79)  AYDD     ACCELERATION    YAW-COMPONENT      BODY REFERENCE  MANU1150
C     Y(1,80)  APDD     ACCELERATION  PITCH-COMPONENT      BODY REFERENCE  MANU1160
C     Y(1,81)  ARDD     ACCELERATION   ROLL-COMPONENT      BODY REFERENCE  MANU1170
C     Y(1,84)  PSDD     ACCELERATION    RPM-COMPONENT      TPP  REFERENCE  MANU1180
C     Y(1,85)  AYED     EUL.ANG.VEL.    YAW-COMPONENT      FIXED TO BODY   MANU1190
C     Y(1,86)  APED     EUL.ANG.VEL.  PITCH-COMPONENT      FIXED TO BODY   MANU1200
C     Y(1,87)  ARED     EUL.ANG.VEL.   ROLL-COMPONENT      FIXED TO BODY   MANU1210
C     Y(1,88)  DTBWTD   VEL      DELTA TZM FROM BOBWT      ROTOR REFERENCE MANU1220
C     Y(1,89)  DTBWTDD  ACCEL    DELTA TZM FROM BOBWT      ROTOR REFERENCE MANU1230
C     Y(1,90)  XXD      VELOCITY          X-COMPONENT      FIXED REFERENCE MANU1240
C     Y(1,91)  YYD      VELOCITY          Y-COMPONENT      FIXED REFERENCE MANU1250
C     Y(1,92)  ZZD      VELOCITY          Z-COMPONENT      FIXED REFERENCE MANU1260
C                                                                           MANU1270
      IF(NVARS.NE.0) GO TO 299                                              MANU1280
      QBRAKE=0.                                                             MANU1290
      ICAN=0                                                                MANU1300
      I=1                                                                   MANU1310
      IND=1                                                                 MANU1320
      LINK=5                                                                MANU1330
      SG=1.                                                                 MANU1340
      DO 297 N=1,2                                                          MANU1350
      NPSIN=NPSI(N)                                                         MANU1360
      IF(NPSIN.EQ.0) GO TO 297                                              MANU1370
      CALL ROTAN(N)                                                         MANU1380
      OLD(1,N)=-FLAP12,N)*SG                                                MANU1390
      OLD(2,N)=-HALFP1                                                      MANU1400
      OLD(3,N)=TAN(OLD(1,N))                                                MANU1410
      OLD(4,N)=(COS(BETAZ(N)-OLD(1,N)))**2*((SG*ARDR(N)-ARD)/               MANU1420
     1         (COS(OLD(1,N)))**2-PSID(N)*TAN(FLAP11,N)))                   MANU1430
      SG=-SG                                                                MANU1440
      L=70N                                                                 MANU1450
      DO 296 K=1,NPSIN                                                      MANU1460
      L=L+1                                                                 MANU1470
      Y(1,L+10)=BETA(K,N)                                                   MANU1480
      Y(1,L+24)=BETAD(K,N)                                                  MANU1490
      Y(1,L+85)=BETAD(K,N)                                                  MANU1500
  296 CONTINUE                                                              MANU1510
  297 CONTINUE                                                              MANU1520
      IND=0                                                                 MANU1530
      LINK=6                                                                MANU1540
  298 HDELT=.5*TDELT                                                        MANU1550
      RDELT=1./TDELT                                                        MANU1560
      RDELT2=2.*RDELT                                                       MANU1570
      IF(KTCTR.EQ.0) GO TO 210                                              MANU1580
  299 CONTINUE                                                              MANU1590
      NVARS=0                                                               MANU1600
      IF(TIME.LT.TMAX) GO TO 151                                            MANU1610
      KTCTR=KTCTR+1                                                         MANU1620
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      GO TO (9060,9061,1), KTCTR                                        MANU1630
 9060 TDELT=ZDELT2                                                      MANU1640
      TMAX=ZMAX2                                                        MANU1650
      NWAG=0                                                            MANU1660
      IF(NWARB.EQ.2) NWAG=1                                             MANU1670
      GO TO 298                                                         MANU1680
 9061 TDELT=ZDELT1                                                      MANU1690
      TMAX=ZMAX3                                                        MANU1700
      NWAG=0                                                            MANU1710
      GO TO 298                                                         MANU1720
C     ****     ****   TIME LOOP   ****     ****                       MANU1730
C                     **** ****                                         MANU1740
  210 CONTINUE                                                          MANU1750
      IF(V(1,7).GE.TWOPI) V(1,7)=V(1,7)-TWOPI                           MANU1760
      IF(V(1,8).GE.TWOPI) V(1,8)=V(1,8)-TWOPI                           MANU1770
      DTZM1=BETAE(1)*PCC(1)                                             MANU1780
      DTZT1=BETAE(2)*PCC(2)                                             MANU1790
      DO 212 N=1,2                                                      MANU1800
      BETAZD(N)=0.                                                      MANU1810
      BETA0(N)=BETAZ(N)+BETAE(N)                                        MANU1820
      IF(NPSI(N).EQ.0) GO TO 212                                        MANU1830
      IF(N.EQ.1) GO TO 208                                              MANU1840
      AYBM=AYBMT                                                        MANU1850
      APBM=APBMT                                                        MANU1860
      ARBM=ARBMT                                                        MANU1870
      GO TO 207                                                         MANU1880
  208 CONTINUE                                                          MANU1890
      AYBM=0.                                                           MANU1900
      APBM=-ZETA                                                        MANU1910
      ARBM=0.                                                           MANU1920
  207 CONTINUE                                                          MANU1930
      CALL RATS (ARD,APD,AYD,AYBM,APBM,ARBM,ARDM,APDM,AYDM,-1)          MANU1940
      BETA1=V(1,7+N+11)-BETAZ(N)                                        MANU1950
      BETA2=V(1,7+N+12)-BETAZ(N)                                        MANU1960
      TANBT1=TAN(BETA1)                                                 MANU1970
      TANBT2=TAN(BETA2)                                                 MANU1980
      DPSI2N=DPSI(2,N)                                                  MANU1990
      SIND2=SIN(DPSI2N)                                                 MANU2000
      SIN1=SIN(V(1,N+6))                                                MANU2010
      COS1=COS(V(1,N+6))                                                MANU2020
      BETA1D=-V(1,7+N+25)                                               MANU2030
      BETA2D=-V(1,7+N+26)                                               MANU2040
      IF(ABS(SIND2).GT..0001) GO TO 209                                 MANU2050
      BETA2=OLD(1,N)                                                    MANU2060
      DPSI2N=PSIREF(N)-OLD(2,N)                                         MANU2070
      TANBT2=OLD(3,N)                                                   MANU2080
      BETA2D=OLD(4,N)                                                   MANU2090
      SIND2=SIN(DPSI2N)                                                 MANU2100
      IF(PSID(N).NE.0.) GO TO 209                                       MANU2110
      TANA1=0.                                                          MANU2120
      TANB1=0.                                                          MANU2130
      IF(COS1.GE..707) TANA1=-TANBT1/COS1                               MANU2140
      IF(COS1.LT..707) TANA1=-TANBT1/SIN1                               MANU2150
      APDR(N)=BETA1D*COS1+APDM                                          MANU2160
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209

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      ARDR(N)=BETA1D*SIN)*ARDM                                          MANU2170
      GO TO 211                                                         MANU2180
  209 CONTINUE                                                          MANU2190
      SIN2=SIN)Y(1,N+6)+DPSI2N)                                         MANU2200
      COS2=COS(Y)1,N+6)+DPSI2N)                                         MANU2210
      TANA1=(SIN1*TANBT2-SIN2*TANBT1)/SIND2                             MANU2220
      TANB1=(COS2*TANBT1-COS1*TANBT2)/SIND2                             MANU2230
      FLAP)1,N)=ATAN(TANA1)                                             MANU2240
      FLAP(2,N)=ATAN(TANB1)                                             MANU2250
      C1=BETA1D/)COS(BETA1))**2                                         MANU2260
      C2=BETA2D/)COS(BETA2))**2                                         MANU2270
      PFAC=)C1*SIN2-C2*SIN1)/SIND2                                      MANU2280
      RFAC=(C2*COS)-C1*COS2)/SIND2                                      MANU2290
      COSB1=COS(FLAP)2,N))                                              MANU2300
      APDP)N)=APDM*(COS)FLAP(1,N)))**2*COSB)*(PFAC-PSID(N)*TANB1)       MANU2310
      ARDP(N)=APDM*COSB1**2*)RFAC+PSID(N)*TANA))                        MANU2320
  211 CONTINUE                                                          MANU2330
      OLD(1,N)=BETA)                                                    MANU2340
      OLD)2,N)=PSIREF)N)                                                MANU2350
      OLD(3,N)=TANBT)                                                   MANU2360
      OLD)4,N)=BETA1D                                                   MANU2370
  212 CONTINUE                                                          MANU2380
      BITR=-BITR                                                        MANU2390
      ARTTD=-ARTTD                                                      MANU2400
      AY1=AY                                                            MANU2410
      THROT)1)=THP                                                      MANU2420
      THROT)2)=TTR                                                      MANU2430
      ZFLWG1=ZFLWG                                                      MANU2440
      ZFRWG1=ZFRWG                                                      MANU2450
      AZETA=0.                                                          MANU2460
      AZETAT=0.                                                         MANU2470
      VZETA=0.                                                          MANU2480
      VZETAT=0.                                                         MANU2490
      IF)ISTOP.NE.1) ISTOP=0                                            MANU2500
      CALL INIT                                                         MANU2510
      DBRAKE=0.                                                         MANU2520
      TIME=TIME+TDELT                                                   MANU2530
      DIST=DIST+V*TDELT                                                 MANU2540
      DO 64 N=1,2                                                       MANU2550
      IF(EMPTIN).EQ.0.) GO TO 64                                        MANU2560
      PSDSQ1=PSID(N)**2*AIR(N)                                          MANU2570
      HUBK)N,1)=HUBKS)1,N)*PSDSQ1                                       MANU2580
      HUBK(N,2)=HUBKS)2,N)*PSDSQ1                                       MANU2590
   64 CONTINUE                                                          MANU2600
      IF(TSTAR(1).GT.TIME) GO TO 200                                    MANU2610
      WVAPS=)                                                           MANU2620
      I=1                                                               MANU2630
      GO TO 450                                                         MANU2640
C                                                                       MANU2650
C               ***RUNGE-KUTTA***                                       MANU2660
C                                                                       MANU2670
  350 I=2                                                               MANU2680
      GO TO (1,390,420,400),I                                           MANU2690
  390 DELT2=HDELT                                                       MANU2700
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      DELT2P=RDELT2                                                     MANU2710
      QUAD1=RDELT1                                                      MANU2720
      GO TO 420                                                         MANU2730
  420 DELT2=TDELT                                                       MANU2740
      DELT2P=RDELT1                                                     MANU2750
      QUAD1=RDELT2                                                      MANU2760
  430 DO 440 K=1,75                                                     MANU2770
      Y(I,K)=Y(1,K)+Y(I,K+75)*DELT2                                     MANU2780
  440 CONTINUE                                                          MANU2790
  450 VXB=Y(I,1)                                                        MANU2800
      VYB=Y(I,2)                                                        MANU2810
      VZB=Y(I,3)                                                        MANU2820
      AYD=Y(I,4)                                                        MANU2830
      APD=Y(I,5)                                                        MANU2840
      ARD=Y(I,6)                                                        MANU2850
      PSIREF(1)=Y(I,7)                                                  MANU2860
      PSIREF(2)=Y(I,8)                                                  MANU2870
      PSD=Y(I,9)                                                        MANU2880
      PSDT=PSD*GEARAT                                                   MANU2890
      AYE=Y(I,10)                                                       MANU2900
      APE=Y(I,11)                                                       MANU2910
      ARE=Y(I,12)                                                       MANU2920
      IF(Y(I,13).LT.0.) Y(I,13)=0.                                      MANU2930
      DTBWT=Y(I,13)                                                     MANU2940
      XX=Y(I,15)                                                        MANU2950
      YY=Y(I,16)                                                        MANU2960
      ZZ=Y(I,17)                                                        MANU2970
      DO 214 N=1,2                                                      MANU2980
      NPSIN=NPSI(N)                                                     MANU299
      IF(NPSIN.EQ.0) GO TO 214                                          MANU3000
      DO 213 K=1,NPSIN                                                  MANU3010
      BETA(K,N)=Y(I,7*N+K+10)                                           MANU3020
      BETAD(K,N)=Y(I,7*N+K+24)                                          MANU3030
  213 CONTINUE                                                          MANU3040
  214 CONTINUE                                                          MANU3050
      PSD550=PSD*R550                                                   MANU3060
      CALL PATS(VXB,VYB,VZB,AYE,APE,ARE,XXD,YYD,ZZD,1)                  MANU3070
      VHSQ=XXD**2+YYD**2                                                MANU3080
      VH=SQRT(VHSQ)                                                     MANU3090
      V=SQRT(VHSQ+ZZD**2)                                               MANU3100
      AY=0.                                                             MANU3110
      AYFP=0.                                                           MANU3120
      APFP=0.                                                           MANU3130
      IF(VXB.NE.0.0.OR .VYB.NE.0.) AY=ATAN2(-VYB,VXB)                   MANU3140
      IF(VH.NE.0.) AYFP=ATAN2(YYD,XXD)                                  MANU3150
      IF(V.NE.0.) APFP=ATAN2(-ZZD,VH)                                   MANU3160
      IF(NVARS.NE.0) RETURN                                             MANU3170
      IF(I.EQ.3.OR.IND.EQ.1) GO TO 225                                  MANU3180
C                                                                       MANU3190
C             *** VARIATIONS DUE TO INPUTS ***                          MANU3200
C                                                                       MANU3210
      CALL VARI                                                         MANU3220
      IF(EXIT.NE.0.) GO TO 1                                            MANU3230
      CALL SWAS (COLSTK)                                                MANU3240
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      T1MT=T1M+DT1(1)                                                    MANU3250
      T2MT=T2M+DT2(1)                                                    MANU3260
      T1TT=T1T+DT1(2)                                                    MANU3270
      T2TT=T2T+DT2(2)                                                    MANU3280
      CALL PCG (PSD,DTZMT,I)                                             MANU3290
      DTZ=DTZMT+ASECOL                                                   MANU3300
      TZM=TZM+DTZM1+DTZ                                                  MANU3310
      TZT =TZT+DTZT1+DTZ*TRIND                                           MANU3320
  225 QRM=PSD*RM                                                         MANU3330
      QRT=PSDT*RTR                                                       MANU3340
      TZMT=TZM +DTBWT                                                    MANU3350
      TZTT=TZT +DTBWT*TRIND                                              MANU3360
      ZZTR=TRALT-ZZ*TRIND                                                MANU3370
C                                                                        MANU3380
      CALL ANAL                                                          MANU3390
C                                                                        MANU3400
      IF(EXIT.NE.0.) GO TO 1                                             MANU3410
      QMR=QMX+QTR*GEARAT                                                 MANU3420
C         QMR     = TORQUE FROM AIRLOAD DRAG                             MANU3430
C         QMAX    = MAXIMUM TORQUE AVAILABLE                             MANU3440
C         QMRS    = TORQUE SUPPLIED                                      MANU3450
C         QMRSA   = TORQUE AVAILABLE, LIMITED BY ENG. ACCEL. SCHED.      MANU3460
      IF (OPC .EQ. 10.)  GO TO 315                                       MANU3470
      IF(QQQ.EQ.1.) GO TO 306                                            MANU3480
      IF (QQQ.NE.2.)GO TO 303                                            MANU3490
      QMRS=QMR                                                           MANU3500
      GO TO 315                                                          MANU3510
  304 IF(QMRSA.GE.QMAX) GO TO 308                                        MANU3520
      IF(GOV.LT.0.0) GO TO 315                                           MANU3530
      IF(GOV.NE.0.) GO TO 305                                            MANU3540
      QMRSA=QMAX                                                         MANU3550
      GO TO 308                                                          MANU3560
  305 IF(I.EQ.3.OR.IND.EQ.1) GO TO 308                                   MANU3570
      TGOV=TDELT/GOV                                                     MANU3580
      QMRSA=QMRSA+(SQRT(QMRSA*QMAX)+.25*TGOV*QMAX)*TGOV                  MANU3590
      IF(QMRSA.GT.QMAX)QMRSA=QMAX                                        MANU3600
  308 QUAD=Y(I-1, 9)                                                     MANU3610
      IF(I.EQ.3)QUAD=Y(1, 9)                                             MANU3620
      QMRS=QMR+(TORS *(OMEGM-QUA0)*QUA01                                 MANU3630
  315 QMRS=XDELIM(0.,QMRSA,QMRS)                                         MANU3640
  303 CONTINUE                                                           MANU3650
      IF(IBRAKE.NE.0) GO TO 322                                          MANU3660
      IF(PSD.EQ.0.) GO TO 323                                            MANU3670
      DPSTOP=PSISTP-PSIREF(1)                                            MANU3680
      IF(PSD .LE.(-PSDD*TDELT)) GO TO 325                                MANU3690
      IF(DPSTOP.GE.(PSD*TDELT)) GO TO 321                                MANU3700
  320 CONTINUE                                                           MANU3710
      DPSTOP=DPSTOP+DPSI(2,1)                                            MANU3720
      IF(ICAN.EQ.1.AND.DPSTOP.GT.DSTOP1) GO TO 325                       MANU3730
      IF(DPSTOP.LT.0.) GO TO 320                                         MANU3740
  321 CONTINUE                                                           MANU3750
      QBRAKE=(TORS*PSD**2/(DPSTOP+DPSTOP)-QMR                            MANU3760
      IF(ICAN.NE.2.OR.DPSTOP.GE.FOURPI) QBRAKE=AMIN1(QBRAKE,QXBRAK)      MANU3770
      IF(QBRAKE.GT.QXBRAK) GO TO 320                                     MANU3780
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      OMR=OMR+OBRAKE                                                    MANU3790
      IF(DPSTOP.LT.DPSI(2,1).AND.OBRAKE.LT.OXBRAK) ICAN=1               MANU3800
      IF(ICAN.EQ.1) DSTDP1=DPSTOP+.1                                    MANU3810
      IF(DPSTOP.GT.PSD*TDELT) GO TO 322                                 MANU3820
  325 CONTINUE                                                          MANU3830
      DPSTP=PSISTP-PSIREF(1)                                            MANU3840
      PS(REF(1)=PSISTP                                                  MANU3850
      PS(REF(2)=PSIREF(2)+DPSTP*GEARAT                                  MANU3860
      DO 324 K=1,4                                                      MANU3870
      Y(K,7)=PSISTP                                                     MANU3880
      Y(K,8)=PSIREF(2)                                                  MANU3890
      Y(K,9)=0.                                                         MANU3900
      Y(K,82)=0.                                                        MANU3910
      Y(K,83)=0.                                                        MANU3920
      Y(K,84)=0.                                                        MANU3930
      ISTOP=1                                                           MANU3940
  324 CONTINUE                                                          MANU3950
      GO TO 323                                                         MANU3960
  322 CONTINUE                                                          MANU3970
      Y(I,84)=(OMRS-OMR)*RITORS                                         MANU3980
  323 CONTINUE                                                          MANU3990
      LP=QL-APD*(AYD*DIZIY-ARD*IXZ)                                     MANU4000
      NP=QN-APD*(ARD*D(YIX+AYD*IXZ)                                     MANU4010
      Y(I,76)= XF*RMASS- APD*VZB + AYD*VYB                              MANU4020
      Y(I,77)= YF*RMASS- AYD*VXB + ARD*VZB                              MANU4030
      Y(I,78)= ZF*RMASS- ARD*VYB + APD*VXB                              MANU4040
      AYDD=LP*DPIXZ+NP*DPIX                                             MANU4050
      APDD=(QR-AYD*ARD*DIXIZ+(AYD+ARD)*(AYD-ARD)*IXZ)*RIY               MANU4060
      ARDD=LP*DPIZ+NP*DPIXZ                                             MANU4070
      Y(I,79)=AYDD                                                      MANU4080
      Y(I,80)=APDD                                                      MANU4090
      Y(I,81)=ARDD                                                      MANU4100
      Y(I,82)=Y(I,9)                                                    MANU4110
      Y(I,83)=Y(I,9)*GEARAT                                             MANU4120
      CAPE=COS(APE)                                                     MANU4130
      SAPE=SIN(APE)                                                     MANU4140
      CAPE=COS(APE)                                                     MANU4150
      IF(ABS(CAPE).LT.0.001) GO TO 1                                    MANU4160
      Y(I,85)= (APD*SAPE + AYD*CAPE)/CAPE                               MANU4170
      Y(I,86)= APD*CAPE - AYD*SAPE                                      MANU4180
      Y(I,87)=ARD+Y(I,85)*SIN(APE)                                      MANU4190
      Y(I,88)=Y(I,14)                                                   MANU4200
      BWTDD=BWTM*(GVERT-GPRELD)-BWTC*Y(I,14)-BWTK*DTBWT                 MANU4210
      IF(DTBWT.GT.0..OR.BWTDD.GE.0.) GO TO 668                          MANU4220
      Y(1,13)=0.                                                        MANU4230
      Y(1,14)=0.                                                        MANU4240
      Y(1,88)=0.                                                        MANU4250
      Y(I,88)=0.                                                        MANU4260
      BWTDD=0.                                                          MANU4270
  668 Y(I,89)=BWTDD                                                     MANU4280
      Y(I,90)= XXD                                                      MANU4290
      Y(I,91)= YYD                                                      MANU4300
      Y(I,92)= ZZD                                                      MANU4310
      PSDD=Y(I,84)                                                      MANU4320
```

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      DO 671 N=1,2                                                      MANU4330
      NPSIN=NPSI(N)                                                     MANU4340
      IF(NPSIN.EQ.0) GO TO 671                                          MANU4350
      DO 670 K=1,NPSIN                                                  MANU4360
      Y(I,7*N+K+10)=BETA(K,N)                                           MANU4370
      Y(I,7*N+K+24)=BETAD(K,N)                                          MANU4380
      Y(I,7*N+K+85)=BETAD(K,N)                                          MANU4390
  670 CONTINUE                                                          MANU4400
  671 CONTINUE                                                          MANU4410
      IF(IND.NE.0) GO TO 500                                            MANU4420
      I=I+1                                                             MANU4430
      IF(I.LE.4) GO TO 355                                              MANU4440
      DO 490 I=1,75                                                     MANU4450
      K=I+75                                                            MANU4460
      Y(4,K)=(Y(1,K)+2.*(Y(2,K)+Y(3,K))+Y(4,K))*.1666667                MANU4470
  490 Y(4,I)=Y(1,I)+TDELT*Y(4,K)                                        MANU4480
      IND=1                                                             MANU4490
      I=4                                                               MANU4500
      GO TO 450                                                         MANU4510
  500 DO 495 I=1,150                                                    MANU4520
  495 Y(1,I)=Y(4,I)                                                     MANU4530
      T=T+TDELT                                                         MANU4540
      IND=0                                                             MANU4550
      I=1                                                               MANU4560
      GO TO 210                                                         MANU4570
    1 A4=99999999.                                                      MANU4580
      WRITE (3) IPSN,A4,A                                               MANU4590
      RETURN                                                            MANU4600
      END                                                               MANU4610
```

```
      SUBROUTINE MATRIX (A1,A2,A3,A,N1)                                 MATR0010
      DIMENSION A(9)                                                    MATR0020
C         COMPUTE EULER ANGLE MATRIX A FROM EULER ANGLES A1,A2,A3       MATR0030
C         N1=1 IS FOR USUAL MATRIX                                      MATR0040
C         N1=-1 IS FOR INVERSE OF USUAL MATRIX                          MATR0050
      SA1=SIN(A1)                                                       MATR0060
      SA2=SIN(A2)                                                       MATR0070
      SA3=SIN(A3)                                                       MATR0080
      CA1=COS(A1)                                                       MATR0090
      CA2=COS(A2)                                                       MATR0100
      CA3=COS(A3)                                                       MATR0110
      S1C3=SA1*CA3                                                      MATR0120
      S1S3=SA1*SA3                                                      MATR0130
      C1C3=CA1*CA3                                                      MATR0140
      C1S3=CA1*SA3                                                      MATR0150
      A(1)=CA1*CA2                                                      MATR0160
      A(3-N1)=C1S3*SA2-S1C3                                             MATR0170
      A(5-2*N1)=C1C3*SA2+S1S3                                           MATR0180
      A(3+N1)=SA1*CA2                                                   MATR0190
      A(5)=S1S3*SA2+C1C3                                                MATR0200
      A(7+N1)=CA2*SA3                                                   MATR0210
      A(5+2*N1)=-SA2                                                    MATR0220
      A(7-N1)=S1C3*SA2-C1S3                                             MATR0230
      A(9)=CA2*CA3                                                      MATR0240
      RETURN                                                            MATR0250
      END                                                               MATR0260
```

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C
C       TWO DIMENSIONAL VECTOR TRANSFORMATION                    MICE0010
C       N1=1 IS FOR USUAL                                        MICE0020
C       N1=-1 IS FOR INVERSE                                     MICE0030
      SUBROUTINE MICE (X1,Y1,A,X2,Y2,N1)                         MICE0040
      S=SIN(A)*N1                                                MICE0050
      C=COS(A)                                                   MICE0060
      X2=X1*C-Y1*S                                               MICE0070
      Y2=X1*S+Y1*C                                               MICE0080
      RETURN                                                     MICE0090
      END                                                        MICE0100
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      SUBROUTINE MNEM                                                   MNEM0010
      COMMON /FORCE/ XF,XFRWG,XFLWG,XFELE,XFFUS,XFRJET,                 MNEM0020
     1               XFLJET,XFMR,XFTR,XFGUN,XFFIN,XFW,                  MNEM0030
     2               YF,YFFUS,YFRJET,YFLJET,YFMR,YFTR,                  MNEM0040
     3               YFGUN,YFFIN,YFW,                                   MNEM0050
     4               ZF,ZFRWG,ZFLWG,ZFELE,ZFFUS,ZFRJET,                 MNEM0060
     5               ZFLJET,ZFMR,ZFTR,ZFGUN,ZFW,                        MNEM0070
     6               QL,LRWG,LLWG,LFLE,LFUS,LRJET,LLJET,                MNEM0080
     7               LMR,LTR,LGUN,LFIN,LQMR,LQTR,                       MNEM0090
     8               QM,MRWG,MLWG,MELE,MFUS,MRJET,MLJET,                MNEM0100
     9               MMR,MTR,MGUN,MFIN,MQMR,MQTR,                       MNEM0110
     A               QN,NRWG,NLWG,NELE,NFUS,NRJET,NLJET,                MNEM0120
     B               NMR,NTR,NGUN,NFIN,NQMR,NQTR                        MNEM0130
      COMMON /STRIAB/ D(21),DT(21),E(70),F(10),X(10),                   MNEM0140
     1               DL,DM,DN,DX,DY,DZ,IX,IY,IZ,PD(10,11),              MNEM0150
     2               DTR,EPD,ERR(10),KM1,RHO,                           MNEM0160
     3               R12,SPD(6,6,3),XRW(21),XEL(14),                    MNEM0170
     4               XEP(7),XFC(28),XFN(7),XFS(35),                     MNEM0180
     5               XGN(7),XIT(21),XMR(49),XTR(49),                    MNEM0190
     6               XWG(21),YMR(21),YTR(21),YWG(21),                   MNEM0200
     7               YEL(21),YFN(21),BLCG,DAMP,DEPD(10),                MNEM0210
     8               EPDS,EPDX(10),MASS,QSV),TMRS,TTRS,                 MNEM0220
     9               WLCG,XCON(63),XJET(14),XMIN,AYFFP,                 MNEM0230
     A               BETAES(2),CNPCD,DHADQ,DYBDR,GUESS,                 MNEM0240
     B               NPASS,PDPHI(10,11),STACG,TZERO,                    MNEM0250
     C               XMAST,DHADAQ,DQDCOL,DTR3SQ,DYBDBR,                 MNEM0260
     D               ENGRPM,MXPASS,PSD30P,TR(ND1,XL1M(T                 MNEM0270
      COMMON /STRIMA/ AY,VH,AGW,DT)(2),DT2(2),IXZ,                      MNEM0280
     1               QMR,XXD,YYD,ZZD,ALGF,APFP,AYFP,                    MNEM0290
     2               CGWL,COLL(6),CYCF(3),CYCL(3),                      MNEM0300
     3               DIST,KCIT(20),PFDA(3),QMAX,                        MNEM0310
     4               QMRS,TIMF,TMAX,XCIT(20,6),ALGF7,                   MNEM0320
     5               ALGF1,ALGF2,CGSTA,CPWIC,DIXIZ,                     MNEM0330
     6               DIY(X,DIZIY,DTZMT,DTZM),DTZT1,FTKTS,               MNEM0340
     *               HURKM(2,2),HURKI(2,2),                             MNEM0350
     7               KREAD,PIU30,TSTAB(14),ZMAX2,ZMAX3,                 MNEM0360
     8               ASFCOL,CYPWIC,GEARAT,PSD55O,                       MNEM0370
     9               PSISTP,QXBRAK,RUD1NO,ZDELT1,ZDELT2                 MNEM0380
      COMMON /STAMAN/ HL(2),XX,YY,AYI,GOV,KPD,QPC,QQQ,                  MNEM0390
     1               RIY,APBG,ARBG,ASFP,AYBG,BWTC,                      MNEM0400
     2              RC,BWTK,BWTM,CGBL,DBIX,DPIZ,                        MNEM0410
     3               EHPT(2),R55O,ALERT,AYDMX,DELT2,                    MNEM0420
     4               DP1X7,DTBWT,DWLCG,HDELT,KGUST,                     MNEM0430
     5               HLTR1,HLTR2,ITORS,KTCTR,OMEGM,                     MNEM0440
     6               PCDEL,QMRSA,RMASS,TRALT,TWOP1,VGUST,               MNEM0450
     7               ISTOP,XAGUN,XAPYL,XARSP(2),YAGUN,                  MNEM0460
     8               YARSP(2),YGUST,ZAGUN,ZAPYL,ZARSP(2),               MNEM0470
     9               DELT2R,DSTACG,EIMAST,GPRELD,HLPYLD,                MNEM0480
     A               IBRAKE,OMEGMO,QBRAKE,BETAZS(2),                    MNEM0490
     B               PCGDED,PCGMAX,PCRATE,PSIDTR,RDELT1,                MNEM0500
     C               RDELT2,RITORS,TRIND7                               MNEM0510
      COMMON /MANAL/  Q,AP,PED,QWG,TZM,TIM,T2M,                         MNEM0520
     1               TZT,T1T,T2T,ALEL,CZET,PSDD,                        MNEM0530
     2               SZET,TAXL,TAXR,XAWG,XLNK(16),ZAWG,                 MNEM0540
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3                 ALCYP,ALFIN,ALLWG,ALRWG,CDELE,CDFIN,                  MNEM0550
4                 CDLWG,CDRWG,CLELE,CLFIN,CLLWG,CLRWG,CWING,            MNEM0560
5                 CYCR1,CYCR2,CZET4,CZET6,CZET9,RANGE,                  MNEM0570
6                 SZET5,SZET7,SZETA,WGCOL,XAELE,XAFIN,                  MNEM0580
7                 XAFUS,XAJET,YAFIN,ZAELE,ZAFIN,ZAFUS,                  MNEM0590
*                 YAELE,YAFUS,YALWG,YARWG,YALJET,YARJET,                MNEM0600
R                 ZAJET,ALECR1,ALGFPD,BOTTOM,CZET11,                    MNEM0610
9                 CZET12,CZET13,EIZETA,HALFPI,SZET1D,                   MNEM0620
A                 XAPYLD,YGUSTW,ZAPYLD,ZFLWG1,ZFRWG1                    MNEM0630
B                 ,TZMS,T1MS,T2MS,TZTS,T1TS,T2TS,                       MNEM0640
C                 CLOCK,FLOCK,XLOCK,TCLOCK                              MNEM0650
 COMMON /ROMAN/   ZZ,VXS(2),VYS(2),VZS(2),BETA(12,2),                   MNEM0660
*                 T,PCC(2),COSE(7,7,2),BETAN(2),BETAX(2),BETAZ(2),      MNEM0670
*                 AIB(2),APDD,ARDD,AYDD,AIR(2),                         MNEM0680
1                 DPS((12,2),DTPR,NPS((2),ZZTR,                         MNEM0690
2                 BETAD(12,2),BNPSI(2),                                 MNEM0700
3                 COND2,GMAXV,RATE1,RATE2,STOP2,                        MNEM0710
4                 THROT(2),TRIND,XGUST,BETAZD(2),GMAXV1,                MNEM0720
5                 GMAXV2,GMAXV3,GUSTYP,HNPSIR(2),                       MNEM0730
6                 HURKPS,HUBKRS,HUBTPS,HUBTRS,                          MNEM0740
7                 KONFIG,LNGTH1,PILGH1,PSIREF(2),                       MNEM0750
8                 START2,XMOMLI(12,2),                                  MNEM0760
9                 RM,RTR,ORM,ORTR,T1MT,T1TT,                            MNEM0770
A                 T2MT,T2TT,TZMT,TZTT,XMA1,XMA1T,                       MNEM0780
B                 XMB1,XMB1T,A1RPM,A1BPT,A1BPM,A1BRT,                   MNEM0790
C                 APTD,APTTD,ARTD,ARTTD,PSD,PSDT,                       MNEM0800
D                 XSTAHM,XSTAHT,YSTAHM,YSTAHT,                          MNEM0810
E                 HUBKP,HUBKTP,HUBKR,HUBKTR                             MNEM0820
F                 ,AZETA,AZETAT,VZETA,VZETAT                            MNEM0830
 COMMON /MANARO/  (,V,(ND,NWAG,APRMT,ARBMT,AYBMT,BETAO(2),TDELT,        MNEM0840
1                 BETABE(2),HGUSTE,HGUSTF,HGUSTW,VGUSTE,                MNEM0850
2                 VGUSTW,YGUSTF,GFWD,GLAT,GVERT,                        MNEM0860
3                 VXB,VZB,APD,VYR,ARD,AYD,                              MNEM0870
4                 COLSTK,CYSTK1,CYSTK2,PEDAL,AYE,                       MNEM0880
5                 APE,ARE,A1M,B1M,A1TR,B1TR,                            MNEM0890
6                 XAR(2),YAR(2),ZAR(2),                                 MNEM0900
7                 V(MR,V(TR,ZETA,ZETATR,HMR,HTR,                        MNEM0910
8                 TMR,TTR,OMX,OTR,YMRF,YTRF                             MNEM0920
 COMMON /STANRO/  J,W,(TM,VMS(2),L(NR,QFLE,VROT(2),                     MNEM0930
1                 VSND,YF(N(2),ZFEL(2),A1BAL(2),                        MNEM0940
2                 B1BAL(2),COND1,SWING,P(LGH2,PWGEL1,                   MNEM0950
3                 BM,BTR,PMOMM,PMOMT,RMOMM,RMOMT                        MNEM0960
 COMMON /ROSTAR/  AM(2),CT,PI,XB(2),ALT,ADR(2),FXH(2),                  MNEM0970
1                 VXR(2),RBM(2),SWC(2),UMS,CDHR(2),LROT(2),             MNEM0980
2                 TAIR(2),RTRP(2),TAIR(14),CONEK(2),DCAFR(2),FV(ND,     MNEM0990
*                 NVARD,                                                MNEM1000
3                 SWXR1(2),SWXR2(2),T(P18(2),T(P38(2),                  MNEM1010
4                 TWIST(20,2),CLRADK(2),DELTA3(2),                      MNEM1020
5                 LAMBDA(2),UPGUST,URGUST,UTGUST,WROTOR,                MNEM1030
6                 ERM,ERTR,ERXM,ERXT,                                   MNEM1040
7                 XLMAXM,XLMAXT,XLMINM,XLM(NT                           MNEM1050
 COMMON /TOPLOT/  AM(3),AL(3),EXIT,ICOM(49),IPSN,                       MNEM1060
1                 NPART,NVARA,NVARR,NVARC,NSCALE                        MNEM1070
1                 ,NVARS,NPR(NT,NT(MF                                   MNEM1080
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      COMMON /STARAN/ RH(2),C3,C4,RW,CLP,CLR,DCD,DQL,DQN,VIM,          MNEM1090
     1                RAIR(2),CLRO,CNRO,ETAQ ,NJET,                   MNEM1100
     2                QF(N,                                           MNEM1110
     3                VIER,CLACL,YFS(14),                             MNEM1120
     4                CNBCL,CNPCL,CNPCO,CNRCL,COLKS,DAELF,            MNEM1130
     5                FNSWC,LWING,PMRFL,PMRWG,                        MNEM1140
     6                PTREN,RPIST,VMAXE,VAERO(31,5),                  MNEM1150
     7                APBJET,ARBJET,AYBJET,                           MNEM1160
     8                CNPCO1,CNPCO2,COLJET,DZWGEL,DZWGEL,             MNEM1170
     9                ETAQMX,PWGWKI,RCWING,SWINGM,                    MNEM1180
     A                VENTER,VXMVER                                   MNEM1190
      COMMON /FORV/    V(4,150)                                        MNEM1200
      REAL IX,IY,IZ,IXZ,MASS,ITORS,LLJET,LRJET,MLJET,MRJET,NLJET,NRJET MNEM1210
      DIMENSION FOR(71)                                               MNEM1220
      EQUIVALENCE (XF,FOR(1))                                         MNEM1230
      NVARO=0                                                         MNEM1240
      IF(NVARC.NE.2) GO TO 102                                        MNEM1250
      NVARO=1                                                         MNEM1260
      NVARC=0                                                         MNEM1270
      GO TO 100                                                       MNEM1280
  102 CONTINUE                                                        MNEM1290
      IF(NVARC.NE.0) NVARC=1                                          MNEM1300
  100 CONTINUE                                                        MNEM1310
      TRIND2=1.-TRIND                                                 MNEM1320
      CALL TINIT (TAIR)                                               MNEM1330
      ALEL=0.                                                         MNEM1340
      ALFIN=0.                                                        MNEM1350
      ALLWG=0.                                                        MNEM1360
      ALRWG=0.                                                        MNEM1370
      APD=0.                                                          MNEM1380
      APDD=0.                                                         MNEM1390
      APBJET=0.                                                       MNEM1400
      ARD=0.                                                          MNEM1410
      ARDD=0.                                                         MNEM1420
      AYD=0.                                                          MNEM1430
      AYDD=0.                                                         MNEM1440
      BETAE(1)=0.                                                     MNEM1450
      BETAE(2)=0.                                                     MNEM1460
      BETAO(1)=0.                                                     MNEM1470
      BETAO(2)=0.                                                     MNEM1480
      CDLWG = 0.                                                      MNEM1490
      CDRWG = 0.                                                      MNEM1500
      CDELE = 0.                                                      MNEM1510
      CDFIN = 0.                                                      MNEM1520
      CLLWG = 0.                                                      MNEM1530
      CLRWG = 0.                                                      MNEM1540
      CLELE = 0.                                                      MNEM1550
      CLFIN = 0.                                                      MNEM1560
      DQL=0.                                                          MNEM1570
      DQN=0.                                                          MNEM1580
      ETAQ=0.                                                         MNEM1590
      EXIT=0.                                                         MNEM1600
      GUSTYP=0.                                                       MNEM1610
      HGUSTE=0.                                                       MNEM1620
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      HGUSTF=0.                                                         MNEM1630
      HGUSTW=0.                                                         MNEM1640
      HMR=0.                                                            MNEM1650
      HTR=0.                                                            MNEM1660
      IND=1                                                             MNEM1670
      NWAG=0                                                            MNEM1680
      PSDD=0.                                                           MNEM1690
      QMX=0.                                                            MNEM1700
      QTR=0.                                                            MNEM1710
      SWC(1)=1.                                                         MNEM1720
      UPGUST=0.                                                         MNEM1730
      UTGUST=0.                                                         MNEM1740
      URGUST=0.                                                         MNEM1750
      VGUSTF=0.                                                         MNEM1760
      VGUSTW=0.                                                         MNEM1770
      VIER=0.                                                           MNEM1780
      VIW=0.                                                            MNEM1790
      XMA1 =0.                                                          MNEM1800
      XMB1 =0.                                                          MNEM1810
      XMA1T=0.                                                          MNEM1820
      XMB1T=0.                                                          MNEM1830
      YGUSTF=0.                                                         MNEM1840
      YGUSTW=0.                                                         MNEM1850
      YMRF=0.                                                           MNEM1860
      YTRF=0.                                                           MNEM1870
      PSD550=PSD*R550                                                   MNEM1880
      DO 307 I=1,71                                                     MNEM1890
      FOR(I)=0.                                                         MNEM1900
  307 CONTINUE                                                          MNEM1910
      DO 308 J=1,150                                                    MNEM1920
      DO 308 I=1,4                                                      MNEM1930
      Y(I,J)=0.                                                         MNEM1940
  308 CONTINUE                                                          MNEM1950
      CALL NOPSI1 (NPSI,HNPSIR,BNPSI,DPSI)                              MNEM1960
      DIZIY=IZ-IY                                                       MNEM1970
      DIXIZ=IX-IZ                                                       MNEM1980
      DIYIX=IY-IX                                                       MNEM1990
                                                                        MNEM2000
      SET UP CURVE FOR EFFECT OF MAIN ROTOR WAKE ON THE ELEVATOR.       MNEM2010
          THIS CURVE CAN BE REPRESENTED BY THREE STRAIGHT LINES - ZERO  MNEM2020
          BEFORE THE VELOCITY IS GREAT ENOUGH  TO CAUSE AN EFFECT ON    MNEM2030
          THE ELEVATOR,VENTER; A LINE WITH CONSTANT SLOPE FROM VENTER   MNEM2040
          TO A VELOCITY WHICH PRODUCES A MAXIMUM EFFECT,VMAXE; AND A    MNEM2050
          CONSTANT AT VMAXE AND GREATER.                                MNEM2060
                                                                        MNEM2070
      VXMVER=PMREL                                                      MNEM2080
      IF(VMAXE.NE.VENTER) VXMVER=PMREL/(VMAXE-VENTER)                   MNEM2090
      IF(XLMINM.LE.0..OR.XLMINM.GT.DTR) XLMINM=.3490658E-02             MNEM2100
      IF(XLMINT.LE.0..OR.XLMINT.GT.DTR) XLMINT=.3490658E-02             MNEM2110
      IF(ERXM.LT.750.) ERXM=750.                                        MNEM2120
      IF(ERXT.LT.750.) ERXT=750.                                        MNEM2130
      XLMAXM=8.*XLMINM                                                  MNEM2140
      XLMAXT=8.*XLMINT                                                  MNEM2150
      IF(XMIN.LT..8726646E-03) XMIN=DTR                                 MNEM2160
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      IF(XMIN.GT.DTR) XMIN=DTR                                          MNEM2170
      IF(XLIMIT.LT.1.5*DTR).OR.XLIMIT.GT..1745329) XLIMIT=DTR           MNEM2180
      IF(DAMP.LT.(40.*ERR(1))) DAMP=40.*ERR(1)                          MNEM2190
      YAR(1)=YARSP(1)                                                   MNEM2200
      YALWG=-YARWG                                                      MNEM2210
      YALJET=-YARJET                                                    MNEM2220
      IF(TRIND.NE.0..AND.ABS(XARSP(1)-XARSP(2)).LE.5.) TRIND1=1.        MNEM2230
      KONFIG=1.+TRIND+TRIND1                                            MNEM2240
      CALL CON2 (XCON,XLNK,KONFIG,RUD(ND)                               MNEM2250
      RC=0.                                                             MNEM2260
      IF(XMR(14).NE.0.) RC=AM(I)/W                                      MNEM2270
      IF(KONFIG.EQ.3) RC=RC*2.*BM                                       MNEM2280
      CALL TILT1 (KONFIG)                                               MNEM2290
      CALL TILT (XAR,ZAR,CGWL,COLL,ZETA,CGSTA)                          MNEM2300
      CALL TFSA (XAR,BETAZ,CGSTA)                                       MNEM2310
      CALL HSAF (XAR,YAR,DPS(,NPS(,CGSTA,PSIREF)                        MNEM2320
      XAR(2)=XARSP(2)+HL(2)*SIN(ZETATR)                                 MNEM2330
      CZTR=COS(ZETATR)                                                  MNEM2340
      HLTR1=HL(2)*TRIND                                                 MNEM2350
      YAR(2)=YARSP(2)-HLTR2*CZTR                                        MNEM2360
      ZAR(2)=ZARSP(2)-HLTR1*CZTR                                        MNEM2370
      CALL RATS (XXD,YYD,ZZD,AYE,APE,ARE,VXB,VYB,VZB,-1)                MNEM2380
      V=SQRT(XXD**2+YYD**2+ZZD**2)                                      MNEM2390
      CALL TURN (XFC,V,ARE)                                             MNEM2400
      WROTOR=1350.*TRIND1                                               MNEM2410
      RW=1./W                                                           MNEM2420
      MASS= W/32.17                                                     MNEM2430
      IF(EPDS.EQ.0.) EPDS=.3                                            MNEM2440
      ARWING=YWG(1R)                                                    MNEM2450
      IF(ARWING.EQ.0.) ARWING=10.                                       MNEM2460
      SWING=SQRT(XWG(1)*ARWING)                                         MNEM2470
      CWING=SWING/ARWING                                                MNEM2480
      RCWING = 0.                                                       MNEM2490
      IF(CWING.NE.0.) RCWING = 1./CWING                                 MNEM2500
      CAGW=COS(AGW)                                                     MNEM2510
      CWG6=.6*CWING                                                     MNEM2520
      YAERO(19,3)=YAERO(13,3)/YAERO(17,3)                               MNEM2530
      RPIST=.35*CAGW/(HALFPI-YAERO(19,3))                               MNEM2540
      DXWGEL=XAWG-XAELE+CWG6*CAGW                                       MNEM2550
      DZWGEL=ZAWG-ZAELE+SIN(AGW)*CWG6                                   MNEM2560
      SWINGH=.5*SWING                                                   MNEM2570
      CNPCD1=CNPCD*YAERO(13,3)                                          MNEM2580
      CNPCD2=CNPCD*2.*YAERO(14,3)*ARWING/(3.+ARWING)                    MNEM2590
C                                                                       MNEM2600
C     IF THERE ARE NO JETS CALCULATE FORCES AND MOMENTS AND USE THE     MNEM2610
C        VALUE OF COLJET TO PREVENT FURTHER CALCULATIONS LATER IN THE   MNEM2620
C        PROGRAM                                                        MNEM2630
C                                                                       MNEM2640
      IF(NJET.EQ.0) COLJET=0.                                           MNEM2650
      CALL RATS(TAXL,0.,0.,-AYRJET,APBJET,ARBJET,XFLJET,YFLJET,ZFLJET,1)MNEM2660
      CALL DOGS (XAJET,YALJET,ZAJET,XFLJET,YFLJET,ZFLJET,LLJET,MLJET,   MNEM2670
     1    NLJET)                                                        MNEM2680
      CALL RATS (TAXR,0.,0.,AYBJET,APRJET,ARBJET,XFRJET,YFRJET,ZFRJET,1)MNEM2690
      CALL DOGS (XAJET,YARJET,ZAJET,XFRJET,YFRJET,ZFRJET,LRJET,MRJET,   MNEM2700
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     1    NRJET)                                                          MNEM2710
          AYBMT=ZETATR*TRIND2                                             MNEM2720
          APBMT=-ZETATR*TRIND                                             MNEM2730
          ARBMT=HALFPI*TRIND2                                             MNEM2740
          ZZTR=TRALT-ZZ*TRIND                                             MNEM2750
          CYCR1=CYSTK1*CYCF(3)+CYCF(2)                                    MNEM2760
          CYCR2=CYSTK2*CYCL(3)+CYCL(2)                                    MNEM2770
          PED=PEDAL*PEDA(3)+PEDA(2)                                       MNEM2780
          COLKS=COLSTK                                                    MNEM2790
          CALL SWAS1 (KONFIG)                                             MNEM2800
          CALL SWAS (COLSTK)                                              MNEM2810
          IF(GUESS.EQ.2) GO TO 58                                         MNEM2820
C                                                                         MNEM2830
C         ORIGINATE GUESS FOR THRUST AND FLAPPING.                        MNEM2840
C                                                                         MNEM2850
          XFWG = 0.                                                       MNEM2860
          ZFWG = 0.                                                       MNEM2870
          IF(QWG.LT.0) GO TO 51                                           MNEM2880
          AP=0.                                                           MNEM2890
          IF(VXB.NE.0.0.OR .VZB.NE.0.) AP=ATAN2(VZB,VXB)                  MNEM2900
          ALWG=AGW+AP                                                     MNEM2910
          XMAC=V*VSND                                                     MNEM2920
          CALL CLCD (ALWG,CL,CD,XMAC,EXIT,3)                              MNEM2930
          IF(EXIT.NE.0.) RETURN                                           MNEM2940
          CALL MICE (-CD,-CL,AP,C1,C2,1)                                  MNEM2950
          VQWG = 2.*V*V*QWG                                               MNEM2960
          ZFWG = VQWG*C2                                                  MNEM2970
          XFWG = VQWG*C1                                                  MNEM2980
    51    CALL RATS (0.,0.,W,AYE,APE,ARE,XFW,YFW,ZFW,-1)                  MNEM2990
          DF=Q*V*V*(YFS(7)+1.)+XFWG                                       MNEM3000
          THR=((ZFW+ZFWG)*CZET+DF*SZET)*(1.-.5*TRIND)                     MNEM3010
          TTR=125.*BTR*TRIND2+THR*TRIND                                   MNEM3020
          IF(GUESS.NE.0.) GO TO 58                                        MNEM3030
          IF(ORM.GT.RM) GO TO 52                                          MNEM3040
          WRITE(6,53)                                                     MNEM3050
          EXIT = 1.                                                       MNEM3060
          RETURN                                                          MNEM3070
    52    CONTINUE                                                        MNEM3080
          ALFI=APE-APFP                                                   MNEM3090
          THTM=TZM-TWIST(3*NXR(1)/4.1)                                    MNEM3100
          ALF=ZETA+TIM-ALFI                                               MNEM3110
          XMU=V/ORM*COS(ALF)                                              MNEM3120
          XLM=V/ORM*SIN(ALF)                                              MNEM3130
          AIM=XMU*(2.666667*THTM+2.*XLM)/(1.-.5*XMU**2)-TIM               MNEM3140
          BIM=TZM                                                         MNEM3150
          THTT=TZT-TWIST(3*NXR(2)/4.2)                                    MNEM3160
          ALF=ZETATR+TIT-ALFI*TRIND-(AYE-AYFP)*TRIND2                     MNEM3170
          XMU=V/ORTR*COS(ALF)                                             MNEM3180
          XLM=V/ORTR*SIN(ALF)                                             MNEM3190
          AITR=XMU*(2.666667*THTT+2.*XLM)/(1.-.5*XMU**2)-TIT              MNEM3200
          BITR=TZT                                                        MNEM3210
    58    CONTINUE                                                        MNEM3220
          VIMR = 0.                                                       MNEM3230
          VITR = 0.                                                       MNEM3240
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      IF(BM.EQ.0.) TMR=0.                                                    MNEM3250
      IF(BTR.EQ.0.) TTR=0.                                                   MNEM3260
      IF(TMR.EQ.0..OR.ORM.LE.RM) GO TO 59                                    MNEM3270
      ALT=-ZZ                                                                MNEM3280
      CALL RATS (VXB,VYB,VZB,0.,-ZETA,0.,VXS(1),VYS(1),VZS(1),-1)            MNEM3290
      VROT(1)=V                                                              MNEM3300
      VHS=VXS(1)**2+VYS(1)**2                                                MNEM3310
      CT=TMR*RTRP(1)                                                         MNEM3320
      CALL VIND (1,EXIT)                                                     MNEM3330
      CALL RATS (VXB,VYB,VZB,AYBMT,APRMT,ARBMT,VXS(2),VYS(2),VZS(2),-1)      MNEM3340
      ALT=ZZTR                                                               MNEM3350
      VROT(2)=V                                                              MNEM3360
      VHS=VXS(2)**2+VYS(2)**2                                                MNEM3370
      CT=TTR*RTRP(2)                                                         MNEM3380
      CALL VIND (2,EXIT)                                                     MNEM3390
   59 CONTINUE                                                               MNEM3400
      Y(1,90)=XXD                                                            MNEM3410
      Y(1,91)=YYD                                                            MNEM3420
      Y(1,92)=ZZD                                                            MNEM3430
      RAIB(2)=BAIB(2)*GEARAT                                                 MNEM3440
      IF(PSD.NE.0.) GO TO 73                                                 MNEM3450
      DO 72 N=1,2                                                            MNEM3460
      BETAN(N)=BETAZ(N)                                                      MNEM3470
      BETAX(N)=BETAZ(N)                                                      MNEM3480
   72 CONTINUE                                                               MNEM3490
      XFC(23)=2.                                                             MNEM3500
      A1M=0.                                                                 MNEM3510
      B1M=0.                                                                 MNEM3520
      A1TR=0.                                                                MNEM3530
      B1TR=0.                                                                MNEM3540
      GO TO 67                                                               MNEM3550
   73 CONTINUE                                                               MNEM3560
      IF(XFC(23).NE.1.) GO TO 66                                             MNEM3570
      IBRAKE=0                                                               MNEM3580
      PSD=0.                                                                 MNEM3590
      PSDT=0.                                                                MNEM3600
   67 CONTINUE                                                               MNEM3610
      NPSI(1)=BM                                                             MNEM3620
      NPSI(2)=BTR                                                            MNEM3630
      ITM=0                                                                  MNEM3640
   66 CONTINUE                                                               MNEM3650
      LINK=1                                                                 MNEM3660
      PSISTP=0.                                                              MNEM3670
      IF(NPART.NE.2) GO TO 109                                               MNEM3680
      WRITE (6,108)                                                          MNEM3690
      IF(NVARB.NE.0) GO TO 103                                               MNEM3700
      WRITE (6,104)                                                          MNEM3710
      GO TO 105                                                              MNEM3720
  103 WRITE (6,104) NVARB                                                    MNEM3730
  105 WRITE (6,107) TZERO,ZDELT1,TMAX,ZDELT2,ZMAX2,ZMAX3                     MNEM3740
      CALL IVAR (EXIT,LINK,TAXL,TAXR,PILGM2,A1M,B1M,A1TR,B1TR)               MNEM3750
  109 CONTINUE                                                               MNEM3760
      IF(XFC(23).NE.1.) GO TO 65                                             MNEM3770
      CALL NOPSI1 (NPSI,MNPSIR,NNPSI,DPSI)                                   MNEM3780
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      DO 64 N=1,2                                                       MNEM3790
      PSIREF(N)=PSISTP                                                  MNEM3800
      IF(KONFIG.EQ.3) GO TO 62                                          MNEM3810
      BETAN(N)=0.                                                       MNEM3820
      BETAZ(N)=0.                                                       MNEM3830
      BETAX(N)=0.                                                       MNEM3840
      IF(N.EQ.2) GO TO 64                                               MNEM3850
      DO 61 K=1,12                                                      MNEM3860
      DPSI(K,N)=0.                                                      MNEM3870
      IF(K.GT.7) GO TO 61                                               MNEM3880
      DO 60 L=1,7                                                       MNEM3890
      COSE(K,L,N)=1.                                                    MNEM3900
   60 CONTINUE                                                          MNEM3910
   61 CONTINUE                                                          MNEM3920
      GO TO 64                                                          MNEM3930
   62 CONTINUE                                                          MNEM3940
      BETAZ(N)=-HALFPI                                                  MNEM3950
      BETAN(N)=-HALFPI                                                  MNEM3960
      BETAX(N)=-HALFPI                                                  MNEM3970
      NPSIN=NPSI(N)                                                     MNEM3980
      DO 63 K=1,NPSIN                                                   MNEM3990
      BETA(K,N)=-HALFPI                                                 MNEM4000
   63 CONTINUE                                                          MNEM4010
   64 CONTINUE                                                          MNEM4020
   65 CONTINUE                                                          MNEM4030
      IF(NPART.NE.2) RETURN                                             MNEM4040
C                                                                       MNEM4050
C     INITIALIZE VARIABLES ONLY IF A MANEUVER IS CALLED FOR.            MNEM4060
C                                                                       MNEM4070
      ITORS=BAIB(1)+BAIB(2)                                             MNEM4080
      IF(ITORS.NE.0.) RITORS=1./ITORS                                   MNEM4090
      LWING=0                                                           MNEM4100
      CALL WAG1                                                         MNEM4110
      RMASS=1./MASS                                                     MNEM4120
      RIY=1./IY                                                         MNEM4130
      DP = IX*IZ - IXZ*IXZ                                              MNEM4140
      IF(DP.EQ.0.) GO TO 70                                             MNEM4150
      DPIXZ=IXZ/DP                                                      MNEM4160
      DPIX=IX/DP                                                        MNEM4170
      DPIZ=IZ/DP                                                        MNEM4180
      Y(1,9)=PSD                                                        MNEM4190
      Y(1,17)=ZZ                                                        MNEM4200
      Y(1,82)=PSD                                                       MNEM4210
      Y(1,83)=PSDT                                                      MNEM4220
      RETURN                                                            MNEM4230
   70 CONTINUE                                                          MNEM4240
      EXIT=1.                                                           MNEM4250
      WRITE (6,71)                                                      MNEM4260
      RETURN                                                            MNEM4270
   53 FORMAT('0 FLAPPING ANGLES CANNOT BE ESTIMATED FOR A STOPPED',     MNEM4280
     1       ' ROTOR. ')                                                MNEM4290
   71 FORMAT ('0 CHECK INPUT FUSELAGE INERTIAS. THE NUMBERS INPUT ARE PHMNEM4300
     1YSICALLY IMPOSSIBLE AND CANNOT BE HANDLED BY THIS PROGRAM.')      MNEM4310
  100 FORMAT (1HI)                                                      MNEM4320
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104 FORMAT (1HO,46X,'WAGNER AND BUETTIKER FUNCTIONS (NACTIVE')          MNEM4330
106 FORMAT (1HO,40X,'WAGNER AND BUETTIKER FUNCTIONS ACTIVE ON TIME STEMNEM4340
   1P',I2)                                                             MNEM4350
107 FORMAT (1HO,54X,23HINPUT DATA FOR MANEUVER/1HO,34X, 'START     DEL MNEM4360
   1T1       MAX1      DELT2       MAX2       MAX3'/35X,          '(SEC)   MNEM4370
   2  (SEC)      (SEC)      (SEC)      (SEC)      (SEC)'/1H,29X,6F10.3     MNEM4380
   3    //35X,      61HJ  XCIT(J,1)     (J,2)      (J,3)      (J,4)      (MNEM4390
   4J,5)      (J,6))                                                   MNEM4400
    END                                                                 MNEM4410
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      SUBROUTINE MODE (PD,V,IMODE)                                          MODE0010
      COMMON /TRONIC/ UU(6),VV(6),TAU(22),DAMP(22),NUMRTS,GAINB,            MODE0020
     1                INDEX,STGAIN(6),TSTAR,COELTD,SLOT(3,9)               MODE0030
      DIMENSION PD(10,11),SLT(3,9),ISLOT(2,2)                               MODE0040
      DIMENSION HEAD(3,2,2),HEAD1(3,3,2)                                    MODE0050
      DATA HEAD /'LAT CYCLIC  PEDAL       F/A CYCLIC  COLLECTIVE  '/        MODE0060
      DATA HEAD1/'SDE.SLP.ANG.ROLL ANGLE  YAW RATE    FWD. VEL.   ANG. OMODE0070
     1F ATK.PITCH ANGLE '/                                                  MODE0080
      DATA ISLOT /3,4,2,1/                                                  MODE0090
      COLD=COELTD                                                           MODE0100
      WRITE (6,299)                                                         MODE0110
      ISLTE=0                                                               MODE0120
      INDEX=0                                                               MODE0130
      KSLTT=-2                                                              MODE0140
      DO 10 I=1,3                                                           MODE0150
      KSLTT=KSLTT+3                                                         MODE0160
      CALL SLTT (SLT,SLOT,KSLTT)                                            MODE0170
      ISLTE=ISLTE+3                                                         MODE0180
      DO 9 J=1,2                                                            MODE0190
      JSLTE=ISLOT(J,IMODE)                                                  MODE0200
      CALL SLTE (PD,ISLTE,JSLTE,IMODE)                                      MODE0210
      COELTD=COELTD/COLD                                                    MODE0220
      IF(I.EQ.1.AND.IMODE.EQ.2) COELTD=COELTD*V                             MODE0230
      CALL SLEC (GAINT)                                                     MODE0240
      INDEX=INDEX+1                                                         MODE0250
      STGAIN(INDEX)=GAINT*COELTD/GAINB                                      MODE0260
      WRITE (6,301) (HEAD1(L,I,IMODE),L=1,3),(HEAD(L,J,IMODE),L=1,3),       MODE0270
     1       (UU(L),VV(L),L=1,3),COELTD                                     MODE0280
    9 CONTINUE                                                              MODE0290
      CALL SLTT (SLOT,SLT,KSLTT)                                            MODE0300
   10 CONTINUE                                                              MODE0310
      DO 669 I=19,21                                                        MODE0320
      IF(TAU(I).NE.0..OR.DAMP(I).NE.0.) GO TO 669                           MODE0330
      N=I                                                                   MODE0340
      GO TO 673                                                             MODE0350
  669 CONTINUE                                                              MODE0360
      GO TO 674                                                             MODE0370
  673 CONTINUE                                                              MODE0380
      DO 668 I=N,21                                                         MODE0390
      DAMP(I)=DAMP(I+1)                                                     MODE0400
      TAU(I)=TAU(I+1)                                                       MODE0410
  668 CONTINUE                                                              MODE0420
  674 CONTINUE                                                              MODE0430
      WRITE (6,300) (((HEAD1(I,J,IMODE),I=1,3),(HEAD(I,K,IMODE),I=1,3),     MODE0440
     1               (TAU(I+3*(K+2*J-3)),DAMP(I+3*(K+2*J-3)),I=1,3),       MODE0450
     2               STGAIN(K+2*J-2),K=1,2),J=1,3),                        MODE0460
     3               (TAU(I),DAMP(I),I=19,21),GAINB,TSTAR                  MODE0470
      RETURN                                                                MODE0480
  299 FORMAT(1H0,   57X,'FREQUENCY RESPONSE',/1X,'DEPENT.VAR.     INDEP.MODE0490
     1 VAR.       REAL1          IMAG1          REAL2          IMAG2       MODE0500
     2REAL3          IMAG3       GAIN')                                   MODE0510
  300 FORMAT ('0DEP.  VAR.        INDEP. VAR.',6X,'TAU',                    MODE0520
     1          12X,'DAMP',9X,'TAU',9X,'DAMP',12X,'TAU',                   MODE0530
     2          11X,'DAMP',5X,'STATIC GAIN'/                               MODE0540
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     3         6(1H ,3A4,5X,3A4,7G14.6/)/                                      MODE0550
     4         '0D E N O M I N A T O R',8X,7G14.6/                             MODE0560
     5           ' ALL ROOTS, FREQUENCIES, PERIODS, AND TIME TO HALF OR        MODE0570
     6DOUBLE AMPLITUDE ARE IN REAL SECONDS'/                                   MODE0580
     7         ' ALL MAGNITUDES AND PHASE ANGLES HAVE BEEN DETERMINED FROMODE0590
     8M ROOTS IN AIR SECONDS'/                                                 MODE0600
     9         ' GAINS ARE DETERMINED FROM ROOTS IN REAL SECONDS'/             MODE0610
     A         ' ALL STATIC GAINS ARE IN NATURAL UNITS PER INCH OF STICKMODE0620
     B'/                                                                       MODE0630
     C         ' T* = ',G13.5)                                                 MODE0640
   301 FORMAT(1H ,3A4,5X,3A4,7G14.6)                                           MODE0650
       END                                                                     MODE0660
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      SUBROUTINE NDSLOT (DIV1,DIV2,TSTAR,PD,SLOT,II,KS,LS,UDSLOT,X)      NDSL0010
      DIMENSION UDSLOT(11,3),PD(10,11),SLOT(3,9),KS(3),LS(2)             NDSL0020
      DO 10 I=1,3                                                        NDSL0030
      DIV=DIV2                                                           NDSL0040
      IF(I.EQ.1) DIV=DIV1                                                NDSL0050
      LK=I                                                               NDSL0060
      DO 8 K=1,II                                                        NDSL0070
      UDSLOT(K,I)=PD(KS(I),LS(LK))/DIV                                   NDSL0080
      LK=LK+I                                                            NDSL0090
    8 CONTINUE                                                           NDSL0100
      J=4                                                                NDSL0110
      DO 9 K=1,3                                                         NDSL0120
      J=J-I                                                              NDSL0130
      UDSLOT(J,I)=SLOT(I,J)/DIV                                          NDSL0140
      UDSLOT(J+3,I)=SLOT(I,J+3)/DIV                                      NDSL0150
      UDSLOT(J+6,I)=SLOT(I,J+6)/(X*DIV)                                  NDSL0160
      DIV=DIV*TSTAR                                                      NDSL0170
    9 CONTINUE                                                           NDSL0180
   10 CONTINUE                                                           NDSL0190
      RETURN                                                             NDSL0200
      END                                                                NDSL0210
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      SUBROUTINE NPSI (NPSI,HNPSI,BNPSI,BPSI)                           NOPS0010
C     NPSI(2),HNPSI(2),BNPSI(2),BPSI(12,2),NPSI(2),                     NOPS0020
     1 HH(2)                                                            NOPS0030
C                                                                       NOPS0040
C                                                                       NOPS0050
C                                                                       NOPS0060
C                                                                       NOPS0070
      CALL SEII (NPSI,HNPSI,BNPSI,BPSI)                                 NOPS0080
C     J=1,2                                                             NOPS0090
      NPSI=NPSI(J)                                                      NOPS0100
      IF(NPSI.EQ.0.0) NPSIJ=1                                           NOPS0110
      BNPSI(J)=BNPSI(J)/NPSIJ                                           NOPS0120
      HNPSI(J)=HH(J)*BNPSI(J)                                           NOPS0130
      BPSI(12,J)=BPSI(12,J)/NPSIJ                                       NOPS0140
      NPSIJ=NPSIJ                                                       NOPS0150
      NPSI(J)=NPSIJ                                                     NOPS0160
C                                                                       NOPS0170
      RETURN                                                            NOPS0180
      END                                                               NOPS0190
                                                                        NOPS0200
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      SUBROUTINE OFFTRM                                                 OFFT0010
      COMMON /STRIAB/ D(21),DT(21),E(79),F(10),X(10),                   OFFT0020
     1                DL,DM,DN,DX,DY,DZ,IX,IY,IZ,PD(10,11),            OFFT0030
     2                DTR,EPD,ERR(10),KM1,RHO,                          OFFT0040
     3                P12,SPO(6,6,3),XBM(21),XEL(14),                   OFFT0050
     4                XER(7),XFC(28),XFN(7),XFS(35),                    OFFT0060
     5                XGN(7),XIT(21),XMR(49),XTR(49),                   OFFT0070
     6                XWG(21),YMR(21),YTR(21),YWG(21),                  OFFT0080
     7                YEL(21),YFN(21),BLCG,DAMP,DEPD(10),               OFFT0090
     8                EPDS,EPDX(10),MASS,QSV1,TMRS,TTRS,                OFFT0100
     9                WLCG,XCON(63),XJET(14),XMIN,AYEFP,                OFFT0110
     A                BETAES(2),CNPCO,DHADO,DYBOR,GUESS,                OFFT0120
     B                NPASS,POPHI(10,11),STACG,TZERO,                   OFFT0130
     C                XMAST,DHADAO,QQDCOL,DTRRSQ,DYBDBR,                OFFT0140
     D                ENGRPM,MXPASS,PSD30P,TRIND1,XLIMIT                OFFT0150
      COMMON /STRIMA/ AY,VH,AGW,DT1(2),DT2(2),IXZ,                      OFFT0160
     1                QMR,XXD,YYD,ZZD,ALGF,APFP,AYFP,                   OFFT0170
     2                CGWL,COLL(6),CYCF(3),CYCL(3),                     OFFT0180
     3                DIST,KCIT(20),PEDA(3),QMAX,                       OFFT0190
     4                QMRS,TIMF,TMAX,XCIT(20,6),ALGEZ,                  OFFT0200
     5                ALGE1,ALGE2,CGSTA,CPWIC,DIXIZ,                    OFFT0210
     6                DIYIX,DIZIY,DTZMT,DTZM1,DTZT1,FTKTS,              OFFT0220
     *                HUBKM(2,2),HUBKI(2,2),                            OFFT0230
     7                KREAD,PIU30,TSTAR(14),ZMAX2,ZMAX3,                OFFT0240
     8                ASECOL,CYPWIC,GEARAT,PSD550,                      OFFT0250
     9                PSISTP,QXBRAK,RUDINO,ZDELT1,ZDELT2                OFFT0260
      COMMON /ROMAN/  ZZ,VXS(2),VYS(2),VZS(2),BETA(12,2),               OFFT0270
     *                T,PCC(2),COSF(7,7,2),BETAN(2),BETAX(2),BETAZ(2),  OFFT0280
     *                AIR(2),APOD,AROD,AYOD,AIR(2),                     OFFT0290
     1                DPSI(12,2),DTRP,NPSI(2),ZZTR,                     OFFT0300
     2                BETAD(12,2),BNPSI(2),                             OFFT0310
     3                COND2,GMAXV,RATE1,RATE2,STOP2,                    OFFT0320
     4                THROT(2),TRIND,XGUST,BETAZD(2),GMAXV1,            OFFT0330
     5                GMAXV2,GMAXV3,GUSTYP,HNPSIR(2),                   OFFT0340
     6                HUBKPS,HUBKRS,HUBTPS,HUBTRS,                      OFFT0350
     7                KONFIG,LNGTH1,PILGH1,PSIREF(2),                   OFFT0360
     8                START2,XMOMLI(12,2),                              OFFT0370
     9                RM,RTR,ORM,ORTR,T1MT,T1TT,                        OFFT0380
     A                T2MT,T2TT,TZMT,TZTT,XMA1,XMA1T,                   OFFT0390
     B                XMB1,XMB1T,AIBPM,AIBPT,AIBRM,AIBRT,               OFFT0400
     C                APTD,APTTD,ARTD,ARTTD,PSD,PSDT,                   OFFT0410
     D                XSTAHM,XSTAHT,YSTAHM,YSTAHT,                      OFFT0420
     E                HUBKP,HUBKTP,HUBKR,HUBKTR                         OFFT0430
     F                ,AZETA,AZETAT,VZETA,VZETAT                        OFFT0440
      COMMON /MANARO/ I,V,INO,NWAG,APBMT,ARBMT,AYBMT,BETAO(2),TDELT,    OFFT0450
     1                BETAE(2),HGUSTE,HGUSTF,HGUSTW,VGUSTE,             OFFT0460
     2                VGUSTW,VGUSTF,GFWD,GLAT,GVERT,                    OFFT0470
     3                VXB,VZB,APO,VYB,ARO,AYO,                          OFFT0480
     4                COLSTK,CYSTK1,CYSTK2,PEDAL,AYE,                   OFFT0490
     5                APE,ARE,A1M,B1M,A1TP,B1TR,                        OFFT0500
     6                XAR(2),YAR(2),ZAR(2),                             OFFT0510
     7                VIMR,VITR,ZETA,ZETATR,HMR,HJR,                    OFFT0520
     8                TMR,TTR,QMX,QTR,YMRF,YTRF                         OFFT0530
      COMMON /FORY/   Y(4,150)                                          OFFT0540
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      REAL MASS,IXZ                                                     OFFTD550
      IF(Y(1,85).EQ.0.) GO TO 225                                       OFFTD560
      ARD=-Y(1,85)*SIN(APE)                                             OFFTD570
      CAPE=Y(1,85)*COS(APE)                                             OFFTD580
      APD=CAPE*SIN(ARE)                                                 OFFTD590
      AYD=CAPE*COS(ARE)                                                 OFFTD600
      GO TO 226                                                         OFFTD610
  225 CONTINUE                                                          OFFTD620
      IF(Y(2,86).EQ.1.) GO TO 224                                       OFFTD630
      APED=32.17*(Y(2,86)-COS(APE)*COS(ARE))/V                          OFFTD640
      CALL CATS (AYE,APE,ARE,AYFP,APFP,0.,AYPB,APPB,ARPB,1.,-1)         OFFTD650
      CALL RATS (0.,APED,0.,AYPB,APPB,ARPB,ARD,APD,AYD,-1)              OFFTD660
  226 CONTINUE                                                          OFFTD670
      DX   = MASS*(APD*VZB-AYD*VYB)                                     OFFTD680
      DY   = MASS*(AYD*VXB-ARD*VZB)                                     OFFTD690
      DZ   = MASS*(ARD*VYB-APD*VXB)                                     OFFTD700
      DL   = APD*(AYD*D(ZIY-ARD*IXZ)                                    OFFTD710
      DM   = ARD*AYD*DIXIZ+(ARD+AYD)*(ARD-AYD)*IXZ                      OFFTD720
      DN   = APD*(ARD*DIYIX+AYD*IXZ)                                    OFFTD730
      CALL RATS (ARD,APD,AYD,D.,-ZETA,C.,ARTD,APTD,TV,-1)               OFFTD740
      CALL RATS (ARD,APD,AYD,AYBMT,APBMT,ARBMT,ARTTD,APTTD,TV,-1)       OFFTD750
  224 CONTINUE                                                          OFFTD760
      RETURN                                                            OFFTD770
      END                                                               OFFTD780
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      SUBROUTINE PARA (W,COND1)                                          PARA0010
      COMMON /FORCE/ XF,XFRWG,XFLWG,XFELE,XFFUS,XFRJET,                  PARA0020
     1               XFLJET,XFMR,XFTR,XFGUN,XFFIN,XFW,                   PARA0030
     2               YF,YFFUS,YFRJET,YFLJET,YFMR,YFTR,                   PARA0040
     3               YFGUN,YFFIN,YFW,                                    PARA0050
     4               ZF,ZFRWG,ZFLWG,ZFELE,ZFFUS,ZFRJET,                  PARA0060
     5               ZFLJET,ZFMR,ZFTR,ZFGUN,ZFW,                         PARA0070
     6               QL,LRWG,LLWG,LELE,LFUS,LRJET,LLJET,                 PARA0080
     7               LMR,LTR,LGUN,LFIN,LOMR,LOTR,                        PARA0090
     8               QM,MRWG,MLWG,MELE,MFUS,MRJET,MLJET,                 PARA0100
     9               MMR,MTR,MGUN,MFIN,MOMR,MOTR,                        PARA0110
     A               QN,NRWG,NLWG,NELE,NFUS,NRJET,NLJET,                 PARA0120
     B               NMR,NTR,NGUN,NFIN,NOMR,NOTR                         PARA0130
      COMMON /STR(AB/ D(21),DT(21),E(79),F(10),X(10),                    PARA0140
     1                QL,QM,QN,QX,QY,QZ,IX,IY,(Z,PD(10,11),              PARA0150
     2                QTR,EPD,ERR(10),KM1,RHO,                           PARA0160
     3                912,SPD(6,6,3),XBW(21),XFL(14),                    PARA0170
     4                XFR(7),XFC(28),XFN(7),XFS(35),                     PARA0180
     5                XGN(7),XIT(21),XMR(49),XTR(49),                    PARA0190
     6                XWG(21),YMR(21),YTR(21),YWG(21),                   PARA0200
     7                YFL(21),YFN(21),BLCG,DAMP,DEPD(10),                PARA0210
     8                EPDS,EPDX(10),MASS,QSV1,TMRS,TTRS,                 PARA0220
     9                WLCG,XCON(63),XJET(14),XMIN,AYEEP,                 PARA0230
     A                BETAES(2),CNPCD,DHADO,DYBDR,GUESS,                 PARA0240
     B                NPASS,POPHI(10,11),STACG,TZERO,                    PARA0250
     C                XMAST,DHADAQ,DQDCOL,DTRRSQ,DYBDBR,                 PARA0260
     D                ENGRPM,MXPASS,PSD30P,TRIND1,XLIMIT                 PARA0270
      COMMON /STR(MA/ AY,VH,AGW,DT1(2),DT2(2),IXZ,                       PARA0280
     1                QMR,YXD,YYD,ZZD,ALGF,APFP,AYFP,                    PARA0290
     2                CGWL,COLL(6),CYCF(3),CYCL(3),                      PARA0300
     3                D(ST,KCIT(20),PEDA(3),QMAX,                        PARA0310
     4                QMRS,TIME,TMAX,XCIT(20,6),ALGEZ,                   PARA0320
     5                ALGE1,ALGE2,CGSTA,CPWIC,DIXIZ,                     PARA0330
     6                DIYIX,D(7(Y,DT7MT,DTZM),DTZT1,FTKTS,               PARA0340
     8                HUBKM(2,2),HUBKI(2,2),                             PARA0350
     7                KREAD,PIU30,TSTAR(14),ZMAX2,ZMAX3,                 PARA0360
     8                ASECOL,CYPWIC,GEARAT,PSD55C,                       PARA0370
     9                PSISTP,QXBRAK,RUDIND,ZDELT1,ZDELT2                 PARA0380
      COMMON /MANAL/  Q,AP,PED,QWG,TZM,T1M,T2M,                          PARA0390
     1                TZT,T1T,T2T,ALEL,CZFT,PSDD,                        PARA0400
     2                SZET,TAXL,TAXR,XAWG,XLNK(16),ZAWG,                 PARA0410
     3                ALCYP,ALFIN,ALLWG,ALRWG,CDELE,CDFIN,               PARA0420
     4                CDLWG,CDRWG,CLELE,CLFIN,CLLWG,CLRWG,CWING,         PARA0430
     5                CYCR1,CYCR2,CZET4,CZET6,CZET9,RANGE,               PARA0440
     6                SZET5,SZET7,SZET8,WGCOL,XAELE,XAFIN,               PARA0450
     7                XAFUS,XAJET,YAFIN,ZAELE,ZAFIN,ZAFUS,               PARA0460
     8                YAFLE,YAFUS,YALWG,YARWG,YALJET,YARJET,             PARA0470
     9                ZAJET,ALFCR1,ALGFPD,BOTTOM,CZET11,                 PARA0480
     A                CZET12,CZET13,ETZETA,HALFPI,SZET10,                PARA0490
     1                XAPYLD,YGUSTW,ZAPYLD,ZFLWG1,ZFRWG)                 PARA0500
     2                ,TZMS,T1MS,T2MS,TZTS,T1TS,T2TS,                    PARA0510
     3                CLOCK,FLOCK,XLOCK,TCLOCK                           PARA0520
      COMMON /REMAN/  ZZ,VXS(2),VYS(2),VZS(2),BETA(12,2),                PARA0530
     4                T,PCC(2),COSE(7,7,2),BETAN(2),BETAX(2),BETAZ(2),   PARA0540
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     *                A(8(2),APDO,ARDO,AYDO,AIR(2),                          PARA0550
     1                DPSI(12,2),DTRR,NPSI(2),ZZTR,                          PARA0560
     2                BETAO(12,2),BNPSI(2(,                                  PARA0570
     3                COND2,GMAXV,RATE1,RATE2,STOP2,                         PARA0580
     4                THROT(2(,TRIND,XGUST,BETAZO(2),GMAXV1,                 PARA0590
     5                GMAXV2,GMAXV3,GUSTYP,HNPSIR(2),                        PARA0600
     6                HUBKPS,HUBKRS,HUBTPS,HUBTRS,                           PARA0610
     7                KONFIG,LNGTH1,P(LGH1,PSIREF(2),                        PARA0620
     8                START2,XMOMLI(12,2),                                   PARA0630
     9                RM,RTR,DRM,DRTR,T1MT,T1TT,                             PARA0640
     A                T2MT,T2TT,TZMT,TZTT,XMA1,XMA1T,                        PARA0650
     B                XMB1,XMB1T,AIBPM,AIBPT,AIBRM,AIBRT,                    PARA0660
     C                APTO,APTTO,ARTO,ARTTO,PSO,PSOT,                        PARA0670
     D                XSTAHM,XSTAHT,YSTAHM,YSTAHT,                           PARA0680
     E                HUBKP,HUBKTP,HUBKR,HUBKTR                              PARA0690
     F                ,AZETA,AZETAT,VZETA,VZETAT                             PARA0700
      COMMON /MANAPO/ I,V,IND,NWAG,APBMT,ARBMT,AYBMT,BETAO(2),TDELT,         PARA0710
     1                BETAE(2(,HGUSTE,HGUSTF,HGUSTW,VGUSTE,                  PARA0720
     2                VGUSTW,YGUSTF,GFWD,GLAT,GVERT,                         PARA0730
     3                VXB,VZB,APO,VYB,ARO,AYO,                               PARA0740
     4                COLSTK,CYSTK1,CYSTK2,PEOAL,AYE,                        PARA0750
     5                APE,ARE,A1M,R1M,A1TP,B1TR,                             PARA0760
     6                XAR(2(,YAR(2),ZAR(2),                                  PARA0770
     7                VIMR,VITR,ZETA,ZETATR,HMR,HTR,                         PARA0780
     8                TMR,TTR,QMX,QTR,YMRF,YTRF                              PARA0790
      COMMON /TDPLOT/ AM(3),AL(3(,EXIT,ICOM(49(,IPSN,                        PARA0800
     1                NPART,NVARA,NVARB,NVARC,NSCALE                         PARA0810
     2                ,NVARS,NPRINT,NTIME                                    PARA0820
      DIMENSION P(48(,HEAD1(2,6(,VAR(11)                                     PARA0830
      EQUIVALENCE (VAR(1(,COLSTK(                                            PARA0840
      DATA HEAD1/ *   MAIN     FWD    RIGHT   TAIL     AFT    LEFT */       PARA0850
      COMMON /METER/ HEAD(10,39(                                             PARA0860
      IF(COND1.NE.0.( GO TO 173                                              PARA0870
      CALL WREM                                                              PARA0880
      CALL WRVP (3,VAR,XM1,PD,TAXL,TAXR)                                     PARA0890
  173 IF(EXIT.NE.0.( GO TO 160                                               PARA0900
      CALL WROT                                                              PARA0910
      WRITE(6,)71(                                                           PARA0920
      GO TO 172                                                              PARA0930
  160 WRITE(6,161( NPASS                                                     PARA0940
  172 WRUD=7.1-RUDINO                                                        PARA0950
      WRITE (6,80( (HEAD1(I,KONFIG(,(=1,2(,(HEAD1((,KONFIG+3(,I=1,2(        PARA0960
      P(1(=TZMT*DTRR                                                         PARA0970
      P(2)=TZTT*DTRR                                                         PARA0980
      P(3(=.5*(ALRWG+ALLWG(*DTRR                                             PARA0990
      P(4)=T1MT*DTRR                                                         PARA1000
      P(5)=T1TT*DTRR                                                         PARA1010
      P(6)=ZFRWG+ZFLWG                                                       PARA1020
      P(7)=T2MT*DTRR                                                         PARA1030
      P(8)=T2TT*DTRR                                                         PARA1040
      P(9)=XFRWG+XFLWG                                                       PARA1050
      P(10)=A1M*DTRR                                                         PARA1060
      P(11)=A1TP*DTRR                                                        PARA1070
      P(12(=ALFL*DTRR                                                        PARA1080
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      P(13)=BIM*DTRR                                                    PARA1090
      P(14)=BITR*DTRR                                                   PARA1100
      P(15)=ZFELE                                                       PARA1110
      P(16)=TMR                                                         PARA1120
      P(17)=TTR                                                         PARA1130
      P(18)=XFELE                                                       PARA1140
      WRITE (6,81)  ((HEAD(I,2*J-1),I=1,10),P(3*J-2),P(3*J-1),          PARA1150
     1               (HEAD(I,2*J),I=1,10),P(3*J),J=1,6)                 PARA1160
      P(19)=HMR                                                         PARA1170
      P(20)=HTR                                                         PARA1180
      P(21)=ALFIN*DTRR                                                  PARA1190
      P(22)=YMRF                                                        PARA1200
      P(23)=YTRF                                                        PARA1210
      P(24)=YFFIN                                                       PARA1220
      P(25)=QMX*PSD550                                                  PARA1230
      P(26)=QTR*PSD550*GEARAT                                           PARA1240
      P(27)=XFFIN                                                       PARA1250
      WRITE (6,81)  ((HEAD(I,3*J-8),I=1,10),P(3*J-2),P(3*J-1),          PARA1260
     1               (HEAD(I,3*J-NRUD),I=1,10),P(3*J),J=7,9)            PARA1270
      P(28)=PSD30P                                                      PARA1280
      P(29)=P(28)*GEARAT                                                PARA1290
      P(30)=AYE*DTRR                                                    PARA1300
      P(31)=ZETA*DTRR                                                   PARA1310
      P(32)=ZETATP*DTRR                                                 PARA1320
      P(33)=APE*DTRR                                                    PARA1330
      P(34)=AIB(1)                                                      PARA1340
      P(35)=AIB(2)                                                      PARA1350
      P(36)=ARE*DTRR                                                    PARA1360
      WRITE (6,81)  ((HEAD(I,2*J+2),I=1,10),P(3*J-2),P(3*J-1),          PARA1370
     1               (HEAD(I,2*J+3),I=1,10),P(3*J),J=10,12)             PARA1380
      P(37)= AXL                                                        PARA1390
      P(38)=-ZZD                                                        PARA1400
      P(39)=TAXR                                                        PARA1410
      P(40)=VH*FTXTS                                                    PARA1420
      P(41)=COLSTK                                                      PARA1430
      P(42)=W                                                           PARA1440
      P(43)=CYSTK1                                                      PARA1450
      P(44)=ENGRPM                                                      PARA1460
      P(45)=CYSTK2                                                      PARA1470
      P(46)=CGSTA                                                       PARA1480
      P(47)=PEDAL                                                       PARA1490
      P(48)=CGWL                                                        PARA1500
      WRITE (6,82)  ((HEAD(I,J-9),I=1,10),P(J),J=37,48)                 PARA1510
      CALL TIMEX (TUSED,DTIME,TLEFT)                                    PARA1520
      WRITE (6,2011) NPASS,TUSED                                        PARA1530
      HPSUP=QMAX*PSD550                                                 PARA1540
      HPTOT=P(25)+P(26)                                                 PARA1550
      IF(HPTOT.LE.HPSUP) GO TO 300                                      PARA1560
      WRITE (6,1028)                                                    PARA1570
      EXIT=).                                                           PARA1580
  300 RETURN                                                            PARA1590
   80 FORMAT (1H0,49X,2A4,3X,2A4)                                       PARA1600
   81 FORMAT (9X,10A4,2F10.3,5X,10A4,F10.3/)                            PARA1610
   82 FORMAT (9X,10A4,5X,F10.3,10X,10A4,F10.3/)                         PARA1620
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 161 FORMAT(1H1,50H HELICOPTER IS ***NOT*** IN STABLE CONDITION AFTER,  PARA1630
     1  I5,12H ITERATIONS./16X,9H*********)                           PARA1640
 171 FORMAT(35HOHELICOPTER IS IN STABLE CONDITION./)                   PARA1650
1028 FORMAT(1HO,56H***** POWER REQD. FOR TRIM COND. EXCEEDS POWER AVAILPARA1660
     1ABLE)                                                           PARA1670
2011 FORMAT (5X6HPART 1,16XI3,12H  ITERATIONS,20XF10.3,               PARA1680
     1              35H      MINUTES ELAPSED COMPUTING TIME /1H1)     PARA1690
      END                                                             PARA1700
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      SUBROUTINE PCG (PSD,DTZMT,I)                                      PCG00010
      COMMON /STAMAN/ HL(2),XX,YY,AYI,GOV,KPD,OPC,QQQ,                  PCG00020
     1                RIY,APBG,ARBG,ASEP,AYBG,BWTC,                     PCG00030
     2              RC,BWTK,BWTM,CGBL,DPIX,DPIZ,                        PCG00040
     3                 FHPT(2),R550,ALERT,AYDMX,DELT2,                  PCG00050
     4                 DPIXZ,DTBWT,DWLCG,HDELT,HGUST,                   PCG00060
     5                 HLTR1,HLTR2,ITOPS,KTCTR,OMEGM,                   PCG00070
     6                 PCDEL,OMR5A,RMASS,TRALT,TWOPI,VGUST,             PCG00080
     7                 ISTOP,XAGUN,XAPYL,XARSP(2),YAGUN,                PCG00090
     8                 YARSP(2),YGUST,ZAGUN,ZAPYL,ZARSP(2),             PCG00100
     9                 DELT2R,DSTACG,EIMAST,GPRELD,HLPYLD,              PCG00110
     A                 IBRAKE,OMEGMO,QBRAKE,BETAZS(2),                  PCG00120
     B                 PCGDED,PCGMAX,PCRATE,PDIDTR,RDELT1,              PCG00130
     C                 RDELT2,RITORS,TPIND2                             PCG00140
      COMMON /FORY/    Y(4,150)                                         PCG00150
      PSOMOM=PSO-OMEGM                                                  PCG00160
      Q1=ABS(PCDEL)                                                     PCG00170
      Q2=Q1-.01*PCRATE                                                  PCG00180
      IF(OPC.EQ.10.) GO TO 224                                          PCG00190
      IF(Q2.GT.0.) PCDEL=PCDEL-SIGN(PCRATE,PCDEL)                       PCG00200
      GO TO 232                                                         PCG00210
  224 CONTINUE                                                          PCG00220
      IF(Q2.GT.0.) GO TO 236                                            PCG00230
      IF(ABS(PSOMOM).LE.(PCGDED*OMEGM)) GO TO 226                       PCG00240
  236 CONTINUE                                                          PCG00250
      Q2=SIGN(PCRATE,PSOMOM)                                            PCG00260
      YOM=Y(I-1,84)-OMEGMO                                              PCG00270
      IF(PSOMOM/(YOM+.2*PSOMOM).GT.0.) PCDEL=PCDEL+Q2                   PCG00280
      IF(Q1.GT.PCGMAX*HDELT) PCDEL=PCDEL-Q2                             PCG00290
      IF((PSOMOM/YOM).GT.0.) GO TO 232                                  PCG00300
      IF(Q2.GT.HDELT*Q1/PCRATE) PCDEL=PCDEL-SIGN(PCRATE,PCDEL)          PCG00310
  232 CONTINUE                                                          PCG00320
      DTZMT=DTZMT+PCDEL                                                 PCG00330
  226 CONTINUE                                                          PCG00340
      RETURN                                                            PCG00350
      END                                                               PCG00360
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      SUBROUTINE PDZI (KL)                                              PDZ00010
      DIMENSION PD(10,11)                                               PDZ00020
      LOGICAL AYEEP                                                     PDZ00030
      KONFIG=KL                                                         PDZ00040
      RETURN                                                            PDZ00050
      ENTRY PDZ (PD,AYEEP)                                              PDZ00060
C           ZERO THE PARTIALS OF THE FLAP MOM OF ONE ROTOR WRT TO       PDZ00070
C                THE FLAP ANGLES OF THE OTHER ROTOR                     PDZ00080
      DO 333 I=7,8                                                      PDZ00090
      DO 333 J=7,8                                                      PDZ00100
      PD(I,J+2)=0.                                                      PDZ00110
  333 PD(I+2,J)=0.                                                      PDZ00120
C         IF TANDEM  RETURN                                             PDZ00130
      GO TO(287,300,301),KONFIG                                         PDZ00140
C         IF SIDE-BY-SIDE WITH SIDESLIP  RETURN                         PDZ00150
  301 IF(AYEEP) RETURN                                                  PDZ00160
C         SET LEFT ROTOR DERIVATIVES TO MAGNITUDE OF CORRESPONDING      PDZ00170
C           RIGHT ROTOR DERIVATIVES                                     PDZ00180
      DO 292 J=9,10                                                     PDZ00190
      PD(9,J)=SIGN(PD(7,J-2),PD(9,J))                                   PDZ00200
      PD(10,J)=SIGN(PD(8,J-2),PD(10,J))                                 PDZ00210
      DO 292 I=1,6                                                      PDZ00220
      PD(J,I)=SIGN(PD(J-2,I),PD(J,I))                                   PDZ00230
  292 PD(I,J)=SIGN(PD(I,J-2),PD(I,J))                                   PDZ00240
C         ZERO PARTIALS OF Y-FORCE, YAW, AND ROLL MOMENTS  WRT          PDZ00250
C           F/A CYCLIC AND COLLECTIVE STICKS AND PITCH ANGLE            PDZ00260
      DO 289 I=2,6,2                                                    PDZ00270
      PD(I,5)=0.                                                        PDZ00280
      DO 289 J=1,2                                                      PDZ00290
  289 PD(I,J)=0.                                                        PDZ00300
      RETURN                                                            PDZ00310
C           SINGLE ROTOR CASES                                          PDZ00320
  287 DO 288 I=9,10                                                     PDZ00330
C           ZERO THE PARTIALS OF THE MR FLAP MOM WRT TO PEDAL           PDZ00340
      PD(I-2,4)=0.                                                      PDZ00350
      DO 288 J=1,3                                                      PDZ00360
C           ZERO THE PARTIALS OF THE TR FLAP MOM WRT STICKS             PDZ00370
  288 PD(I,J)=0.                                                        PDZ00380
  300 RETURN                                                            PDZ00390
      END                                                               PDZ00400
```

```
      SUBROUTINE PPLOT                                                  PPL00010
      COMMON /TOPLOT/ AH(3),AL(3),EXIT,ICOM(49),IPSN,                   PPL00020
     1                NPART,NVARA,NVARB,NVARC,NSCALE                   PPL00030
     1                ,NVARS,NPRINT,NTIME                              PPL00040
      COMMON /PLOTD/  HEAD(9,267)                                       PPL00050
      DIMENSION A(266)                                                  PPL00060
      DIMENSION AC(3),AD(3),NVAR(3),RATE(3)                             PPL00070
      LOGICAL*1 LINE(101),I1/'1'/,I2/'2'/,I3/'3'/,I4/'4'/,I5/'5'/,      PPL00080
     1    I6/'6'/,I7/'7'/,IB/' '/,M                                     PPL00090
      EQUIVALENCE (NVAR(1),NVARA)                                       PPL00100
      IF(NPART.EQ.3) GO TO 4100                                         PPL00110
C         TRANSFER T-H FROM 3 TO 9 OR 9 TO 3                            PPL00120
      CALL C81L                                                         PPL00130
      GO TO 9999                                                        PPL00140
 4100 CONTINUE                                                          PPL00150
C         WRITE HEADING FOR PLOT                                        PPL00160
      CALL WROT                                                         PPL00170
C         CHANGE PROPER PLOT SCALES                                     PPL00180
      IF(NSCALE.LT.4) GO TO 3003                                        PPL00190
      NSCALE=NSCALE-4                                                   PPL00200
      AH(3)=AH(3)*1000.                                                 PPL00210
      AL(3)=AL(3)*1000.                                                 PPL00220
 3003 IF(NSCALE.LT.2) GO TO 3004                                        PPL00230
      NSCALE=NSCALE-2                                                   PPL00240
      AH(2)=AH(2)*1000.                                                 PPL00250
      AL(2)=AL(2)*1000.                                                 PPL00260
 3004 IF(NSCALE.LT.1) GO TO 3005                                        PPL00270
      NSCALE=NSCALE-1                                                   PPL00280
      AH(1)=AH(1)*1000.                                                 PPL00290
      AL(1)=AL(1)*1000.                                                 PPL00300
 3005 DO 4000 N=1,3                                                     PPL00310
      L=NVAR(N)                                                         PPL00320
      IF(AH(N).NE.AL(N)) GO TO 3010                                     PPL00330
      AL(N)=0.                                                          PPL00340
      AH(N)=10.                                                         PPL00350
 3010 CONTINUE                                                          PPL00360
      IF(N.EQ.1) M=I1                                                   PPL00370
      IF(N.EQ.2) M=I2                                                   PPL00380
      IF(N.EQ.3) M=I4                                                   PPL00390
      IF(L.GT.0.AND.L.LT.267) GO TO 3011                                PPL00400
      WRITE (6,3015) M,(HEAD(K,267),K=1,9)                              PPL00410
      AH(N)=-1000.                                                      PPL00420
      AL(N)=-2000.                                                      PPL00430
      GO TO 4000                                                        PPL00440
 3011 WRITE(6,3015) M,(HEAD(K,L),K=1,9)                                 PPL00450
 4000 CONTINUE                                                          PPL00460
C         COMPUTE SCALING CONSTANTS                                     PPL00470
      DO 4010 I=1,3                                                     PPL00480
      RATE(I)=(AH(I)-AL(I))/10.                                         PPL00490
      AC(I)=10./RATE(I)                                                 PPL00500
 4010 AD(I)=1.5-AL(I)*AC(I)                                             PPL00510
C         WRITE SYMBOL AND SCALE HEADING                                PPL00520
      WRITE (6,6) I1, AL(1),AH(1),RATE(1),I3,I1,I2                      PPL00530
      WRITE (6,6) I2, AL(2),AH(2),RATE(2),I5,I1,I4                      PPL00540
```

```
      WRITE (6,6) I4, AL(3),AH(3),RATE(3),I6,(2,I4                      PPL00550
      WRITE (6,7) I7,I1,I2,I4                                           PPL00560
C               INITIALIZE LINE TO BLANKS                               PPL00570
      DO 3100 I=1,101                                                   PPL00580
 3100 LINE(I)=IB                                                        PPL00590
      CALL TIMEX (TUSED,TDELT,TLEFT)                                    PPL00600
 6019 READ (3) IPSN,T,A                                                 PPL00610
      IF(T.GT.9999.E+04) GO TO 9999                                     PPL00620
      NTIME=NTIME+1                                                     PPL00630
      IF(NTIME.EQ.NPRINT) NTIME=0                                       PPL00640
      IF(NTIME.NE.0) GO TO 6019                                         PPL00650
C             SCALE DATA TO FIXED POINT POSITION ON SCALE               PPL00660
      KB=A(NVARA)*AC(1)+AD(1)                                           PPL00670
      KX=A(NVARB)*AC(2)+AD(2)                                           PPL00680
      KY=A(NVARC)*AC(3)+AD(3)                                           PPL00690
C                       CHECK FOR EQUALITY OF VARIABLES                 PPL00700
      IF(KB.EQ.KX) GO TO 3101                                           PPL00710
      IF(KB.EQ.KY) GO TO 3102                                           PPL00720
      IF(KX.EQ.KY) GO TO 3103                                           PPL00730
C                       CHECK TO SEE IF VARIABLES FALL ON SCALE         PPL00740
      IF(KB.GE.1.AND.KB.LE.101) LINE(KB)=I1                             PPL00750
      IF(KX.GE.1.AND.KX.LE.101) LINE(KX)=I2                             PPL00760
      IF(KY.GE.1.AND.KY.LE.101) LINE(KY)=I4                             PPL00770
      GO TO 5000                                                        PPL00780
 3101 IF(KB.EQ.KY) GO TO 3104                                           PPL00790
C         FIRST AND SECOND VARIABLES ARE IN SAME POSITION               PPL00800
      IF(K3.GE.1.AND.KB.LE.101) LINE(KB)=I3                             PPL00810
      IF(KY.GE.1.AND.KY.LE.101) LINE(KY)=I4                             PPL00820
      GO TO 5000                                                        PPL00830
C         FIRST AND THIRD VARIABLES ARE IN SAME POSITION                PPL00840
 3102 IF(KB.GE.1.AND.KB.LE.101) LINE(KB)=I5                             PPL00850
      IF(KX.GE.1.AND.KX.LE.101) LINE(KX)=I2                             PPL00860
      GO TO 5000                                                        PPL00870
C         SECOND AND THIRD VARIABLES ARE IN SAME POSITION               PPL00880
 3103 IF(KB.GE.1.AND.KB.LE.101) LINE(KB)=I1                             PPL00890
      IF(KX.GE.1.AND.KX.LE.101) LINE(KX)=I6                             PPL00900
      GO TO 5000                                                        PPL00910
C         ALL THREE VARIABLES ARE IN SAME POSITION                      PPL00920
 3104 IF(KB.GE.1.AND.KB.LE.101) LINE(KB)=I7                             PPL00930
 5000 WRITE (6,5001) T,LINE                                             PPL00940
C                   RESET LINE TO BLANKS                                PPL00950
      IF(KB.GE.1.AND.KB.LE.101) LINE(KB)=IB                             PPL00960
      IF(KX.GE.1.AND.KX.LE.101) LINE(KX)=IB                             PPL00970
      IF(KY.GE.1.AND.KY.LE.101) LINE(KY)=IB                             PPL00980
      GO TO 6019                                                        PPL00990
 9999 CONTINUE                                                          PPL01000
      CALL TIMEX (TUSED,TDELT,TLEFT)                                    PPL01010
      WRITE (6,7000) TDELT                                              PPL01020
      RETURN                                                            PPL01030
    6 FORMAT (1H ,10X,'SCALE    ',A1,'    FROM',F11.3,'  TO',F11.3,      PPL01040
     1     ',  1 INCH =',F9.3,11X,A1,' FOR ',A1,' + ',A1,4X,            PPL01050
     2     ' ON SAME PRINT POS.')                                       PPL01060
    7 FORMAT (1H ,85X,A1,' FOR ',A1,' + ',A1,' + ',A1,' ON SAME PRINT POPPL01070
     1S.'//67X,'INCHES'/T20,'0',T30,'1',T40,'2',T50,'3',T60,'4',T70,'5',PPL01080
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     2T90,'7',T99,'7',T100,'8',T110,'8',T119,'10'/ T20,'*',T30,'*',      PPL01090
     3  T40,'*',T50,'*',T60,'*',T70,'*',T80,'*',T90,'*',T100,'*',        PPL01100
     4  T110,'*',T120,'*')                                               PPL01110
 215 FORMAT (78X,' SYMBOL ',A1,' =',9A4)                                 PPL01120
 221 FORMAT (1H ,5X,E9.2,4X,101A1)                                       PPL01130
 230 FORMAT (1H0,E15.5)                                                  PPL01140
     END                                                                 PPL01150
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```
      SUBROUTINE RATI (X,EPDX,XLIMIT,VAR)                                RATI0010
      COMMON /KVARTR/ KVAR(10)                                           RATI0020
      DIMENSION VAR(11),X(10),EPDX(10)                                   RATI0030
      RATIO=1.                                                           RATI0040
      RATIO1=1.                                                          RATI0050
      DO 10 I=1,10                                                       RATI0060
C         CHECK TO SEE IF ANY CORRECTION EXCEEDS LIMITS                  RATI0070
      IF(ABS(X(I)).GT.XLIMIT) RATIO1=ABS(XLIMIT/X(I))                    RATI0080
C         CHOOSE RATIO SO THAT LARGEST CORRECTION = LIMIT                RATI0090
      IF(RATIO.LE.RATIO1) GO TO 10                                       RATI0100
      RATIO=RATIO1                                                       RATI0110
      II=I                                                               RATI0120
   10 CONTINUE                                                           RATI0130
C         MAKE CORRECTIONS                                               RATI0140
      DO 20 I=1,10                                                       RATI0150
   20 VAR(KVAR(I))=VAR(KVAR(I))+X(I)*RATIO*EPDX(I)                       RATI0160
      IF(RATIO.NE.1.) WRITE (6,40) X,RATIO,II                            RATI0170
   30 RETURN                                                             RATI0180
   40 FORMAT (1H0//1H ,'CORRECTIONS',2X,10F11.7,                         RATI0190
     1       /1H0,'RATIO APPLIED TO CORRECTION VECTOR IS ',F10.7,        RATI0200
     2      2X,'FROM COMPONENT ',I3)                                     RATI0210
      END                                                                RATI0220
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```
      SUBROUTINE RATS (X1,Y1,Z1,A1,A2,A3,X2,Y2,Z2,N1)                    RATS0010
      DIMENSION A(9)                                                     RATS0020
C         THREE DIMENSIONAL VECTOR TRANSFORMATION                        RATS0030
C         N1=1 FOR USUAL                                                 RATS0040
C         N1=-1 FOR INVERSE                                              RATS0050
      CALL MATRIX (A1,A2,A3,A,N1)                                        RATS0060
      X2=X1*A(1)+Y1*A(2)+Z1*A(3)                                         RATS0070
      Y2=X1*A(4)+Y1*A(5)+Z1*A(6)                                         RATS0080
      Z2=X1*A(7)+Y1*A(8)+Z1*A(9)                                         RATS0090
      RETURN                                                             RATS0100
      END                                                                RATS0110
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      SUBROUTINE READIN (T,TAIR)                                        READ0010
      COMMON /STRIAB/ D(21),DT(21),E(79),F(10),X(10),                   READ0020
     1                DL,DM,DN,DX,DY,DZ,IX,IY,IZ,PD(10,11),            READ0030
     2                DTR,EPD,ERR(10),KM1,RMO,                         READ0040
     3                R12,SPD(6,6,3),XBW(21),XEL(14),                  READ0050
     4                XER(7),XFC(28),XFN(7),XFS(35),                   READ0060
     5                XGN(7),XIT(21),XMR(49),XTR(49),                  READ0070
     6                XWG(21),YMR(21),YTR(21),YWG(21),                 READ0080
     7                YEL(21),YFN(21),BLCG,DAMP,DEPD(10),              READ0090
     8                EPDS,EPDX(10),MASS,QSV1,TWRS,TTRS,               READ0100
     9                WLCG,XCON(63),XJET(14),XMIN,AYEFP,               READ0110
     A                BETAES(2),CNPCD,DHADQ,DYBDR,GUESS,               READ0120
     B                NPASS,PDPHI(10,11),STACG,TZERO,                  READ0130
     C                XMAST,DHADAQ,DQDCOL,DTRRSQ,DYBDBR,               READ0140
     D                ENGRPM,MXPASS,PSD30P,TRIND1,XLIMIT               READ0150
      COMMON /STRIMA/ AY,VH,AGW,DT1(2),DT2(2),IXZ,                      READ0160
     1                QMR,XXD,YYD,ZZD,ALGF,APFP,AYFP,                  READ0170
     2                CGWL,COLL(6),CYCF(3),CYCL(3),                    READ0180
     3                DIST,KCIT(20),PEDA(3),QMAX,                      READ0190
     4                QMRS,TIME,TMAX,XCIT(20,6),ALGEZ,                 READ0200
     5                ALGE1,ALGE2,CGSTA,CPWIC,DIXIZ,                   READ0210
     6                DIYIX,DIZIY,DTZMT,DTZM1,DTZT1,FTKTS,             READ0220
     *                HUBKM(2,2),HUBKI(2,2),                           READ0230
     7                KREAD,PIU30,TSTAB(14),ZMAX2,ZMAX3,               READ0240
     8                ASECOL,CYPWIC,GEARAT,PSD55D,                     READ0250
     9                PSISTP,QXBRAK,RUDIND,ZDELT1,ZDELT2               READ0260
      COMMON /TOPLOT/ AH(3),AL(3),EXIT,ICOM(49),IPSN,                   READ0270
     1                NPART,NVARA,NVARB,NVARC,NSCALE                   READ0280
     1                ,NVARS,NPRINT,NTIME                              READ0290
      DIMENSION TAIR(14)                                                READ0300
C                                                                       READ0310
C * * NAMELIST DICTIONARY                                              READ0320
C                                                                       READ0330
      NAMELIST /CHANGE/  XFS      ,XMR      ,D        ,YMR      ,XTR   READ0340
     *                  ,DT       ,YTR      ,XWG      ,YWG      ,XEL   READ0350
     *                  ,YEL      ,XFN      ,YFN      ,XJET     ,XBW   READ0360
     *                  ,XCON     ,XFC      ,XGN      ,XER      ,XIT   READ0370
      IF  (NPART.NE.10)   GO TO 10                                      READ0380
      READ (5,CHANGE)                                                   READ0390
      GUESS = 2.                                                        READ0400
      RETURN                                                            READ0410
   10 CONTINUE                                                          READ0420
      READ (5,1011)  IPSN   ,ICOM                                       READ0430
      READ (5,1003)  XFS                                                READ0440
      READ (5,1003)  XMR    ,D      ,YMR                                READ0450
      READ (5,1003)  XTR    ,DT     ,YTR                                READ0460
      READ (5,1003)  XWG    ,YWG                                        READ0470
      READ (5,1003)  XEL    ,YEL                                        READ0480
      READ (5,1003)  XFN    ,YFN                                        READ0490
      READ (5,1003)  XJET                                               READ0500
      READ (5,1003)  XBW                                                READ0510
      READ (5,1003)  XCON                                               READ0520
      READ (5,1003)  XFC    ,XGN                                        READ0530
      READ (5,1003)  XER                                                READ0540
```

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      READ (5,1003)    XIT                                                    READ0550
      READ (5,1        TSTAB                                                  READ0560
      READ (5,1         R                                                     READ0570
      IF  (NPA          R.NPART.EQ.7)   RETURN                                READ0580
      READ (5,1         ZERO   ,ZDELT1   ,ZMAX1   ,ZDELT2   ,ZMAX2            READ0590
     *                  /MAX3                                                 READ0600
      T   =   TZERO                                                           READ0610
      IF  (ZDELT1.EQ.0.)   ZDELT1  =  0.1                                     READ0620
      IF(ZDELT2.EQ.0.) ZDELT2=ZDELT1                                          READ0630
      TMAX  =  ZMAX1                                                          READ0640
      DO 201 I=1,20                                                           READ0650
      READ (5,2001)  NEXT,  J  ,(XCIT(I,K),K=1,6)                             READ0660
      KCIT(I)  =  J                                                           READ0670
      KREAD  =  I                                                             READ0680
      IF  (NEXT.EQ.0)   RETURN                                                READ0690
  201 CONTINUE                                                                READ0700
      RETURN                                                                  READ0710
 1003 FORMAT(7F10.0)                                                          READ0720
 1011 FORMAT(2X,I8,15A4/17A4/1?A4)                                            READ0730
 2001 FORMAT(I1,I4,5X,6F10.0)                                                 READ0740
      END                                                                     READ0750
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      SUBROUTINE ROOA                                                   ROOA0010
      COMMON /STBD/ X,Y,U,V,T,A(9,2),IY,IYS,G(6,2),SL(M,(0,ID           ROOA0020
      DOUBLE PRECISION UNPV,BS(6  ), SLIM2, T,X,Y,U,V, YS, DF(6), X(,CS ROOA0030
     1(6  ), TS1, TS2, TS3, TS4, UNP(11), DXN1, DYN1, UN, VN, DUN, Y(,  ROOA0040
     2 AVG, DRN, DIN, TS5, TS6, TS, TS7, TS8, TS9, DX, DY, TST, AT, ATX,ROOA0050
     3XX, YX, EVL(2,2), UNPT, DS, DVN, US, US1, US2, US3, DXSP, DXS,DUNIROOA0060
     4,DVN1,UI,U2,U3,U4,U5,U6,U7,D1,YSX,DABS,DSORT,DSIGN,A,G             ROOA0070
      EQUIVALENCE (DF(1),UN), (DF(2),VN), (DF(3),DUN), (DF(4),DVN), (DF ROOA0080
     1(5), DUN1), (DF(6),DVN1), ( UNP((1),YS), (UNP(1),U1), (UNP(2),U2),ROOA0090
     2(UNP(3),U3), (UNP(4),U4), (UNP(5), U5), (UNP(6),U6) , (UNP(7),U7),ROOA0100
     3(UNP(8),US1), (UNP(9),US2) , (UNP(10), US3)                       ROOA0110
      DATA FA,FB/' ','*'/                                               ROOA0120
      IFT=1                                                             ROOA0130
      IR=0                                                              ROOA0140
      IS=0                                                              ROOA0150
      IH=0                                                              ROOA0160
      ITF=0                                                             ROOA0170
      DO 97 I=1, IO                                                     ROOA0180
   97 BS(I)=0.                                                          ROOA0190
      DS= .0005                                                         ROOA0200
      TST=0.                                                            ROOA0210
      UNPV=0.                                                           ROOA0220
      SLIM2=SLIM*SLIM                                                   ROOA0230
      X = 5.272                                                         ROOA0240
      Y=0.                                                              ROOA0250
      GO TO 15                                                          ROOA0260
      ENTRY  ROOB                                                       ROOA0270
      IF (IFT-3 ) 7, 42, 69                                             ROOA0280
    7 EVL(1,IFT)=X                                                      ROOA0290
      EVL(2,IFT)=U                                                      ROOA0300
      GO TO (4,9),IFT                                                   ROOA0310
    4 X=10.53                                                           ROOA0320
    5 IFT=IFT+1                                                         ROOA0330
      GO TO 15                                                          ROOA0340
    9 X=0.                                                              ROOA0350
      IF ( EVL(2,1).NE. 0..OR. EVL(2,2). NE. 0. ) GO TO 5               ROOA0360
      WRITE (6,657)                                                     ROOA0370
  657 FORMAT ( ' FUNCTION VALUF IS ZERO FOR ALL VALUES OF X' )          ROOA0380
      GO TO 92                                                          ROOA0390
   42 IFT=4                                                             ROOA0400
      IF(U.EQ.0..AND.V.EQ.0.) IH=1                                      ROOA0410
   10 ICT=0                                                             ROOA0420
      FM=FA                                                             ROOA0430
      IF(DABS(G(IR+1,1))+DABS(G(IR+1,2)))11,11,63                       ROOA0440
   63 IF((X-G(IR+1,1))**2+(Y-G(IR+1,2))**2-.05*TST)12,12,60             ROOA0450
   11 IF(IH)67,67,38                                                    ROOA0460
   67 IF(ITF)35,35,66                                                   ROOA0470
   35 DS=.01                                                            ROOA0480
      ITF=1                                                             ROOA0490
   14 X = -.1274396                                                     ROOA0500
      Y=X                                                               ROOA0510
      GO TO 174                                                         ROOA0520
   66 IF(G(IR,1).EQ.0..AND.G(IR,2).EQ.0.) GO TO 14                      ROOA0530
   12 G(IR+1,1)=X                                                       ROOA0540
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      G(IR+1,2)=Y                                                        R00A0550
   60 X= G(IR+1,1)*.999                                                  R00A0560
      Y=DMAX1(DABS(G(IR+1,2)*.999D0),DABS(1.D-3*G(IR+1,1)))              R00A0570
  174 DO 40 I=1,11                                                       R00A0580
   40 UNP(I)=0.                                                          R00A0590
      GO TO 15                                                           R00A0600
   17 DXN1=DX                                                            R00A0610
      DYN1=DY                                                            R00A0620
      DXSP=DXS                                                           R00A0630
   13 DX=DS*X                                                            R00A0640
      DY=DS*Y                                                            R00A0650
      DXS=DX*DX+DY*DY                                                    R00A0660
      X=X+DX                                                             R00A0670
      Y=Y+DY                                                             R00A0680
   15 RETURN                                                             R00A0690
   69 ICT=ICT+1                                                          R00A0700
      IF(U. EQ. 0..AND. V. EQ. 0. ) GO TO 160                            R00A0710
      IF( IR)62,62,19                                                    R00A0720
   19 CALL OVERFL(IOV)                                                   R00A0730
      DO 23 J=1,IS                                                       R00A0740
      XI=X-CS(J)                                                         R00A0750
      YI=Y                                                               R00A0760
      TS4=V/U                                                            R00A0770
      IF(BS(J))90,90,91                                                  R00A0780
   91 YI=(Y+Y)*XI                                                        R00A0790
      XI=(XI-Y)*(XI+Y)+BS(J)                                             R00A0800
   90 TS2=U/(XI*XI+YI*YI)                                                R00A0810
      U=(XI+YI*TS4)*TS2                                                  R00A0820
   23 V=(TS4*XI-YI)*TS2                                                  R00A0830
      CALL OVERFL(IOV)                                                   R00A0840
      GO TO (160,62,160),IOV                                             R00A0850
   62 US=DABS(U)+DABS(V)                                                 R00A0860
      U7=U7+US-US3                                                       R00A0870
      U6=U4                                                              R00A0880
      U5=U3                                                              R00A0890
      U4=V-U2                                                            R00A0900
      U3=U-U1                                                            R00A0910
      U2=V                                                               R00A0920
      U1=U                                                               R00A0930
      US3=US2                                                            R00A0940
      US2=US1                                                            R00A0950
      US1=US                                                             R00A0960
      IF(ICT-2)13,17,84                                                  R00A0970
   84 AVG=3./U7                                                          R00A0980
      DO 126 I=1,6                                                       R00A0990
  126 DF(I)=UNP(I)*AVG                                                   R00A1000
      IF(DY)55,56,55                                                     R00A1010
   56 DRN=DX/DXN1                                                        R00A1020
      TS3=(DUN-DRN*DUN1)*DRN                                             R00A1030
      TS=1.+DRN                                                          R00A1040
      TS1=TS*DUN+TS3                                                     R00A1050
      TS5=-2.*UN*TS                                                      R00A1060
      TS7=TS1*TS1+2.*TS3*TS5                                             R00A1070
  137 DXN1=DX                                                            R00A1080
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      DX=TS5*DX/(TS1+DSIGN(DSQRT(DABS(TS7)),TS1))                          RDDA1090
      GO TO 138                                                            RDDA1100
55    DRN=(DX*DXN1+DY*DYN1)/DXSP                                           RDDA1110
      DIN=(DY*DXN1-DX*DYN1)/DXSP                                           RDDA1120
      TS1=DUN-DRN*DUN1+DIN*DVN1                                            RDDA1130
      TS2=DVN-DIN*DUN1-DRN*DVN1                                            RDDA1140
      TS3=DRN*TS1-DIN*TS2                                                  RDDA1150
      TS4=DRN*TS2+DIN*TS1                                                  RDDA1160
      TS=1.+DRN                                                            RDDA1170
      TS1=TS*DUN-DVN*DIN+TS3                                               RDDA1180
      TS2=TS*DVN+DUN*DIN+TS4                                               RDDA1190
      TS5=2.*(VN*DIN-UN*TS)                                                RDDA1200
      TS6=-2.*(VN*TS+UN*DIN)                                               RDDA1210
      TS7=(TS1-TS2)*(TS1+TS2)+2.*(TS5*TS3-TS4*TS6)                         RDDA1220
      TS8=2.*(TS1*TS2+TS4*TS5+TS3*TS6)                                     RDDA1230
      TS9=DABS(TS7)*DSQRT(1.+(TS8/TS7)**2)                                 RDDA1240
      TS3=DSQRT(.5 *DABS(TS9+TS7))                                         RDDA1250
      TS4=DSIGN(DSQRT(.5*DABS(TS9-TS7)),TS8)                               RDDA1260
134   IF(TS1*TS3+TS2*TS4 )132,131,131                                      RDDA1270
132   TS4=-TS4                                                             RDDA1280
      TS3=-TS3                                                             RDDA1290
131   TS7=TS1+TS3                                                          RDDA1300
      TS8=TS2+TS4                                                          RDDA1310
      TS3=TS7**2+TS8**2                                                    RDDA1320
      TS1=(TS5*TS7+TS6*TS8)/TS3                                            RDDA1330
      TS2=(TS6*TS7-TS5*TS8)/TS3                                            RDDA1340
      DXN1=DX                                                              RDDA1350
      DYN1=DY                                                              RDDA1360
      DX=TS1*DXN1-TS2*DYN1                                                 RDDA1370
      DY=TS2*DXN1+TS1*DYN1                                                 RDDA1380
      DXSP=DXS                                                             RDDA1390
      Y=Y+DY                                                               RDDA1400
      IF (DABS(Y) .GT. 1.D-5 .AND. DABS(Y/X) .GT.'5.D-4 ) GO TO 128        RDDA1410
      Y=0.                                                                 RDDA1420
      DY=0.                                                                RDDA1430
128   YS=Y*Y                                                               RDDA1440
138   X=X+DX                                                               RDDA1450
      TST=X*X+YS                                                           RDDA1460
      IF(TST-1.D-15)41,41,74                                               RDDA1470
41    FM=FB                                                                RDDA1480
38    IH=0                                                                 RDDA1490
73    X=0.                                                                 RDDA1500
      Y=0.                                                                 RDDA1510
      YS=0.                                                                RDDA1520
      GO TO 160                                                            RDDA1530
74    DXS=DX*DX+DY*DY                                                      RDDA1540
      AT=DXS/TST                                                           RDDA1550
      IF (AT .LE. 1.D-15 ) GO TO 20                                        RDDA1560
      IF (ICT -21 ) 305,87,88                                              RDDA1570
 88   IF(AT-ATX) 87,70,70                                                  RDDA1580
95    AT=ATX                                                               RDDA1590
      X=XX                                                                 RDDA1600
      Y=YX                                                                 RDDA1610
      YS=YSX                                                               RDDA1620
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   75 FM=FB                                                              R00A1630
      GO TO 20                                                           R00A1640
   97 ATX=AT                                                             R00A1650
      XX=X                                                               R00A1660
      YX=Y                                                               R00A1670
      YSX=YS                                                             R00A1680
   70 IF ((ICT .LT. 25 ) GO TO 305                                       R00A1690
      IF (AT .NE. ATX ) GO TO 95                                         R00A1700
      IF (ICT.GE. 40) GO TO 75                                           R00A1710
  305 (F(TST-SLIM2)15,15,50                                              R00A1720
   31 Y=-Y                                                               R00A1730
      YS(IS)=YS                                                          R00A1740
      IS=IS-1                                                            R00A1750
   95 ICT=0                                                              R00A1760
  160 AT=0.                                                              R00A1770
   20 CONTINUE                                                           R00A1780
      IF(IR.EQ.6) GO TO 51                                               R00A1790
      IR=IR+1                                                            R00A1800
      IS=IS+1                                                            R00A1810
      XS(IS)=X                                                           R00A1820
      G(IR,1)=X                                                          R00A1830
      G(IR,2)=Y                                                          R00A1840
      (F(Y.NE.0..AND.ICT.GT.0) GO TO 31                                  R00A1850
      DO 61 I=1,2                                                        R00A1860
      TS2=EVL(1,I)-X                                                     R00A1870
      IF(YS.GT.0.) TS2=TS2*TS2+YS                                        R00A1880
   61 EVL(2,I)=EVL(2,I )/TS2                                             R00A1890
      D1=(EVL(2,1)+EVL(2,2))*.5                                          R00A1900
      UNPT=D1*T                                                          R00A1910
      IF ( DABS(EVL(2,1)-EVL(2,2)) . LE. 1.0-4* DABS(D1)) GO TO 92       R00A1920
      (F (IR.LT. (0 ) GO TO 10                                           R00A1930
   51 CONTINUE                                                           R00A1940
      WRITE (6,54)                                                       R00A1950
   54 FORMAT (' SOLUTION EXCEEDS MAXIMUM NUMBER OF ROOTS')               R00A1960
      GO TO 36                                                           R00A1970
   50 WRITE (6,52) SLIM                                                  R00A1980
   52 FORMAT  (' NEXT ROOT GREATER THAN' F10.1, ' RADIANS ')             R00A1990
   36 WRITE (6,655)                                                      R00A2000
  655 FORMAT ( ' INCOMPLETE FUNCTION, RESIDUE F(S) REMAINING.' )         R00A2010
   92 (D= 0                                                              R00A2020
      ID=IR                                                              R00A2030
       X=UNPT                                                            R00A2040
      RETURN                                                             R00A2050
      END                                                                R00A2060
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      SUBROUTINE ROTAN (N)                                                  ROTA0010
      COMMON /ANODIT/ A1,B1,XK,XY,VI2,VI4,APDM,APFM,ARDM,ARFM,              ROTA0020
     1                AYFM,ROTJ,XK43,XLIM,CBFAC,                           ROTA0030
     2                GDISK(120),NOPST,TANA1,TANB1,                        ROTA0040
     3                TANT1,TANT2,DCAFXK,IPRINT,NORADL,                    ROTA0050
     4                SHEARL(12),SHEARD(12),SHEARR(12),                    ROTA0060
     5                XMOML(12),XMOMD(12)                                  ROTA0070
     6                ,APDS,ARDS,PFAC,RFAC,APDBS,ARDBS                     ROTA0080
      COMMON /ROMAN/  ZZ,VXS(2),VYS(2),VZS(2),BETA(12,2),                  ROTA0090
     *                T,PCC(2),COSE(7,7,2),BETAN(2),BETAX(2),BETAZ(2),     ROTA0100
     *                AIB(2),APDD,ARDD,AYDD,AIR(2),                        ROTA0110
     !                DPSI(12,2),DTRP,NPSI(2),ZZTR,                        ROTA0120
     2                BETAD(12,2),BNPSI(2),                                ROTA0130
     3                CON02,GMAXV,RATE1,RATE2,STOP2,                       ROTA0140
     4                THROT(2),TRIND,XGUST,BETAZO(2),GMAXV1,               ROTA0150
     5                GMAXV2,GMAXV3,GUSTYP,HNPSIR(2),                      ROTA0160
     6                HUBKPS,HUBKRS,HUBTPS,HUBTRS,                         ROTA0170
     7                KONFIG,LNGTH1,PILGH1,PSIREF(2),                      ROTA0180
     8                START2,XMOMLI(12,2),                                 ROTA0190
     9                R(2),OR(2),T1(2),                                    ROTA0200
     A                T2(2),TZR(2),XMA(2),                                 ROTA0210
     B                XMB(2),AIBP(2),AIBR(2),                              ROTA0220
     C                APDR(2),ARDR(2),PSIO(2),                             ROTA0230
     D                XSTAH(2),YSTAH(2),                                   ROTA0240
     F                HUBKPR(2),HUBKRR(2)                                  ROTA0250
     E                ,AZETAR(2),VZETAR(2)                                 ROTA0260
      COMMON /MANARO/ I,V,IND,NWAG,APBMT,ARBMT,AYBMT,BETAO(2),TDELT,        ROTA0270
     1                BETAF(2),HGUSTE,HGUSTF,HGUSTW,VGUSTE,                ROTA0280
     2                VGUSTW,YGUSTE,GFWO,GLAT,GVERT,                       ROTA0290
     3                VXB,VZB,APD,VYB,ARD,AYD,                             ROTA0300
     4                COLSTK,CYSTK1,CYSTK2,PEDAL,AYE,                      ROTA0310
     5                APE,ARE,A1M,B1M,A1TR,B1TR,                           ROTA0320
     6                XAR(2),YAR(2),ZAR(2),                                ROTA0330
     7                VIR(2),ZETAR(2),HFORCE(2),                           ROTA0340
     8                THRUST(2),TORQUE(2),YFORCE(2)                        ROTA0350
      COMMON /STANRO/ J,W,ITM,VHS(2),LINK,QELE,VROT(2),                     ROTA0360
     1                VSNO,YFIN(2),ZFEL(2),A1BAL(2),                       ROTA0370
     2                B1BAL(2),COND1,SWING,PILGH2,PWGEL1,                  ROTA0380
     3                B(2),PMOM(2),RMOM(2)                                 ROTA0390
      COMMON /ROSTAR/ AM(2),CT,PI,XB(2),ALT,AOR(2),EXH(2),                 ROTA0400
     1                NXR(2),RBH(2),SWC(2),UHS,CDHB(2),LROT(2),            ROTA0410
     2                RAIB(2),RTRP(2),TAIR(14),CONEK(2),DCAFR(2),FVINO,    ROTA0420
     *                NVARO,                                               ROTA0430
     3                SWKR1(2),SWKR2(2),TIP1B(2),TIP3B(2),                 ROTA0440
     4                TWIST(20,2),CLRAOK(2),DELTA3(2),                     ROTA0450
     5                LAMBDA(2),UPGUST,URGUST,UTGUST,WROTOR,               ROTA0460
     6                ER(2),ERX(2),                                        ROTA0470
     7                XLIMAX(2),XLIMIN(2)                                  ROTA0480
      COMMON /TOPLOT/ AH(3),AL(3),EXIT,ICOM(49),IPSN,                       ROTA0490
     1                NPART,NVARA,NVARB,NVARC,NSCALE                       ROTA0500
     1                ,NVARS,NPRINT,NTIME                                  ROTA0510
      DIMENSION FLAP(2,2),HEADRO(6),AA(60)                                  ROTA0520
      EQUIVALENCE (FLAP(1,1),A1M),(AA(1),SHEARL(1))                         ROTA0530
      DATA HEADRO/'MAIN FWD  RTTAIL AFTLEFT'/                               ROTA0540
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      A1=FLAP(1,N)                                                          ROTA0550
      B1=FLAP(2,N)                                                          ROTA0560
      DO 200 K=1,60                                                         ROTA0570
      AA(K)=0.                                                              ROTA0580
  200 CONTINUE                                                              ROTA0590
      NDPSI=NPSI(N)                                                         ROTA0600
      NDRADL = NXR(N)                                                       ROTA0610
      IPRINT = 0                                                            ROTA0620
      IF(COND2.GT.2.5) IPRINT = 1                                           ROTA0630
      IF(LINK.LT.4.OR.IND.NE.1.OR.TAIR(1).GT.(T+TDELT)) GO TO 199           ROTA0640
      IF(N.EQ.1.AND.NVARC.EQ.0.AND.NVARD.NE.0) GO TO 199                    ROTA0650
      IF(N.EQ.2.AND.NVARC.EQ.0.AND.NVARD.EQ.0) GO TO 199                    ROTA0660
      IPRINT=1                                                              ROTA0670
  199 CONTINUE                                                              ROTA0680
      CALL RATS (GFWD,GLAT,GVERT,0.,-ZETAR(N),0.,GMFWD,GMLAT,GMVERT,-1)     ROTA0690
      NROT=KONFIG+3*(N-1)                                                   ROTA0700
      RDTJ=3-2*N                                                            ROTA0710
      A1SV=A1                                                               ROTA0720
      B1SV=B1                                                               ROTA0730
      T1S=T1(N)                                                             ROTA0740
      T2S=T2(N)                                                             ROTA0750
      KOUNT=0                                                               ROTA0760
      CALL DOGS (ARD,APD,AYD,XAR(N),YAR(N),ZAR(N),VXR,VYR,VZR)              ROTA0770
      AYFM=AYE                                                              ROTA0780
      CALL CATS (0.,-ZETAR(N),0.,AYE,APE,ARE,AYFM,APFM,ARFM,1,1)            ROTA0790
      CBFAC=COS(APFM)*COS(ARFM)                                             ROTA0800
      CALL RATS (0.,0.,WROTDR,AYFM,APFM,ARFM,XWRDT,YWROT,ZWROT,-1)          ROTA0810
  250 FFWD=XWROT*GMFWD                                                      ROTA0820
      FSIDE=YWROT*GMLAT                                                     ROTA0830
      VXR=VXR+VXB                                                           ROTA0840
      VYR=VYR+VYB*SWC(N)                                                    ROTA0850
C           VYR FOR TAIL ROTOR = VYR FROM DOGS + VYB*(1.-TRSWC)             ROTA0860
      VZR=VZR+VZB                                                           ROTA0870
      VROT(N)=SQRT(VXR**2+VYR**2+VZR**2)                                    ROTA0880
      ALT=-ZZ                                                               ROTA0890
      VI2=.5*VROT(N)**2                                                     ROTA0900
      VI4=VI2**2                                                            ROTA0910
  601 CONTINUE                                                              ROTA0920
      FWDS=HFORCE(N )                                                       ROTA0930
      FLATS=YFORCE(N)                                                       ROTA0940
      DT1=SWKR1(N)*(HFORCE(N)-FFWD)                                         ROTA0950
      DT2=-SWKR2(N)*(YFORCE(N)+FSIDE)                                       ROTA0960
      T1(N)=T1S+DT1                                                         ROTA0970
      T2(N)=T2S+DT2                                                         ROTA0980
      KOUNT=KOUNT+1                                                         ROTA0990
      AYBM=0.                                                               ROTA1000
      APBM=-ZETAR(1)                                                        ROTA1010
      ARBM=0.                                                               ROTA1020
      IF(N.EQ.1) GO TO 287                                                  ROTA1030
      T2(N)=-T2(N)                                                          ROTA1040
      ARDR(N)=-ARDR(N)                                                      ROTA1050
      YFORCE(N)=-YFORCE(N)                                                  ROTA1060
      B1=-B1                                                                ROTA1070
      AYBM=AYBMT                                                            ROTA1080
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      APBM=APBMT                                                        ROTA1090
      ARBM=ARBMT                                                        ROTA1100
      ALT=ZZTR                                                          ROTA1110
  287 CONTINUE                                                          ROTA1120
      XLIM=XLIMAX(N)                                                    ROTA1130
      CALL RATS (VXR,VYR,VZR,AYBM,APBM,ARBM,VXS(N),VYS(N),VZS(N),-1)    ROTA1140
      UHS=VYS(N)**2+VYS(N)**2                                           ROTA1150
      VHS(N)=SQRT(UHS)                                                  ROTA1160
      VYS(2)=-VYS(2)                                                    ROTA1170
      TANT1=TAN(T1(N))                                                  ROTA1180
      TANT2=TAN(T2(N))                                                  ROTA1190
      CALL RATS (ARD,APD,AYD,AYBM,APBM,ARBM,ARDS,APDS,AYDS,-1)          ROTA1200
      CALL RATS (ARDD,APDD,AYDD,AYBM,APBM,ARBM,ARDDS,APDDS,AYDDS,-1)    ROTA1210
      PSD2=PSID(N)*2.                                                   ROTA1220
      APDS=APDS-VZETAR(N)                                               ROTA1230
      ARDM=PSD2*ARDS+APDDS-AZETAR(N)                                    ROTA1240
      APDM=PSD2*APDS-ARDDS                                              ROTA1250
      IF(LINK.NE.2) GO TO 289                                           ROTA1260
      ARDR(N)=APDS                                                      ROTA1270
      IF(N.EQ.2) ARDR(N)=-ARDS                                          ROTA1280
      APDR(N)=APDS                                                      ROTA1290
  289 CONTINUE                                                          ROTA1300
      IF(LINK.EQ.4) GO TO 288                                           ROTA1310
      APDBS=APDR(N)-APDS                                                ROTA1320
      ARDBS=ARDR(N)-ARDS                                                ROTA1330
  288 CONTINUE                                                          ROTA1340
      XK=11.25*VHS(N)                                                   ROTA1350
      IF(VHS(N).GT.(.1067*DR(N))) XK=1.36*DR(N)-1.5*VHS(N)              ROTA1360
      IF(VHS(N).GT.(.5733*DR(N))) XK=.5*DR(N)                           ROTA1370
      IF(ABS(DR(N)).LT.R(N)) GO TO 286                                  ROTA1380
      XK=XK/DR(N)                                                       ROTA1390
      GO TO 1001                                                        ROTA1400
  286 XK = .5                                                           ROTA1410
 1001 CONTINUE                                                          ROTA1420
      XK43=XK*1.333333                                                  ROTA1430
      QCAFXK=QCAFR(N)*XK                                                ROTA1440
      IF(GUSTYP.LT.1.) GO TO 17                                         ROTA1450
      AYFM=AYF                                                          ROTA1460
      CALL CATS (AYBM,APBM,ARBM,AYF,APF,APF,AYFM,APFM,ARFM,1,1)         ROTA1470
      DO 19 K=1,120                                                     ROTA1480
      GD(SK(K)=0.                                                       ROTA1490
   19 CONTINUE                                                          ROTA1500
   17 CONTINUE                                                          ROTA1510
      CALL ITROT (N)                                                    ROTA1520
      IF(EXIT.NE.0.) RETURN                                             ROTA1530
      IF(N.EQ.1) GO TO 304                                              ROTA1540
      VYS(2)=-VYS(2)                                                    ROTA1550
      T2(N)=-T2(N)                                                      ROTA1560
      ARDR(N)=-ARDR(N)                                                  ROTA1570
      YFORCE(N)=-YFORCE(N)                                              ROTA1580
      R1=-R1                                                            ROTA1590
      PMOM(N) = -RMOM(N)                                                ROTA1600
  304 IF(LINK.EQ.4.OR.SWKRI(N).EQ.0.) GO TO 606                         ROTA1610
      ABSHF=ABS(HFORCE(N)-FWDS)                                         ROTA1620
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      ABSYF=ABS(YFORCE(N)-FLATS)                                        ROTA1630
      IF(KOUNT.EQ.10) GO TO 606                                         ROTA1640
C     IF(KOUNT.EQ.10) GO TO 602                                         ROTA1650
C       ABOVE CARD USED IF DIAGNOSTICS WANTED                           ROTA1660
      IF(ABSHF.GT.1..OR.ABSYF.GT.1.) GO TO 601                          ROTA1670
      GO TO 606                                                         ROTA1680
  602 WRITE (6,603) HEADRO(NROT),ABSHF,ABSYF                            ROTA1690
  606 CONTINUE                                                          ROTA1700
      IF(TRIND.EQ.0..AND.N.EQ.2) GO TO 305                              ROTA1710
      IF(GUSTYP.LT.1..OR.I.NE.2) GO TO 305                              ROTA1720
      IF(N.EQ.1) WRITE(6,9070) VGUSTW,VGUSTE,HGUSTW,HGUSTE,HGUSTF,VGUSTFROTA1730
      CALL DISK (GDISK)                                                 ROTA1740
  305 IF(NWAG.EQ.0) GO TO 503                                           ROTA1750
      LROT(N)=LROT(N)+1                                                 ROTA1760
      DLIFT=THRUST(N)-THROT(N)                                          ROTA1770
      CALL WAG (RIN(N),LROT(N),N,V,TDELT,RED,DLIFT)                     ROTA1780
      THRUST(N)=THRUST(N)-RED                                           ROTA1790
  503 IF(LINK.EQ.2.AND.J.EQ.1) RETURN                                   ROTA1800
      A1BAL(N)=A1                                                       ROTA1810
      B1BAL(N)=B1                                                       ROTA1820
      FLAP(1 ,N)=A1SV                                                   ROTA1830
      FLAP(2 ,N)=B1SV                                                   ROTA1840
      IF(IPRINT.EQ.0) RETURN                                            ROTA1850
      IF(N.EQ.1.AND.NVARD.NE.0) RETURN                                  ROTA1860
      DO 702 L=1,13                                                     ROTA1870
      TAIR(L)=TAIR(L+1)                                                 ROTA1880
  702 CONTINUE                                                          ROTA1890
      TAIR(14)=9999.                                                    ROTA1900
      RETURN                                                            ROTA1910
  603 FORMAT (1H0//10X,A4,' ROTOR H-FORCE AND Y-FORCE NOT BALANCED. DELTROTA1920
     1AS ARE',2G15.7,5X,'LBS.')                                         ROTA1930
 9070 FORMAT(61H      VGUSTW     VGUSTE     HGUSTW     HGUSTE     HGUSTF     YROTA1940
     1GUSTF/1H ,6E10.3)                                                 ROTA1950
      END                                                               ROTA1960
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      SUBROUTINE SETE                                                   SETE0010
      COMMON /FORCE/  A(71)                                             SETE0020
      COMMON /STRIAB/ D(21),DT(21),E(79),F(10),X(10),                   SETE0030
     1                DL,DM,DN,DX,DY,DZ,IX,IY,IZ,PD(10,11),            SETE0040
     2                DTR,EPD,ERR(10),KM1,RHO,                          SETE0050
     3                R12,SPD(6,6,3),XBW(21),XEL(14),                   SETE0060
     4                XER(7),XFC(28),XFN(7),XFS(35),                    SETE0070
     5                XGN(7),XIT(21),XMR(49),XTR(49),                   SETE0080
     6                XWG(21),YMR(21),YTR(21),YWG(21),                  SETE0090
     7                YEL(21),YFN(21),BLCG,DAMP,DEPD(10),               SETE0100
     8                EPDS,EPDX(10),MASS,QSV1,TMRS,TTRS,                SETE0110
     9                WLCG,XCON(63),XJET(14),XMIN,AYEFP,                SETE0120
     A                BETAES(2),CNPCD,DHADQ,DYBDR,GUESS,                SETE0130
     B                NPASS,PDPH1(10,11),STACG,TZERO,                   SETE0140
     C                XMAST,DHADAQ,DQDCOL,DTRRSQ,DYBDBR,                SETE0150
     D                ENGRPM,MXPASS,PSD30P,TRIND1,XLIMIT                SETE0160
      COMMON /MANARO/ I,V,IND,NWAG,APBMT,ARBMT,AYBMT,BETAO(2),TDELT,    SETE0170
     1                BETAE(2),HGUSTE,HGUSTF,HGUSTW,VGUSTE,             SETE0180
     2                VGUSTW,VGUSTF,GFWD,GLAT,GVERT,                    SETE0190
     3                VXB,VZB,APD,VYB,ARD,AYD,                          SETE0200
     4                COLSTK,CYSTK1,CYSTK2,PEDAL,AYE,                   SETE0210
     5                APE,ARE,A1M,B1M,A1TR,B1TR,                        SETE0220
     6                XAR(2),YAR(2),ZAR(2),                             SETE0230
     7                VIMR,VITR,ZETA,ZETATR,HMR,HTR,                    SETE0240
     8                TMR,TTR,QMX,QTR,YMRF,YTRF                         SETE0250
      DIMENSION KS(6)                                                   SETE0260
      DATA KS/1,13,22,59,46,33/                                         SETE0270
      DO 301 L=1,6                                                      SETE0280
      PD(L,7)=-A(KS(L))                                                 SETE0290
  301 CONTINUE                                                          SETE0300
      DO 74 K=1,71                                                      SETE0310
      E(K)=A(K)                                                         SETE0320
   74 CONTINUE                                                          SETE0330
      E(72) = TMR                                                       SETE0340
      E(73) = HMR                                                       SETE0350
      E(74) = YMRF                                                      SETE0360
      E(75) = QMX                                                       SETE0370
      E(76) = TTR                                                       SETE0380
      E(77)=HTR                                                         SETE0390
      E(78) = YTRF                                                      SETE0400
      E(79) = QTR                                                       SETE0410
      QSV1=.5*(QMX+QTR)                                                 SETE0420
      BETAES(1)=BETAE(1)                                                SETE0430
      BETAES(2)=BETAE(2)                                                SETE0440
      TMRS=TMR                                                          SETE0450
      TTRS=TTR                                                          SETE0460
      KM1=6                                                             SETE0470
      RETURN                                                            SETE0480
      END                                                               SETE0490
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      SUBROUTINE SLTE (PD ,J,L,M)                                       SLTE0010
      COMMON /TRONIC/ UU(6),VV(6),TAU(22),DAMP(22),NUMRTS,GAINB,        SLTE0020
     1                INDEX,STGAIN(5),TSTAP,COELTD,SLOT(3,9)           SLTE0030
      DIMENSION PD(10,11),K(3,2)                                        SLTE0040
      DATA K /2,5,4,1,3,5/                                              SLTE0050
      DO 10 I=1,3                                                       SLTE0060
      SLOT(I,J)=PD(K(I,M),L)                                            SLTE0070
   10 CONTINUE                                                          SLTE0080
      CALL SRT                                                          SLTE0090
      RETURN                                                            SLTE0100
      END                                                               SLTE0110
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      SUBROUTINE SLTT (A,B,K)                                    SLTT0010
      DIMENSION A(3,9),B(3,9)                                    SLTT0020
      L=K+2                                                      SLTT0030
      DO 10 I=1,3                                                SLTT0040
      DO 10 J=K,L                                                SLTT0050
      A(I,J)=B(I,J)                                              SLTT0060
      B(I,J)=0.                                                  SLTT0070
   10 CONTINUE                                                   SLTT0080
      RETURN                                                     SLTT0090
      END                                                        SLTT0100
```

```
      SUBROUTINE SOLVE                                                  SOLV0010
      COMMON /STRIAB/ D(21),DT(21),E(79),F(10),X(10),                   SOLV0020
     1                DL,DM,DN,DX,DY,DZ,IX,IY,IZ,PD(10,11),            SOLV0030
     2                DTR,EPD,ERR(10),KM1,RHO,                          SOLV0040
     3                R12,SPD(6,6,3),XBW(21),XEL(14),                   SOLV0050
     4                XEP(7),XFC(29),XFN(7),XFS(35),                    SOLV0060
     5                XGN(7),XIT(21),XMR(49),XTR(49),                   SOLV0070
     6                XWG(21),YMR(21),YTR(21),YWG(21),                  SOLV0080
     7                YEL(21),YFN(21),BLCG,DAMP,DEPD(10),               SOLV0090
     8                EPDS,EPDX(10),MASS,OSV1,TMRS,TTRS,                SOLV0100
     9                WLCG,XCON(63),XJET(14),XMIN,AYEFP,                SOLV0110
     A                BETAES(2),CNPCD,DHADQ,DYBDR,GUESS,                SOLV0120
     B                NPASS,PDPHI(10,11),STACG,TZERO,                   SOLV0130
     C                XMAST,DHADAQ,DQDCOL,DTRRSQ,DYBDBR,                SOLV0140
     D                ENGRPM,MXPASS,PSD3OP,TRINO1,XLIMIT                SOLV0150
      COMMON /TOPLOT/ AH(3),AL(3),EXIT,ICOM(49),IPSN,                   SOLV0160
     1                NPART,NVARA,NVARB,NVARC,NSCALE                    SOLV0170
     1                ,NVARS,NPRINT,NTIME                               SOLV0180
C          SOLUTION OF KM1 LINEAR EQUATIONS IN KM1 VARIABLES            SOLV0190
      N1 = 1 + KM1                                                      SOLV0200
      NM1=KM1-1                                                         SOLV0210
      DO 150M = 1, KM1                                                  SOLV0220
      K = M + 1                                                         SOLV0230
C          CHECK FOR ZERO ON DIAGONAL                                   SOLV0240
      IF(ABS(PDPHI(M,M)).GE.1.E-05)GO TO 100                            SOLV0250
      DO 81 I=K,KM1                                                     SOLV0260
      IF(ABS(PDPHI(I,M)).GE.1.E-05)GO TO 82                             SOLV0270
   81 CONTINUE                                                          SOLV0280
C          SINGULAR MATRIX  NO SOLUTION                                 SOLV0290
      EXIT=1.                                                           SOLV0300
      RETURN                                                            SOLV0310
   82 DO 85 III=1,N1                                                    SOLV0320
      B=PDPHI(I,III)                                                    SOLV0330
      PDPHI(I,III)=PDPHI(M,III)                                         SOLV0340
   85 PDPHI(M,III)=B                                                    SOLV0350
  100 DO 110J = K, N1                                                   SOLV0360
  110 PDPHI(M,J)=PDPHI(M,J)/PDPHI(M,M)                                  SOLV0370
      IF(KM1.LT.K)GO TO 160                                             SOLV0380
      DO 150MP = K, KM1                                                 SOLV0390
      DO 150 J = K, N1                                                  SOLV0400
  150 PDPHI(MP,J)=PDPHI(MP,J)-PDPHI(MP,M)*PDPHI(M,J)                    SOLV0410
  160 DO 180M = 1, KM1                                                  SOLV0420
  180 X(M)=PDPHI(M,N1)                                                  SOLV0430
      DO 250K1 = 1, NM1                                                 SOLV0440
      J = N1 - K1                                                       SOLV0450
      K = J - 1                                                         SOLV0460
      DO 250M = 1, K                                                    SOLV0470
  250 X(M)=X(M)-PDPHI(M,J)*X(J)                                         SOLV0480
      RETURN                                                            SOLV0490
      END                                                               SOLV0500
```

```
      SUBROUTINE SRT                                                    SRT00010
      COMMON /STBD/ UX,UY,U,V,T,A(9,2),ID,IO2,G(6,2),SLIM,ID,IL         SRT00020
      COMMON /TRONIC/ UU(6),VV(6),TAU(22),DAMP(22),NR,GAINB,            SRT00030
     1                INDEX,STGAIN(6),TSTAR,COL,SLOT(3,9)              SRT00040
      DOUBLE PRECISION UX,UY,U,V,T,A,UR,G,UI                            SRT00050
      DO 1 I=1,6                                                        SRT00060
      DO 1 J=1,2                                                        SRT00070
    1 G(I,J) = 0.                                                       SRT00080
      ID=6                                                              SRT00090
      ID=3                                                              SRT00100
      IO2=9                                                             SRT00110
      IL=1                                                              SRT00120
      SLIM=10000.                                                       SRT00130
      T=1.                                                              SRT00140
      CALL  ROOA                                                        SRT00150
  151 UR =(UX-UY)*(UX+UY)                                               SRT00160
      UI= 2.*UX*UY                                                      SRT00170
      DO 2 L=1,3                                                        SRT00180
      M= 3*L-3                                                          SRT00190
      DO 2 I=1,3                                                        SRT00200
      N=M+I                                                             SRT00210
      K=3*I-2                                                           SRT00220
      A(N,1) = SLOT(L,K+2)+SLOT(L,K+1)*UX + SLOT (L, K  ) *UR           SRT00230
    2 A(N,2) = SLOT(L,K+1) *UY +SLOT IL,K   )*UI                        SRT00240
   10 CALL DET                                                          SRT00250
      CALL ROOB                                                         SRT00260
      IF (IL)161,24,161                                                 SRT00270
   24 NR=ID                                                             SRT00280
      IF(NR.GT.4) NR=4                                                  SRT00290
      COL=UX                                                            SRT00300
      DO 3 J=1,ID                                                       SRT00310
      UU(J)=G(J,1)                                                      SRT00320
    3 VV(J)=G(J,2)                                                      SRT00330
      RETURN                                                            SRT00340
      END                                                               SRT00350
```

```
      SUBROUTINE STAB                                                   STAB0010
      COMMON /FORCE/ XF,XFRWG,XFLWG,XFELE,XFFUS,XFRJET,                 STAB0020
     1               XFLJET,XFMR,XFTR,XFGUN,XFFIN,XFW,                  STAB0030
     2               YF,YFFUS,YFRJET,YFLJET,YFMR,YFTR,                  STAB0040
     3               YFGUN,YFFIN,YFW,                                   STAB0050
     4               ZF,ZFRWG,ZFLWG,ZFELE,ZFFUS,ZFRJET,                 STAB0060
     5               ZFLJET,ZFMR,ZFTR,ZFGUN,ZFW,                        STAB0070
     6               QL,LRWG,LLWG,LELE,LFUS,LRJET,LLJET,                STAB0080
     7               LMR,LTR,LGUN,LFIN,LQMR,LQTR,                       STAB0090
     8               QM,MRWG,MLWG,MELE,MFUS,MRJET,MLJET,                STAB0100
     9               MMR,MTR,MGUN,MFIN,MQMR,MQTR,                       STAB0110
     A               QN,NRWG,NLWG,NELE,NFUS,NRJET,NLJET,                STAB0120
     B               NMR,NTR,NGUN,NFIN,NQMR,NQTR                        STAB0130
      COMMON /STRIAB/ D(21),DT(21),E(79),F(10),X(10),                   STAB0140
     1                DL,DM,DN,DX,DY,DZ,IX,IY,IZ,PD(10,11),             STAB0150
     2                DTR,EPD,ERP(10),KM1,RHO,                          STAB0160
     3                R12,SPD(6,6,3),XRW(21),XEL(14),                   STAB0170
     4                XEP(7),XFC(28),XFN(7),XFS(35),                    STAB0180
     5                XGN(7),XIT(21),XMR(49),XTR(49),                   STAB0190
     6                XWG(21),YMR(21),YTR(21),YWG(21),                  STAB0200
     7                YEL(21),YFN(21),BLCG,DAMP,DEPD(10),               STAB0210
     8                EPDS,EPDX(10),MASS,OSV1,TMRS,TTRS,                STAB0220
     9                WLCG,XCON(63),XJET(14),XMIN,AYEFP,                STAB0230
     A                BETAES(2),CNPCO,DHADO,DYBDR,GUESS,                STAB0240
     B                NPASS,PDPHI(10,11),STACG,TZERO,                   STAB0250
     C                XMAST,DHADAO,DODCOL,DTRRSO,DYBDBR,                STAB0260
     D                ENGRPM,MXPASS,PSD30P,TRIND1,XLIMIT                STAB0270
      COMMON /STRIMA/ AY,VH,AGW,DT1(2),DT2(2),IXZ,                      STAB0280
     1                QMR,XXD,YYD,ZZD,ALGF,APFP,AYFP,                   STAB0290
     2                CGWL,COLL(6),CYCF(3),CYCL(3),                     STAB0300
     3                DIST,KCIT(20),PEDA(3),QMAX,                       STAB0310
     4                QMRS,TIME,TMAX,XCIT(20,6),ALGEZ,                  STAB0320
     5                ALGF1,ALGE2,CGSTA,CPWIC,DIXIZ,                    STAB0330
     6                DIYIX,DIZIY,DTZMT,DTZM1,DTZT1,FTKTS,              STAB0340
     *                HUBKM(2,2),HUBKI(2,2),                            STAB0350
     7                KREAD,PIU30,TSTAB(14),ZMAX2,ZMAX3,                STAB0360
     8                ASECOL,CYPWIC,GFARAT,PSD55O,                      STAB0370
     9                PSISTP,QXBRAK,RUDIND,ZDELT1,ZDELT2                STAB0380
      COMMON /MANAL/  Q,AP,PED,QWG,TZM,T1M,T2M,                         STAB0390
     1                TZT,T1T,T2T,ALEL,CZFT,PSDO,                       STAB0400
     2                SZFT,TAXL,TAXR,XAWG,XLNK(16),ZAWG,                STAB0410
     3                ALCYP,ALFIN,ALLWG,ALRWG,CDELE,CDFIN,              STAB0420
     4                CDLWG,CDRWG,CLELE,CLFIN,CLLWG,CLRWG,CWING,        STAB0430
     5                CYCR1,CYCR2,CZET4,CZET6,CZET9,RANGE,              STAB0440
     6                SZET5,SZET7,SZET8,WGCOL,XAELE,XAFIN,              STAB0450
     7                XAFUS,XAJET,YAFIN,ZAELE,ZAFIN,ZAFUS,              STAB0460
     *                YAELE,YAFUS,YALWG,YARWG,YALJET,YARJET,            STAB0470
     9                ZAJET,ALECR1,ALGFPD,BOTTOM,CZET11,                STAB0480
     9                CZET12,CZET13,EIGETA,HALFPI,SZET10,               STAB0490
     A                XAPYLO,YGUSTW,ZAPYLO,ZFLWG1,ZFRWG1                STAB0500
     B                ,TZMS,T1MS,T2MS,TZTS,T1TS,T2TS,                   STAB0510
     C                CLOCK,FLOCK,XLOCK,TCLOCK                          STAB0520
      COMMON /ROMAN/  ZZ,VXS(2),VYS(2),VZS(2),BETA(12,2),               STAB0530
     *                T,PCC(2),COSE(7,7,2),BETAN(2),BETAX(2),BETAZ(2),  STAB0540
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*                 A)B(2),APDD,ARDD,AYDD,A)R(2),                          STAB0550
1                 DPSI()2,2),DTRR,NPSI(2),ZZTR,                          STAB0560
2                 BETAD(12,2),BNPS)(2),                                  STAB0570
3                 COND2,GMAXV,RATE1,RATE2,STOP2,                         STAB0580
4                 THROT(2),TRIND,XGUST,BETAZD(2),GMAXV1,                 STAB0590
5                 GMAXV2,GMAXV3,GUSTYP,HNPSIR(2),                        STAB0600
/                 HUBKPS,HUBKRS,HUBTPS,HUBTRS,                           STAB0610
7                 KONFIG,LNGTH1,PILGH1,PSIREF(2),                        STAB0620
8                 START2,XMOMLI(12,2),                                   STAB0630
9                 RM,RTR,ORM,OPTR,T1MT,T1TT,                             STAB0640
A                 T2MT,T2TT,TZMT,TZTT,XMA1,XMA1T,                        STAB0650
B                 XMB1,XMB1T,A1BPM,A1BPT,A1BRM,A1BRT,                    STAB0660
C                 APTD,APTTD,ARTD,ARTTD,PSD,PSD1,                        STAB0670
D                 XSTAHM,XSTAHT,YSTAHM,YSTAHT,                           STAB0680
E                 HUBKP,HUBKTP,HUBKR,HUBKTR                              STAB0690
F                 ,AZETA,AZETAT,VZETA,VZETAT                             STAB0700
 COMMON /MANAPD/ ),V,)ND,NWAG,APBMT,ARBMT,AYBMT,BETAO(2),TDELT,          STAB0710
1                 BETAE(2),HGUSTE,HGUSTF,HGUSTW,VGUSTE,                  STAB0720
2                 VGUSTW,YGUSTE,GEWD,GLAT,GVERT,                         STAB0730
3                 VXB,VZB,APD,VYB,ARD,AYD,                               STAB0740
4                 COLSTK,CYSTK1,CYSTK2,PEDAL,AYE,                        STAB0750
5                 APE,ARE,A1M,B1M,A1TR,B1TR,                             STAB0760
6                 XAR(2),YAR(2),ZAR(2),                                  STAB0770
7                 VIMR,V)TR,ZETA,ZETATR,HMR,HTR,                         STAB0780
8                 TMR,TTR,OMX,QTR,YMRF,YTRF                              STAB0790
 COMMON /STANPD/ J,W,ITM,VHS(2),L)NK,QELE,VKOT(2),                       STAB0800
1                 VSND,YFIN(2),ZFEL(2),A1B4L(2),                         STAB0810
2                 P1BAL(2),COND),SW)NG,PILGH2,PWGEL1,                    STAB0820
3                 BM,BTR,PMOMM,PMOMT,RMOMM,RMOMT                         STAB0830
 COMMON /TOPLOT/ AH(3),AL(3),EXIT,ICOM(49),)PSN,                         STAB0840
1                 NPART,NVARA,NVARB,NVARC,NSCALE                         STAB0850
2                 ,NVARS,NPRINT,NTIME                                    STAB0860
 COMMON /KVARTR/ KVAR(10)                                                STAB0870
 D)MENSION VAR(6),EPDD(6),A(71),KS(6),HEAD1(2)                           STAB0880
1          ,VAR1(6),UNIT(6),DAPTD(6),DARTD(6),DAPTTD(6),                 STAB0890
2     DARTTD(6),VARSV(4),DPSISV(7,2)                                     STAB0900
 EQUIVALENCE (VAR(1),VXB),(A(1)),XF),(VAR1(1),COLSTK)                    STAB0910
 DATA HEAD)/'MAINTAIL'/                                                  STAB0920
 DATA KS/)2,2),32,45,58,71/                                              STAB0930
 LINK=3                                                                  STAB0940
 KVAR(5)=5                                                               STAB0950
 KVAR(6)=6                                                               STAB0960
 DTZ41=BETAE(1)*PCC(1)                                                   STAB0970
 DTZT1=BETAE(2)*PCC(2)                                                   STAB0980
 VIMRS=V)MR                                                              STAB0990
 VITRS=V)TR                                                              STAB1000
 DO 313 N=1,4                                                            STAB1010
 VARSV(N)=VAR1(N)                                                        STAB1020
313 CONTINUE                                                             STAB1030
 IF(PSD.EQ.0.) GO TO 309                                                 STAB1040
 DO 315 I=1,7                                                            STAB1050
 DPSISV(I,1)=DPSI(I,1)                                                   STAB1060
 DPSISV(I,2)=DPSI(I,2)                                                   STAB1070
315 CONTINUE                                                             STAB1080
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      J=1                                                                STAB1090
      NPS(1)=12                                                          STAB1100
      NPSI(2)=12                                                         STAB1110
      CALL NOPSI1 (NPSI,HNPSIR,BNPSI,DPSI)                               STAB1120
      CALL AJAC08                                                        STAB1130
      ITM=40                                                             STAB1140
      A(BPM=XMA1                                                         STAB1150
      A(BPM=-XMB1                                                        STAB1160
      A!BPT=XMA1T                                                        STAB1170
      A!BPT=XMB1T                                                        STAB1180
  309 CONTINUE                                                           STAB1190
      J=2                                                                STAB1200
      CALL SETE                                                          STAB1210
      CALL JACOBI                                                        STAB1220
      DO 312 J=1,6                                                       STAB1230
      DAPTD(J)=0.                                                        STAB1240
      DARTD(J)=0.                                                        STAB1250
      DAPTTD(J)=0.                                                       STAB1260
      DARTTD(J)=0.                                                       STAB1270
  312 CONTINUE                                                           STAB1280
      KOUNTS=0                                                           STAB1290
      DCOL=0.                                                            STAB1300
      COLS=COLSTK                                                        STAB1310
      UNIT(1)=100.*RANGE/COLL(1)                                         STAB1320
      UN(T(2)=100.*CYCF(3)/CYCF(1)                                       STAB1330
      UN(T(3)=100.*CYCL(3)/CYCL(1)                                       STAB1340
      UN(T(4)=100.*PEDA(3)/PEDA(1)                                       STAB1350
      CALL RATS (XXD,YYD,ZZD,AYE,APE,ARE,VXB,VYB,VZB,-1)                 STAB1360
      DO 306 J=1,4                                                       STAB1370
      DO 306 I=1,6                                                       STAB1380
      PD(I,J)=PD(I,J)*UNIT(J)                                            STAB1390
  306 CONTINUE                                                           STAB1400
      WRITE (6,404)                                                      STAB1410
      CALL WRVP (2,VAR1,KM1,PD,TAXL,TAXR)                                STAB1420
      CALL RATS (0.,0.,W,AYE,APE,ARE,XFW,YFW,ZFW,-1)                     STAB1430
      EPDD(1)=EPDS*100.                                                  STAB1440
      EPDD(2)=EPDS*100.                                                  STAB1450
      EPDD(3)=EPDS                                                       STAB1460
      EPDD(4)=EPDS*100.                                                  STAB1470
      EPDD(5)=EPDS                                                       STAB1480
      EPDD(6)=EPDS                                                       STAB1490
      DAPTD(3)=EPDD(3)                                                   STAB1500
      CALL RATS (0.,EPDD(3),0.,AYBMT,APBMT,ARBMT,DARTTD(3),DAPTTD(3),    STAB1510
     1           TV,-1)                                                  STAB1520
      DARTD(5)=EPDD(5)*CZET                                              STAB1530
      CALL RATS (EPDD(5),0.,0.,AYBMT,APBMT,ARBMT,DARTTD(5),DAPTTD(5),    STAB1540
     1           TV,-1)                                                  STAB1550
      DARTD(6)=EPDD(6)*SZET                                              STAB1560
      CALL RATS (0.,0.,EPDD(6),AYBMT,APBMT,ARBMT,DARTTD(6),DAPTTD(6),    STAB1570
     1           TV,-1)                                                  STAB1580
      DO 55 J=1,6                                                        STAB1590
      VAR(J)=VAR(J)+EPDD(J)                                              STAB1600
      APTD=APTD+DAPTD(J)                                                 STAB1610
      ARTD=ARTD+DARTD(J)                                                 STAB1620
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      APTTD=APTTD+DAPTTD(J)                                                  STAB1630
      ARTTD=ARTTD+DARTTD(J)                                                  STAB1640
      IF(J.EQ.1) GO TO 307                                                   STAB1650
      VAR(J-1)=VAR(J-1)-EPDD(J-1)                                            STAB1660
      APTD=APTD-DAPTD(J-1)                                                   STAB1670
      ARTD=ARTD-DARTD(J-1)                                                   STAB1680
      APTTD=APTTD-DAPTTD(J-1)                                                STAB1690
      ARTTD=ARTTD-DAPTTD(J-1)                                                STAB1700
  307 CONTINUE                                                               STAB1710
      BETAF(1)=BETAES(1)                                                     STAB1720
      BETAF(2)=BETAES(2)                                                     STAB1730
      TMR=TMRS                                                               STAB1740
      TTR=TTRS                                                               STAB1750
  303 CONTINUE                                                               STAB1760
      CALL ANAL                                                              STAB1770
      IF(TX(T.NE.0.) RETURN                                                  STAB1780
      IF(KOUNTS.NE.0) GO TO 305                                              STAB1790
      WRITE (6,401)                                                          STAB1800
      TV=VAR(3)                                                              STAB1810
      VAR(3)=VAR(3)*DTRR                                                     STAB1820
      CALL WRVP (1,VAR,KM1,PD,TAXL,TAXR)                                     STAB1830
      VAR(3)=TV                                                              STAB1840
      CALL WREV                                                              STAB1850
  305 CONTINUE                                                               STAB1860
      IF(J.NE.1.OR.ZETA.LT.1.396263.OR.PSD.EQ.0..OR.CLOCK.NE.0.) GOTO304     STAB1870
      1.396263 RADIANS = 80. DEGREES                                         STAB1880
      OSV2=.5*(OMX+OTR)                                                      STAB1890
      DO=OSV2-OSV1                                                           STAB1900
      IF(ABS(DO).LT..001*ABS(OSV1)) GO TO 302                                STAB1910
      KOUNTS=KOUNTS+1                                                        STAB1920
      IF(KOUNTS.GT.20) GO TO 302                                             STAB1930
      IF(KOUNTS.NE.1) DODCOL=(OSV2-OSV3)/DCOL                                STAB1940
      IF(KOUNTS.EQ.1) OSV3=OSV2                                              STAB1950
      DCOL=DCOL-DO/DODCOL                                                    STAB1960
      COLSTK=COLS+DCOL                                                       STAB1970
      CALL SWAS (COLSTK)                                                     STAB1980
      TZMT=TZM+DTZM1+DTZMT+ASECOL                                            STAB1990
      TZTT=TZT+DTZT1+TRIND*(DTZMT+ASECOL)                                    STAB2000
      T1MT=T1M+DT1(1)                                                        STAB2010
      T1TT=T1T+DT1(2)                                                        STAB2020
      T2MT=T2M+DT2(1)                                                        STAB2030
      T2TT=T2T+DT2(2)                                                        STAB2040
      GO TO 303                                                              STAB2050
  302 CONTINUE                                                               STAB2060
      COLSTK=COLS                                                            STAB2070
      CALL SWAS (COLSTK)                                                     STAB2080
      TZMT=TZM+DTZM1+DTZMT+ASECOL                                            STAB2090
      TZTT=TZT+DTZT1+TRIND*(DTZMT+ASECOL)                                    STAB2100
      T1MT=T1M+DT1(1)                                                        STAB2110
      T1TT=T1T+DT1(2)                                                        STAB2120
      T2MT=T2M+DT2(1)                                                        STAB2130
      T2TT=T2T+DT2(2)                                                        STAB2140
      KOUNTS=0                                                               STAB2150
      DODU=(OSV3-OSV1)/EPDD(1)                                               STAB2160
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      WRITE (6,400) DODCOL,DODU,DCOL                                    STAB2170
  304 CONTINUE                                                          STAB2180
      SPD(J,1,1)=XF-E(1)                                                STAB2190
      SPD(J,2,1)=ZF-E(22)                                               STAB2200
      SPD(J,3,1)=QM-E(46)                                               STAB2210
      SPD(J,4,1)=YF-E(13)                                               STAB2220
      SPD(J,5,1)=QL-E(33)                                               STAB2230
      SPD(J,6,1)=QN-E(59)                                               STAB2240
      SPD(J,1,2)=TMR-E(72)                                              STAB2250
      SPD(J,2,2)=HMR-E(73)                                              STAB2260
      SPD(J,3,2)=A1BAL(1)-A1M                                           STAB2270
      SPD(J,4,2)=YMRF-E(74)                                             STAB2280
      SPD(J,5,2)=QMX-E(75)                                              STAB2290
      SPD(J,6,2)=B1BAL(1)-B1M                                           STAB2300
      SPD(J,1,3)=TTR-E(76)                                              STAB2310
      SPD(J,2,3)=HTR-E(77)                                              STAB2320
      SPD(J,3,3)=A1BAL(2)-A1TR                                          STAB2330
      SPD(J,4,3)=YTRF-E(78)                                             STAB2340
      SPD(J,5,3)=QTR-E(79)                                              STAB2350
      SPD(J,6,3)=B1BAL(2)-B1TR                                          STAB2360
      DO 55 LL=1,3                                                      STAB2370
      DO 56 K=1,6                                                       STAB2380
      SPD(J,K,LL)=SPD(J,K,LL)/EPDD(J)                                   STAB2390
   56 CONTINUE                                                          STAB2400
      DO 57 K=1,71                                                      STAB2410
      A(K)=A(K)-E(K)                                                    STAB2420
   57 CONTINUE                                                          STAB2430
      WRITE (6,402)                                                     STAB2440
      CALL WRFM                                                         STAB2450
      L=1                                                               STAB2460
      DO 59 K=1,6                                                       STAB2470
      M=KS(K)                                                           STAB2480
      RAL=1.                                                            STAB2490
      IF(A(L).NE.0.) RAL=100./A(L)                                      STAB2500
      DO 58 KK=L,M                                                      STAB2510
      A(KK)=A(KK)*RAL                                                   STAB2520
   58 CONTINUE                                                          STAB2530
      L=M+1                                                             STAB2540
   59 CONTINUE                                                          STAB2550
      WRITE (6,403)                                                     STAB2560
      CALL WRFM                                                         STAB2570
   55 CONTINUE                                                          STAB2580
      VAR(6)=VAR(6)-EPDD(6)                                             STAB2590
      APTD=APTD-DAPTD(6)                                                STAB2600
      ARTD=ARTD-DARTD(6)                                                STAB2610
      APTTD=APTTD-DAPTTD(6)                                             STAB2620
      ARTTD=ARTTD-DARTTD(6)                                             STAB2630
      WRITE (6,152) (((SPD(I,J,L),I=1,6),J=1,6),L=1,3)                  STAB2640
      WRITE (6,153) HEAD1(1),((SPD(I,J,2),I=1,6),J=1,6)                 STAB2650
      WRITE (6,153) HEAD1(2),((SPD(I,J,3),I=1,6),J=1,6)                 STAB2660
      XAELW=XAELE-XAWG                                                  STAB2670
      IF(QWG.GE..5*Q) GO TO 300                                         STAB2680
      QWG=.5*Q                                                          STAB2690
      CW(NG=1.                                                          STAB2700
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      SWING=1.                                                          STA82710
  300 CONTINUE                                                          STA82720
      DO 299 J=1,4                                                      STA82730
      DO 298 I=1,6                                                      STA82740
      PD(I,J)=PD(I,J)/V                                                 STA82750
  298 CONTINUE                                                          STA82760
  299 CONTINUE                                                          STA82770
      CALL LMODE (V,OMG,E(12),E(32),CWING,XAELW)                        STA82780
      CALL LAMODE (V,OMG,E(32),SWING)                                   STA82790
      LINK=4                                                            STA82800
      BETAE(1)=BETAES(1)                                                STA82810
      BETAE(2)=BETAES(2)                                                STA82820
      TMR=TMRS                                                          STA82830
      TTR=TTRS                                                          STA82840
      VIMR=VIMRS                                                        STA82850
      VITR=VITRS                                                        STA82860
      AIBPM=0.                                                          STA82870
      AIBRM=0.                                                          STA82880
      AIBPT=0.                                                          STA82890
      AIBRT=0.                                                          STA82900
      DO 311 J=1,13                                                     STA82910
      TSTAB(J)=TSTAB(J+1)                                               STA82920
  311 CONTINUE                                                          STA82930
      TSTAB(14)=9999.                                                   STA82940
      DO 314 J=1,4                                                      STA82950
      VAR1(J)=VARSV(J)                                                  STA82960
  314 CONTINUE                                                          STA82970
      IF(PSD.EQ.0.) GO TO 308                                           STA82980
      NPSI(1)=BM                                                        STA82990
      NPSI(2)=BTR                                                       STA83000
      CALL NOPSI (NPSI,HNPSIR,BNPSI,DPSI)                               STA83010
      DO 316 I=1,7                                                      STA83020
      DPSI(I,1)=DPSISV(I,1)                                             STA83030
      DPSI(I,2)=DPSISV(I,2)                                             STA83040
  316 CONTINUE                                                          STA83050
      ITM=0                                                             STA83060
  308 CONTINUE                                                          STA83070
      CALL TIMEX (TUSED,DTIME,TLEFT)                                    STA83080
      WRITE (6,20) DTIME,TUSED                                          STA83090
      RETURN                                                            STA83100
   20 FORMAT (1H0,10X,F7.3,' MINUTES USED IN STAB ',5X,F8.3,            STA83110
     1        ' MINUTES TOTAL RUN TIME')                                STA83120
  152 FORMAT (1H1,47X,'STABILITY PARTIAL DERIVATIVE MATRICES'           STA83130
     1       //1H0,30X,'U',17X,'W',17X,'Q',17X,'V',17X,'P',17X,'R',    STA83140
     2       /1H0,4X,'X-FORCE          ',6G18.7/                       STA83150
     3            5X,'Z-FORCE          ',6G18.7/                       STA83160
     4            5X,'PITCH MOMENT     ',6G18.7/                       STA83170
     5           /5X,'Y-FORCE          ',6G18.7/                       STA83180
     6            5X,'ROLL MOMENT      ',6G18.7/                       STA83190
     7            5X,'YAW MOMENT       ',6G18.7/)                      STA83200
  153 FORMAT ( /62X,A4,' ROTOR'/                                        STA83210
     1           /5X,'THRUST           ',6G18.7/                       STA83220
     2            5X,'H-FORCE          ',6G18.7/                       STA83230
     3            5X,'F/A FLAPPING     ',6G18.7/                       STA83240
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     4             /5X,'Y-FORCE          ',6G18.7/                          STAB3250
     5              5X,'TORQUE           ',6G18.7/                          STAB3260
     6              5X,'LAT FLAPPING     ',6G18.7/)                         STAB3270
400  FORMAT (1HO,'DQ/DCOL = ',G15.7,2X,'FT-LBS/PERCENT'/                     STAB3280
     1        1HO,'DQ/DU   = ',G15.7,2X,'FT-LBS/FT/SEC '/                   STAB3290
     2        1HO,'DCOL    = ',G15.7,2X,'PERCENT')                          STAB3300
401  FORMAT (1H1)                                                           STAB3310
402  FORMAT (1HO,63X,'DELTA')                                               STAB3320
403  FORMAT (1HO,58X,'NORMALIZED DELTA')                                    STAB3330
404  FORMAT (1H1,30X,'THE FIRST FOUR ROWS OF THIS MATRIX ARE LBS OR FT-     STAB3340
     1LBS PER INCH OF CONTROL MOVEMENT')                                    STAB3350
      END                                                                   STAB3360
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      SUBROUTINE START                                                  STAR0010
      COMMON /STRIAB/ D(21),DT(21),E(79),F(10),X(10),                   STAR0020
     1                DL,DM,DN,OX,OY,DZ,IX,IY,IZ,PO(10,11),            STAR0030
     2                DTR,EPD,ERR(10),KM1,RHO,                          STAR0040
     3                R12,SPD(6,6,3),XBW(21),XEL(14),                   STAR0050
     4                XER(7),XFC(28),XFN(7),XFS(35),                    STAR0060
     5                XGN(7),XIT(21),XMR(49),XTR(49),                   STAR0070
     6                XWG(21),YMR(21),YTR(21),YWG(21),                  STAR0080
     7                YEL(21),YFN(21),BLCG,DAMP,OEPD(10),               STAR0090
     8                FPDS,EPDX(10),MASS,QSV1,TMRS,TTRS,                STAR0100
     9                WLCG,XCON(63),XJET(14),XMIN,AYFFP,                STAR0110
     A                BETAES(2),CNPCD,DHADQ,OYBOR,GUESS,                STAR0120
     B                NPASS,POPHI(10,11),STACG,TZERO,                   STAR0130
     C                XMAST,OHAOAQ,OOOCOL,DTRRSQ,OYBOBR,                STAR0140
     D                ENGRPM,MXPASS,PS030P,TRIND1,XLIMIT                STAR0150
      COMMON /STRIMA/ AY,VH,AGW,OT1(2),DT2(2),IXZ,                      STAR0160
     1                QMR,XXO,YYO,ZZO,ALGF,APFP,AYFP,                   STAR0170
     2                CGWL,COLL(6),CYCF(3),CYCL(3),                     STAR0180
     3                DIST,KCIT(20),PEDA(3),QMAX,                       STAR0190
     4                QMRS,TIME,TMAX,XCIT(20,6),ALGEZ,                  STAR0200
     5                ALGEI,ALGE2,CGSTA,CPWIC,OIXIZ,                    STAR0210
     6                OIYIX,OIZIY,DTZMT,DTZM1,DTZTI,FTKTS,              STAR0220
     *                HUBKM(2,2),HUBKI(2,2),                            STAR0230
     7                KREAD,PIU3O,TSTAB(14),ZMAX2,ZMAX3,                STAR0240
     8                ASECOL,CYPWIC,GEARAT,PS0550,                      STAR0250
     9                PSISTP,OXBRAK,RUDIND,ZDELT1,ZDELT2                STAR0260
      COMMON /STAMAN/ HL(2),XX,YY,AYI,GOV,KPO,QPC,OOO,                  STAR0270
     1                RIY,APBG,ARBG,ASFP,AYBG,BWTC,                     STAR0280
     2               RC,BWTK,BWTM,CGBL,OPIX,OPIZ,                       STAR0290
     3                FHPT(2),R550,ALERT,AYOMX,OELT2,                   STAR0300
     4                OPIXZ,DTBWT,DWLCG,HDELT,HGUST,                    STAR0310
     5                HLTR1,HLTR2,ITOPS,KTCTR,OMEGM,                    STAR0320
     6                PCDEL,QMRSA,RMASS,TRALT,TWOPI,VGUST,              STAR0330
     7                ISTOP,XAGUN,XAPYL,XARSP(2),YAGUN,                 STAR0340
     8                YARSP(2),YGUST,ZAGUN,ZAPYL,ZARSP(2),              STAR0350
     9                OELT2R,DSTACG,EIMAST,GPRELO,HLPYLD,               STAR0360
     A                IBRAKE,OMEGMD,OBRAKE,BETAZS(2),                   STAR0370
     B                PCGDEO,PCGMAX,PCRATE,P010TR,RDELTI,               STAR0380
     C                RDELT2,RITORS,TRIND2                              STAR0390
      COMMON /MANAL/  O,AP,PED,QWG,TZM,T1M,T2M,                         STAR0400
     1                TZT,T1T,T2T,ALEL,CZET,PSOO,                       STAR0410
     2                SZET,TAXL,TAXR,XAWG,XLNK(16),ZAWG,                STAR0420
     3                ALCYP,ALFIN,ALLWG,ALRWG,CDELE,CDFIN,              STAR0430
     4                CDLWG,CDRWG,CLFLE,CLFIN,CLLWG,CLRWG,CWING,        STAR0440
     5                CYCR1,CYCR2,CZET4,CZET6,CZET9,RANGE,              STAR0450
     6                SZET5,SZET7,SZET8,WGCOL,XAELE,XAFIN,              STAR0460
     7                XAFUS,XAJFT,YAFIN,ZAELE,ZAFIN,ZAFUS,              STAR0470
     *                YAELE,YAFUS,YALWG,YARWG,YALJET,YARJET,            STAR0480
     8                ZAJET,ALECR1,ALGFPD,BOTTOM,CZET11,                STAR0490
     9                CZET12,CZET13,EIZETA,HALFPI,SZET10,               STAR0500
     A                XAPYLO,YGUSTW,ZAPYLO,ZFLWG1,ZFRWG1                STAR0510
     B                ,TZMS,T1MS,T2MS,TZTS,T1TS,T2TS,                   STAR0520
     C                CLOCK,FLOCK,XLOCK,TCLOCK                          STAR0530
      COMMON /ROMAN/  ZZ,VXS(2),VYS(2),VZS(2),BETA(12,2),               STAR0540
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*                 T,PCC(2),COSE(7,7,2),BETAN(2),BETAX(2),BETAZ(2),      STAR0550
*                 AIB(2),APDD,ARDD,AYDD,AIR(2),                         STAR0560
1                 DPSI(12,2),DTRR,NPSI(2),ZZTR,                         STAR0570
2                 BETAD(12,2),BNPSI(2),                                 STAR0580
3                 COND2,GMAXV,RATE1,RATE2,STOP2,                        STAR0590
4                 THROT(2),TRIND,XGUST,BETAZD(2),GMAXV1,                STAR0600
5                 GMAXV2,GMAXV3,GUSTYP,HNPSIR(2),                       STAR0610
6                 HUBKPS,HUBKRS,HUBTPS,HUBTRS,                          STAR0620
7                 KONFIG,LNGTHL,PILGHI,PSIREF(2),                       STAR0630
8                 START2,XMOMLI(12,2),                                  STAR0640
9                 RM,RTR,OPM,ORTR,TIMT,TITT,                            STAR0650
A                 T2MT,T2TT,TZMT,TZTT,XMA1,XMAIT,                       STAR0660
B                 XMB1,XMBIT,AIBPM,AIBPT,AIBRM,AIBRT,                   STAR0670
C                 APTD,APTTD,ARTD,ARTTD,PSD,PSDT,                       STAR0680
D                 XSTAHM,XSTAHT,YSTAHM,YSTAHT,                          STAR0690
E                 HUBKP,HUBKTP,HUBKR,HUBKTR                             STAR0700
F                 ,AZETA,AZETAT,VZETA,VZETAT                            STAR0710
      COMMON /MANARO/ I,V,IND,NWAG,APBMT,ARBMT,AYBMT,BETAO(2),TDELT,    STAR0720
1                 BETAF(2),HGUSTE,HGUSTF,HGUSTW,VGUSTE,                 STAR0730
2                 VGUSTW,YGUSTF,GFWD,GLAT,GVERT,                        STAR0740
3                 VXB,VZB,APD,VYB,ARD,AYD,                              STAR0750
4                 COLSTK,CYSTKI,CYSTK2,PEDAL,AYE,                       STAR0760
5                 APE,ARE,AIM,BIM,AITR,BITR,                            STAR0770
6                 XAR(2),YAR(2),ZAR(2),                                 STAR0780
7                 VIMR,VITR,ZETAR(2),HMR,HTR,                           STAR0790
8                 THRUST(2),QMX,QTR,YMRF,YTRF                           STAR0800
      COMMON /STANRO/ J,W,ITM,VHS(2),LINK,QELE,VROT(2),                 STAR0810
1                 VSND,YFIN(2),ZFEL(2),AIBAL(2),                        STAR0820
2                 BIBAL(2),COND1,SWING,PILGH2,PWGELI,                   STAR0830
3                 B(2),PMOM(2),RMOM(2)                                  STAR0840
      COMMON /ROSTAR/ AM(2),CT,PI,XB(2),ALT,ADR(2),EXH(2),              STAR0850
1                 NXR(2),RBH(2),SWC(2),UHS,CDHB(2),LROT(2),             STAR0860
2                 RAIB(2),RTRP(2),TAIR(14),CDNEK(2),DCAFR(2),FVIND,     STAR0870
*                 NVARD,                                                STAR0880
3                 SWKR1(2),SWKR2(2),TIPI8(2),TIP38(2),                  STAR0890
4                 TWIST(20,2),CLRADK(2),DELTA3(2),                      STAR0900
5                 LAMBDA(2),UPGUST,URGUST,UTGUST,WROTOR,                STAR0910
6                 ERM,ERTR,ERXM,FRXT,                                   STAR0920
7                 XLMAXM,XLMAXT,XLMINM,XLMINT                           STAR0930
      COMMON /STARAN/ BH(2),C3,C4,RW,CLP,CLR,DCD,DOL,DON,VIW,           STAR0940
1                 BAIB(2),CLBO,CNBO,ETAO ,NJET,                         STAR0950
2                 OFIN,                                                 STAR0960
3                 VIER,CLBCL,YFS(14),                                   STAR0970
4                 CNBCL,CNPCL,CNRCD,CNRCL,COLKS,D3ELE,                  STAR0980
5                 FNSWC,LWING,PMREL,PMRWG,                              STAR0990
6                 PTRFN,RPIST,VMAXE,YAERO(31,5),                        STAR1000
7                 APBJET,ARBJET,AYBJET,                                 STAR1010
8                 CNPCD1,CNPCD2,COLJET,DXWGEL,DZWGEL,                   STAR1020
9                 ETAQMX,PWGWKI,RCWING,SWINGH,                          STAR1030
A                 VFNTER,VXMVER                                         STAR1040
      COMMON /KVARTR/ KVAR(10)                                          STAR1050
      DIMENSION HEAD(4,14),HEAD1(2,2)                                   STAR1060
      DATA HEAD /'        FUSELAGE       MAIN ROTOR       TAIL ROTOR    STAR1070
1       WING         ELEVATOR       FIN/RUDDER            JET        BSTAR1080
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     2DBWEIGHT        CONTROLSFLIGHT CONSTANTS ALLOWABLE ERROR        ITFSTAR1090
     3RATION      STAB TIMES   AIRLOAD TIMES'/                          STAR1100
      DATA HEAD1 /' ROLL     YAW     '/                                STAR1110
      REAL IX,IY,IZ,IXZ                                                STAR1120
      GUESS=0.                                                         STAR1130
C                                                                      STAR1140
C     READ IN DATA THRU SUBROUTINE READIN.                             STAR1150
C                                                                      STAR1160
      CALL READIN (T,TAIR)                                             STAR1170
C                                                                      STAR1180
C     CALCULATE PHYSICAL CONSTANTS.                                    STAR1190
C                                                                      STAR1200
      DTR=.174532925E-01                                               STAR1210
      RHO=.002378*XFC(28)                                              STAR1220
      Q=.5*RHO                                                         STAR1230
      PIU30=9.54929658                                                 STAR1240
      DTRRSQ=3282.80635                                                STAR1250
      DTRR=57.2957795                                                  STAR1260
      R12=1./12.                                                       STAR1270
      PI=3.1415926536                                                  STAR1280
      P010TR=.174532925E-03                                            STAR1290
      HALFPI=1.570796327                                               STAR1300
      TWOPI=6.283185307                                                STAR1310
      TRIND=0.                                                         STAR1320
      TRIND1=0.                                                        STAR1330
      RAIB(1)=0.                                                       STAR1340
      RAIB(2)=0.                                                       STAR1350
      RAIB(1)=0.                                                       STAR1360
      RAIB(2)=0.                                                       STAR1370
      GEARAT=0.                                                        STAR1380
C                                                                      STAR1390
C     WRITE OUT HEADINGS.                                              STAR1400
C                                                                      STAR1410
      CALL WROT                                                        STAR1420
      WRITE (6,100)                                                    STAR1430
      WRITE (6,101) (HEAD(I,1),I=1,4),XFS                              STAR1440
C                                                                      STAR1450
C     CALCULATE CONSTANTS FOR FUSELAGE - SEE INPUT FORMAT GUIDE FOR    STAR1460
C        DESCRIPTION OF CONSTANTS.                                     STAR1470
C                                                                      STAR1480
      W=XFS(1)                                                         STAR1490
      STACG=XFS(5)*R12                                                 STAR1500
      BLCG=XFS(6)*R12                                                  STAR1510
      WLCG=XFS(7)*R12                                                  STAR1520
      CGSTA=XFS(5)                                                     STAR1530
      CGBL=XFS(6)                                                      STAR1540
      CGWL=XFS(7)                                                      STAR1550
      XAFUS=STACG-XFS(2)*R12                                           STAR1560
      YAFUS=XFS(3)*R12-BLCG                                            STAR1570
      ZAFUS=WLCG-XFS(4)*R12                                            STAR1580
      IX=XFS(8)                                                        STAR1590
      IY=XFS(9)                                                        STAR1600
      IZ=XFS(10)                                                       STAR1610
      IXZ=XFS(11)                                                      STAR1620
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      YFS(1)=XFS(20)                                                    STAR1630
      YFS(2)=XFS(21)*DTRR                                               STAR1640
      YFS(3)=XFS(15)                                                    STAR1650
      YFS(4)=XFS(16)*DTRR                                               STAR1660
      YFS(5)=XFS(17)                                                    STAR1670
      YFS(6)=XFS(18)*DTRR                                               STAR1680
      YFS(7)=XFS(22)                                                    STAR1690
      YFS(8)=XFS(23)*DTRR                                               STAR1700
      YFS(9)=XFS(24)*DTRRSQ                                             STAR1710
      YFS(10)=XFS(26)                                                   STAR1720
      YFS(11)=XFS(27)*DTRR                                              STAR1730
      YFS(12)=XFS(28)*DTRRSQ                                            STAR1740
      YFS(13)=XFS(25)*DTRRSQ                                            STAR1750
      YFS(14)=XFS(32)                                                   STAR1760
      WR=XFS(29)/W*R12                                                  STAR1770
      XAPYL=(XMR(8)-XFS(30))*WR                                         STAR1780
      ZAPYL=(XMR(10)-XFS(31))*WR                                        STAR1790
      HLPYLD=XFS(33)                                                    STAR1800
      WRITE (6,101) (HEAD(I,2),I=1,4),XMR,Q,YMR                         STAR1810
C                                                                       STAR1820
C     CALCULATE CONSTANTS FOR MAIN ROTOR - SEE INPUT FORMAT GUIDE FOR   STAR1830
C        DESCRIPTION OF CONSTANTS.                                      STAR1840
C                                                                       STAR1850
C                                                                       STAR1860
      PSD30P = XMR(13)*XFC(25)                                          STAR1870
      OMEGM = PSD30P/PIU30                                              STAR1880
      PSD=OMEGM                                                         STAR1890
      CALL INRO (ZETAR,BH,BAIB,XMR,Q,B,1)                               STAR1900
      WRITE (6,101) (HEAD(I,3),I=1,4),XTR,DT,YTR                        STAR1910
C                                                                       STAR1920
C     CALCULATE CONSTANTS FOR TAIL ROTOR - SEE INPUT FORMAT GUIDE FOR   STAR1930
C        DESCRIPTION OF CONSTANTS.                                      STAR1940
C                                                                       STAR1950
      IF(XMR(13).NE.0.) GEARAT=XTR(13)/XMR(13)                          STAR1960
      PSDT=PSD*GEARAT                                                   STAR1970
      IF(XTR(14).NE.0.) TRIND=1.                                        STAR1980
      SWC(2)=1.-XTR(28)                                                 STAR1990
      CALL INRO (ZETAR,BH,BAIB,XTR,Q,B,2)                               STAR2000
      WRITE (6,101) (HEAD(I,4),I=1,4),XWG,YWG                           STAR2010
C                                                                       STAR2020
C     CALCULATE CONSTANTS FOR WING - SEE INPUT FORMAT GUIDE FOR         STAR2030
C        DESCRIPTION OF CONSTANTS.                                      STAR2040
C                                                                       STAR2050
      QWG=.5*Q*XWG(1)                                                   STAR2060
      XAWG=STACG-XWG(2)*R12                                             STAR2070
      YARWG=XWG(3)*R12-BLCG                                             STAR2080
      ZAWG=WLCG-XWG(4)*R12                                              STAR2090
      AGW=XWG(5)*DTR                                                    STAR2100
      PMRWG=XWG(8)                                                      STAR2110
      PWGWK1  =XWG(9)*DTR                                               STAR2120
      ETAQMX=XWG(10)                                                    STAR2130
      CLBO=XWG(12)                                                      STAR2140
      CLBCL=XWG(13)                                                     STAR2150
      CLR=XWG(14)                                                       STAR2160
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      CLP=XWG(15)                                                       STAR2170
      CNBO=XWG(16)                                                      STAR2180
      CNBCL=XWG(17)                                                     STAR2190
      CNRCL=XWG(18)                                                     STAR2200
      CNRCO=XWG(19)*QTR                                                 STAR2210
      CNPCL=XWG(20)                                                     STAR2220
      CNPCO=XWG(21)                                                     STAR2230
      WRITE (6,101) (HEAD(I,5),I=1,4),XEL,YEL                           STAR2240
C                                                                       STAR2250
C     CALCULATE CONSTANTS FOR ELEVATOR - SEE INPUT FORMAT GUIDE FOR     STAR2260
C        DESCRIPTION OF CONSTANTS.                                      STAR2270
C                                                                       STAR2280
      QELE=Q*XEL(1)                                                     STAR2290
      XAELE=STACG-XEL(2)*R12                                            STAR2300
      YAELE=XEL(3)*R12-BLCG                                             STAR2310
      ZAELE=WLCG-XEL(4)*R12                                             STAR2320
      ALGEZ=XEL(5)*QTR                                                  STAR2330
      PMREL=XEL(8)                                                      STAR2340
      VENTER=XEL(9)*1.6878                                              STAR2350
      VMAXE=XEL(10)*1.6878                                              STAR2360
      PWGEL1=XEL(11)*QTR                                                STAR2370
      WRITE (6,101) (HEAD(I,6),I=1,4),XFN,YFN                           STAR2380
C                                                                       STAR2390
C     CALCULATE CONSTANTS FOR  FIN/RUDDER - SEE INPUT FORMAT GUIDE FOR  STAR2400
C        DESCRIPTION OF CONSTANTS.                                      STAR2410
C                                                                       STAR2420
      QFIN=Q*XFN(1)                                                     STAR2430
      XAFIN=STACG-XFN(2)*R12                                            STAR2440
      YAFIN=XFN(3)*R12-BLCG                                             STAR2450
      ZAFIN=WLCG-XFN(4)*R12                                             STAR2460
      ALGF=XFN(5)*QTR                                                   STAR2470
      PTRFN=XFN(6)                                                      STAR2480
      FNSWC=1.-XFN(7)                                                   STAR2490
      WRITE (6,101) (HEAD(I,7),I=1,4),XJET                              STAR2500
C                                                                       STAR2510
C     CALCULATE CONSTANTS FOR JET - SEE INPUT FORMAT GUIDE FOR          STAR2520
C        DESCRIPTION OF CONSTANTS.                                      STAR2530
C                                                                       STAR2540
      NJET=XJET(1)                                                      STAR2550
      TAXR=XJET(2)                                                      STAR2560
      TAXL=XJET(3)                                                      STAR2570
      XAJET=STACG-XJET(4)*R12                                           STAR2580
      YARJET=XJET(5)*R12-BLCG                                           STAR2590
      ZAJET=WLCG-XJET(6)*R12                                            STAR2600
      AYBJET=XJET(8)*QTR                                                STAR2610
      APBJET=XJET(9)*QTR                                                STAR2620
      WRITE (6,101) (HEAD(I,8),I=1,4),XBW                               STAR2630
C                                                                       STAR2640
C     CALCULATE CONSTANTS FOR BOBWEIGHT - SEE INPUT FORMAT GUIDE FOR    STAR2650
C        DESCRIPTION OF CONSTANTS.                                      STAR2660
C                                                                       STAR2670
      IF(XBW(1).EQ.0.) GO TO 12                                         STAR2680
      R1=XBW(16)/XBW(18)                                                STAR2690
      R2=R1*XBW(19)/XBW(20)                                             STAR2700
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      R3=R2*XBW(21)                                                    STAR2710
      TM1=XBW(9)*XBW(17)                                               STAR2720
      TM=(TM1+R3*XBW(11))*R12                                          STAR2730
      TI=XBW(4)+R1**2*XBW(5)+R2**2*XBW(6)+TM1*XBW(17)+                 STAR2740
     1   XBW(16)**2*XBW(8)+(R1*XBW(19))**2*XBW(10)+R3**2*XBW(11)       STAR2750
      GPRELD=XBW(7)                                                    STAR2760
      CF=386.04*XBW(15)**2/TI                                          STAR2770
      BWTC=XBW(3)*CF                                                   STAR2780
      BWTK=XBW(2)*CF                                                   STAR2790
      BWTM=R3*XBW(1)*DTR*TM/TI*12.                                     STAR2800
      BWTF=SQRT(BWTK)/TWOPI                                            STAR2810
      WRITE (6,13) BWTF                                                STAR2820
   13 FORMAT (1HO,10X,'BOB WEIGHT FREQUENCY = ',G12.5,' CPS')          STAR2830
      GO TO 14                                                         STAR2840
   12 BWTC=0.                                                          STAR2850
      BWTK=0.                                                          STAR2860
      BWTM=0.                                                          STAR2870
      GPRELD=0.                                                        STAR2880
   14 CONTINUE                                                         STAR2890
      WRITE (6,101) (HEAD(I,9),I=1,4),XCON                             STAR2900
      CALL       CON1 (XCON,D3ELE,TRIND,COLJET,EIMAST,PCGDED,PCGMAX)   STAR2910
      WRITE (6,101) (HEAD(I,10),I=1,4),XFC,XGN                         STAR2920
      XXD=XFC(1)*1.6878                                                STAR2930
      YYD=XFC(2)*1.6878                                                STAR2940
      ZZD=-XFC(3)                                                      STAR2950
      ZZ=-XFC(4)                                                       STAR2960
      IALFS=IALF                                                       STAR2970
      IALF=XIT(15)                                                     STAR2980
      KVAR(5)=6                                                        STAR2990
      KVAR(6)=7                                                        STAR3000
      IF(IALF.LT.1.OR.IALF.GT.2) IALF=1                                STAR3010
      IF(IALF.EQ.2) KVAR(6)=5                                          STAR3020
      IF(GUESS.EQ.2..AND.IALF.EQ.2.AND.IALFS.EQ.1) GO TO 18            STAR3030
      AYE=XFC(5)*DTR                                                   STAR3040
      ARE=XFC(7)*DTR                                                   STAR3050
   18 CONTINUE                                                         STAR3060
      IF(GUESS.EQ.2.) GO TO 15                                         STAR3070
      APE=XFC(6)*DTR                                                   STAR3080
      COLSTK=XFC(8)                                                    STAR3090
      CYSTK1=XFC(9)                                                    STAR3100
      CYSTK2=XFC(10)                                                   STAR3110
      PEDAL=XFC(11)                                                    STAR3120
      A1M=XFC(15)*DTR                                                  STAR3130
      B1M=XFC(16)*DTR                                                  STAR3140
      A1TR=XFC(17)*DTR                                                 STAR3150
      B1TR=XFC(18)*DTR                                                 STAR3160
      THRUST(1)=XFC(19)                                                STAR3170
      THRUST(2)=XFC(20)                                                STAR3180
      GUESS=XFC(22)                                                    STAR3190
   15 CONTINUE                                                         STAR3200
      CALL WRVP1 (HEAD1,IALF)                                          STAR3210
      ENGRPM=XFC(25)                                                   STAR3220
      OMAX=100000.                                                     STAR3230
      IF(OMEGM.NE.0..AND.XFC(26).NE.0.) OMAX=XFC(26)*500./OMEGM        STAR3240
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```
      VSND=1./XFC(27)                                                   STAR3250
      XAGUN=STACG-XGN(1)*R12                                            STAR3260
      YAGUN=XGN(2)*R12-BLCG                                             STAR3270
      ZAGUN=WLCG-XGN(3)*R12                                             STAR3280
      AYBG=XGN(4)*DTR                                                   STAR3290
      APBG=XGN(5)*DTR                                                   STAR3300
      WRITE (6,101) (HEAD(I,11),I=1,4),XER                              STAR3310
C                                                                       STAR3320
C     CALCULATE ALLOWABLE ERRORS.                                       STAR3330
C                                                                       STAR3340
      ERR(1)=XER(1)                                                     STAR3350
      ERR(2)=XER(2)                                                     STAR3360
      ERR(3)=XER(3)                                                     STAR3370
      ERR(4)=XER(4)                                                     STAR3380
      ERR(5)=XER(4)                                                     STAR3390
      ERR(6)=XER(5)                                                     STAR3400
      ERR(7)=XER(6)                                                     STAR3410
      ERR(8)=XER(6)                                                     STAR3420
      ERR(9)=XER(7)                                                     STAR3430
      ERR(10)=XER(7)                                                    STAR3440
      ERM=XER(6)                                                        STAR3450
      ERTR=XER(7)                                                       STAR3460
      WRITE (6,101) (HEAD(I,12),I=1,4),XIT                              STAR3470
      MXPASS=XIT(1)                                                     STAR3480
      ITM=XIT(2)                                                        STAR3490
      EPDS=XIT(4)/10.                                                   STAR3500
      COND1=XIT(5)                                                      STAR3510
      COND2=XIT(6)                                                      STAR3520
      FVIND=XIT(7)                                                      STAR3530
      XLMINM=XIT(8)*DTR                                                 STAR3540
      XLMINT=XIT(9)*DTR                                                 STAR3550
      ERXM=XIT(10)                                                      STAR3560
      ERXT=XIT(11)                                                      STAR3570
      XLIMIT=2.*DTR*XIT(12)                                             STAR3580
      XMIN=XIT(13)*DTR                                                  STAR3590
      DAMP=XIT(14)                                                      STAR3600
      IF(FVIND.LE.0.) FVIND=.5                                          STAR3610
      WRITE (6,101) (HEAD(I,13),I=1,4),TSTAB                            STAR3620
      WRITE (6,101) (HEAD(I,14),I=1,4),TAIR                             STAR3630
C                                                                       STAR3640
C     CALCULATE CONSTANTS FOR SUBROUTINE CLCD.                          STAR3650
C                                                                       STAR3660
      CALL YFIX (YMR,YAERO)                                             STAR3670
      CALL MNEM                                                         STAR3680
      RETURN                                                            STAR3690
  100 FORMAT (1HO//1H ,61X,'INPUT DATA'/)                               STAR3700
  101 FORMAT (1HO,55X,4A4,' GROUP'/(1H ,3X,7G18.7))                     STAR3710
      END                                                               STAR3720
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```
      SUBROUTINE SWAS1 (KL)                                                 SWAS0010
      COMMON /MANAL/  Q,AP,PED,QWG,TZM,T1M,T2M,                             SWAS0020
     1                TZT,T1T,T2T,ALEL,CZET,PSDD,                           SWAS0030
     2                SZET,TAXL,TAXR,XAWG,XLNK(16),ZAWG,                    SWAS0040
     3                ALCYP,ALFIN,ALLWG,ALRWG,CDELE,CDFIN,                  SWAS0050
     4                CDLWG,CDRWG,CLELE,CLFIN,CLLWG,CLRWG,CWING,            SWAS0060
     5                CYCR1,CYCR2,CZET4,CZET6,CZET9,RANGE,                  SWAS0070
     6                SZET5,SZET7,SZET8,WGCOL,XAELE,XAFIN,                  SWAS0080
     7                XAFUS,XAJET,YAFIN,ZAELE,ZAFIN,ZAFUS,                  SWAS0090
     *                YAELE,YAFUS,YALWG,YARWG,YALJET,YARJET,                SWAS0100
     8                ZAJET,ALECR1,ALGFPD,BOTTOM,CZET11,                    SWAS0110
     9                CZET12,CZET13,EIZETA,HALFPI,SZET10,                   SWAS0120
     A                XAPYLD,YGUSTW,ZAPYLD,ZFLWG1,ZFRWG1                    SWAS0130
     B                ,TZMS,T1MS,T2MS,TZTS,T1TS,T2TS,                       SWAS0140
     C                CLOCK,FLOCK,XLOCK,TCLOCK                              SWAS0150
      KONFIG=KL                                                             SWAS0160
      RETURN                                                                SWAS0170
      ENTRY SWAS (COLSTK)                                                   SWAS0180
C                                                                           SWAS0190
C        BOTTOM = RAD                                                       SWAS0200
C        RANGE  = RAD/PERCENT                                               SWAS0210
C                                                                           SWAS0220
C           SINGLE ROTOR CONTROLS                                           SWAS0230
      TZMR=COLSTK*RANGE+BOTTOM                                              SWAS0240
      T1MR=CYCR1*CZET                                                       SWAS0250
      T2MR=CYCR2*CZET                                                       SWAS0260
      IF(KONFIG.NE.1) GO TO 105                                             SWAS0270
      TZTR=XLNK(1)+XLNK(2)*PED+XLNK(3)*PED**3                               SWAS0280
      T1TR=0.                                                               SWAS0290
      T2TR=0.                                                               SWAS0300
      GO TO 102                                                             SWAS0310
C           TAIL ROTOR CONTROLS FOR EITHER TANDEM OR SIDE-BY-SIDE           SWAS0320
  105 T1TR=T1MR*XLNK(1)                                                     SWAS0330
      T2TR=T2MR*XLNK(2)                                                     SWAS0340
      TZTR=TZMR*XLNK(3)                                                     SWAS0350
      IF(KONFIG.EQ.3) GO TO 104                                             SWAS0360
C           TANDEM CONTROLS                                                 SWAS0370
      TZTR=TZTR+XLNK(4)*T1MR                                                SWAS0380
      TZMR=TZMR+XLNK(5)*T1MR                                                SWAS0390
      T2TR=T2TR+XLNK(6)*PED                                                 SWAS0400
      T2MR=T2MR+XLNK(7)*PED                                                 SWAS0410
      GO TO 102                                                             SWAS0420
C           SIDE-BY-SIDE CONTROLS                                           SWAS0430
C        EXAMPLE- SZET9=XLNK(9)*SIN(F(ZETA))                                SWAS0440
  104 TZTR=TZTR+CYCR2*CZET4+PED*SZET5                                       SWAS0450
      TZMR=TZMR+CYCR2*CZET6+PED*SZET7                                       SWAS0460
      T1TR=T1TR+CYCR2*SZET8+PED*CZET9                                       SWAS0470
      T1MR=T1MR+CYCR2*SZET10+PED*CZET11                                     SWAS0480
C           CHECK CONTROL LOCKS                                             SWAS0490
  102 IF(CLOCK.EQ.0.) GO TO 99                                              SWAS0500
      TZM=TZMS                                                              SWAS0510
      GO TO 98                                                              SWAS0520
   99 TZM=TZMR                                                              SWAS0530
   98 IF(FLOCK.EQ.0.) GO TO 97                                              SWAS0540
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      T1M=T1MS                                                          SWAS0550
      T1T=T1TS                                                          SWAS0560
      GO TO 100                                                         SWAS0570
   97 T1M=T1MR                                                          SWAS0580
      T1T=T1TR                                                          SWAS0590
  100 IF(XLOCK.NE.0.) GO TO 101                                         SWAS0600
      T2M=T2MR                                                          SWAS0610
      T2T=T2TR                                                          SWAS0620
      GO TO 107                                                         SWAS0630
  101 IF(XLOCK.LT.1.5) GO TO 96                                         SWAS0640
      T2M=T2MS+CYCR1*CZET12                                             SWAS0650
      T2T=T2TS+CYCR1*CZET13                                             SWAS0660
      GO TO 107                                                         SWAS0670
   96 T2M=T2MS                                                          SWAS0680
      T2T=T2TS                                                          SWAS0690
  107 IF(TCLOCK.EQ.0.) GO TO 95                                         SWAS0700
      TZT=TZTS                                                          SWAS0710
      RETURN                                                            SWAS0720
   95 TZT=TZTR                                                          SWAS0730
      RETURN                                                            SWAS0740
      END                                                               SWAS0750
```

```
      SUBROUTINE TABINT (CL,CD,X,Z,SG)                                  TABI0010
C                                                                       TABI0020
C           X = XMAC                                                    TABI0030
C           Z = ALD                                                     TABI0040
C                                                                       TABI0050
      COMMON /TAB/ CURVEL(209),CURVED(857),K(11),L(17)                  TABI0060
      DIMENSION CLO(2)                                                  TABI0070
      NX=9                                                              TABI0080
      NZ=20                                                             TABI0090
      N=10.*X+1.                                                        TABI0100
      IF(N.GT.11) N=11                                                  TABI0110
      KM=K(N)                                                           TABI0120
      DO 30 I=KM,NX                                                     TABI0130
      IF(X.GE.CURVEL(I)) GO TO 30                                       TABI0140
      KX=I                                                              TABI0150
      IF(I.EQ.1) KX=2                                                   TABI0160
      GO TO 32                                                          TABI0170
   30 CONTINUE                                                          TABI0180
      KX=NX                                                             TABI0190
   32 XL=CURVEL(KX-1)                                                   TABI0200
      XM=(X-XL)/(CURVEL(KX)-XL)                                         TABI0210
      XM1=1.-XM                                                         TABI0220
      M=NZ+NX                                                           TABI0230
      N=Z+1.                                                            TABI0240
      IF(N.GT.17) N=17                                                  TABI0250
      KA=L(N)                                                           TABI0260
      J=NX+KA                                                           TABI0270
      DO 70 I=J,M                                                       TABI0280
      IF(Z.GE.CURVEL(I)) GO TO 70                                       TABI0290
      KZ=I                                                              TABI0300
      IF(I.EQ.(NX+1)) KZ=NX+2                                           TABI0310
      GO TO 72                                                          TABI0320
   70 CONTINUE                                                          TABI0330
      KZ=M                                                              TABI0340
   72 ZL=CURVEL(KZ-1)                                                   TABI0350
      J=(KZ-NX-2)*NX+KX+NZ                                              TABI0360
      DO 75 I=1,2                                                       TABI0370
      J=J+NX                                                            TABI0380
      CLO(I)=CURVEL(J-1)*XM1+CURVEL(J)*XM                               TABI0390
   75 CONTINUE                                                          TABI0400
      CL=CLO(1)+(Z-ZL)/(CURVEL(KZ)-ZL)*(CLO(2)-CLO(1))                  TABI0410
      NX=12                                                             TABI0420
      N=65                                                              TABI0430
      Z=Z*SG                                                            TABI0440
      DO 40 I=KM,NX                                                     TABI0450
      IF(X.GE.CURVED(I)) GO TO 40                                       TABI0460
      KX=I                                                              TABI0470
      IF(I.EQ.1) KX=2                                                   TABI0480
      GO TO 42                                                          TABI0490
   40 CONTINUE                                                          TABI0500
      KX=NX                                                             TABI0510
   42 XL=CURVED(KX-1)                                                   TABI0520
      XM=(X-XL)/(CURVED(KX)-XL)                                         TABI0530
      XM1=1.-XM                                                         TABI0540
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      M=NZ+NX                                                                  TABI0550
      KA=33.+Z                                                                 TABI0560
      IF(KA.LT.17) KA=1                                                        TABI0570
      IF(KA.GT.49) KA=49                                                       TABI0580
      J=NX+KA                                                                  TABI0590
      DO 60 I=J,M                                                              TABI0600
      IF(Z.GE.CURVED(I)) GO TO 60                                              TABI0610
      KZ=I                                                                     TABI0620
      IF(I.EQ.(NX+1)) KZ=NX+2                                                  TABI0630
      GO TO 62                                                                 TABI0640
   60 CONTINUE                                                                 TABI0650
      KZ=M                                                                     TABI0660
   62 ZL=CURVED(KZ-1)                                                          TABI0670
      J=(KZ-NX-2)*NX+KX+NZ                                                     TABI0680
      DO 65 I=1,2                                                              TABI0690
      J=J+NX                                                                   TABI0700
      CLO(I)=CURVED(J-1)*XM1+CURVED(J)*XM                                      TABI0710
   65 CONTINUE                                                                 TABI0720
      CO=CLO(1)+(Z-ZL)/(CURVED(KZ)-ZL)*(CLO(2)-CLO(1))                         TABI0730
      RETURN                                                                   TABI0740
      END                                                                      TABI0750
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```
      SUBROUTINE TILT1 (KL)                                              TILT0D10
      COMMON /STAMAN/ HL(2),XX,YY,AY1,GOV,KPD,QPC,QQQ,                   TILT0D20
     1                RIY,APBG,ARBG,ASEP,AYBG,BWTC,                     TILT0030
     2              RC,BWTK,BWTM,CGBL,OPIX,OPIZ,                        TILT0040
     3                 FHPT(2),R550,ALERT,AYDMX,DELT2,                  TILT0050
     4                 DPIXZ,DTBWT,DWLCG,HDELT,HGUST,                   TILT0D60
     5                 HLTR1,HLTR2,ITORS,KTCTR,OMEGM,                   TILT0070
     6                 PCOEL,QMRSA,RMASS,TRALT,TWOPI,VGUST,             TILT0080
     7                 ISTOP,XAGUN,XAPYL,XARSP(2),YAGUN,                TILT0D90
     8                 YARSP(2),YGUST,ZAGUN,ZAPYL,ZARSP(2),             TILT0100
     9                 OELT2R,OSTACG,EIMAST,GPRELD,HLPYLO,              TILT0110
     A                 IBRAKE,OMEGMO,QBRAKE,BETAZS(2),                  TILT0120
     B                 PCGDED,PCGMAX,PCRATE,P01DTR,RDELT1,              TILT0130
     C                 RDELT2,RITORS,TRIND2                             TILT0140
      COMMON /MANAL/  Q,AP,PED,QWG,TZM,T1M,T2M,                          TILT0150
     1                TZT,T1T,T2T,ALEL,CZET,PSOD,                       TILT0160
     2                SZET,TAXL,TAXR,XAWG,XLNK(16),ZAWG,                TILT0170
     3                ALCYP,ALFIN,ALLWG,ALRWG,CDELE,CDFIN,              TILT0180
     4                CDLWG,CDRWG,CLELE,CLFIN,CLLWG,CLRWG,CWING,        TILT0190
     5                CYCR1,CYCR2,CZET4,CZET6,CZET9,RANGE,              TILT0200
     6                SZET5,SZET7,SZET8,WGCOL,XAELE,XAFIN,              TILT0210
     7                XAFUS,XAJET,YAFIN,ZAELE,ZAFIN,ZAFUS,              TILT0220
     *                YAELE,YAFUS,YALWG,YARWG,YALJET,YARJET,            TILT0230
     8                ZAJET,ALECR1,ALGFPO,BOTTOM,CZET11,                TILT0240
     9                CZET12,CZET13,EIZETA,HALFPI,SZET10,               TILT0250
     A                XAPYLD,YGUSTW,ZAPYLD,ZFLWG1,ZFRWG1                TILT0260
     B                ,TZMS,T1MS,T2MS,TZTS,T1TS,T2TS,                   TILT0270
     C                CLOCK,FLOCK,XLOCK,TCLOCK                          TILT0280
      DIMENSION XAR(2),YAR(2),ZAR(2),COLL(6),DPSI(12,2),NPSI(2),         TILT0290
     1          BETAZ(2),PSIREF(2)                                      TILT0300
      KONFIG=KL                                                          TILT0310
      DSTCGT=0.                                                          TILT0320
      DSTCGH=0.                                                          TILT0330
      DBLCG=0.                                                           TILT0340
      DSTACG=0.                                                          TILT0350
      DWLCG=0.                                                           TILT0360
      RETURN                                                             TILT0370
      ENTRY TILT (XAR,ZAR,CGWL,COLL,ZETA,CGSTA)                          TILT0380
      SZET=SIN(ZETA)                                                     TILT0390
      CZET=COS(ZETA)                                                     TILT0400
      CZETM1=1.-CZET                                                     TILT0410
      XA=ZAPYL*SZET+XAPYL*CZETM1-DSTACG                                  TILT0420
      ZA=ZAPYL*CZETM1-XAPYL*SZET-DWLCG                                   TILT0430
      DSTACG=XA+DSTACG                                                   TILT0440
      DWLCG=ZA+DWLCG                                                     TILT0450
      ZAFUS=ZAFUS+ZA                                                     TILT0460
      ZARSP(1)=ZARSP(1)+ZA                                               TILT0470
      ZARSP(2)=ZARSP(2)+ZA                                               TILT0480
      ZAR(1)=ZARSP(1)-HL(1)*CZET                                         TILT0490
      ZAGUN=ZAGUN+ZA                                                     TILT0500
      ZAFIN=ZAFIN+ZA                                                     TILT0510
      ZAELE=ZAELE+ZA                                                     TILT0520
      ZAWG=ZAWG+ZA                                                       TILT0530
      ZAJET=ZAJET+ZA                                                     TILT0540
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      ZAPYLD=ZARSP(1)-HLPYLD*CZET                                       TILT0550
      CGWL=CGWL+ZA*12.                                                  TILT0560
      RANGE=(COLL(6)*ZETA+COLL(5))*P01DTR                               TILT0570
      BOTTOM=COLL(2)+ZETA*(COLL(3)+ZETA*COLL(4))                        TILT0580
      CZET12=XLNK(12)*CZET                                              TILT0590
      CZET13=XLNK(13)*CZET                                              TILT0600
      EIZETA=EIMAST*ZETA                                                TILT0610
      IF(KONFIG.NE.3) GO TO 100                                         TILT0620
      CX26=COS(XLNK(14)*ZETA)                                           TILT0630
      SPED2=SIN(XLNK(15)*ZETA+XLNK(16))                                 TILT0640
      CZET4=XLNK(4)*CX26                                                TILT0650
      SZET5=XLNK(5)*SPED2                                               TILT0660
      CZET6=XLNK(6)*CX26                                                TILT0670
      SZET7=XLNK(7)*SPED2                                               TILT0680
      SZET8=XLNK(8)*SZET                                                TILT0690
      CZET9=XLNK(9)*CZET                                                TILT0700
      SZET10=XLNK(10)*SZET                                              TILT0710
      CZET11=XLNK(11)*CZET                                              TILT0720
      GO TO 100                                                         TILT0730
      ENTRY HSAF (XAR,YAR,DPSI,NPSI,CGSTA,PSIREF)                       TILT0740
      NPSI1 = NPSI(1)                                                   TILT0750
      SUMCOS = 0.                                                       TILT0760
      SUMSIN = 0.                                                       TILT0770
      DO 10 I=1,NPSI1                                                   TILT0780
      ARG = PSIREF(1) + DPSI(I,1)                                       TILT0790
      SUMCOS = SUMCOS + COS(ARG)                                        TILT0800
      SUMSIN = SUMSIN + SIN(ARG)                                        TILT0810
   10 CONTINUE                                                          TILT0820
      XA=RC*SUMCOS-DSTCGH                                               TILT0830
      YA=-RC*SUMSIN-DBLCG                                               TILT0840
      DSTCGH = XA + DSTCGH                                              TILT0850
      DBLCG  = YA + DBLCG                                               TILT0860
      YAFUS = YAFUS + YA                                                TILT0870
      YARSP(1) = YARSP(1) + YA                                          TILT0880
      YARSP(2) = YARSP(2) + YA                                          TILT0890
      YAR(1) = YARSP(1)                                                 TILT0900
      YAR(2)=YARSP(2)                                                   TILT0910
      XAR(2)=XAR(2)+XA                                                  TILT0920
      YAGUN = YAGUN + YA                                                TILT0930
      YAFIN = YAFIN + YA                                                TILT0940
      YAELE = YAELE + YA                                                TILT0950
      YALWG = YALWG + YA                                                TILT0960
      YARWG = YARWG + YA                                                TILT0970
      YALJET = YALJET + YA                                              TILT0980
      YARJET = YARJET + YA                                              TILT0990
      CGBL=CGBL+YA*12.                                                  TILT1000
      GO TO 100                                                         TILT1010
      ENTRY TFFA (XAR,BETAZ,CGSTA)                                      TILT1020
      XA=-RC*SZET*SIN(BETAZ(1))-DSTCGT                                  TILT1030
      DSTCGT = XA + DSTCGT                                              TILT1040
  100 CONTINUE                                                          TILT1050
      XAFUS=XAFUS+XA                                                    TILT1060
      XARSP(1)=XARSP(1)+XA                                              TILT1070
      XARSP(2)=XARSP(2)+XA                                              TILT1080
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      XAR(1)=XARSP(1)+HL(1)*SZET                                        TILT1090
      XAGUN=XAGUN+XA                                                    TILT1100
      XAFIN=XAFIN+XA                                                    TILT1110
      XAELE=XAELE+XA                                                    TILT1120
      XAWG=XAWG+XA                                                      TILT1130
      XAJET=XAJET+XA                                                    TILT1140
      XAPYLD=XARSP(1)+HLPYLD*SZET                                       TILT1150
      CGSTA=CGSTA+XA*12.                                                TILT1160
      RETURN                                                            TILT1170
      END                                                               TILT1180
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      SUBROUTINE TINIT (TAIR)                                          TINI0010
      COMMON /STRIMA/ AY,VH,AGW,DT1(2),DT2(2),IXZ,                     TINI0020
     1                QMR,XXD,YYD,ZZD,ALGF,APFP,AYFP,                 TINI0030
     2                CGWL,COLL(6),CYCF(3),CYCL(3),                   TINI0040
     3                DIST,KCIT(20),PEDA(3),QMAX,                     TINI0050
     4                QMRS,TIME,TMAX,XCIT(20,6),ALGEZ,                TINI0060
     5                ALGE1,ALGE2,CGSTA,CPWIC,DIXIZ,                  TINI0070
     6                DIYIX,DIZIY,DTZMT,DTZM1,DTZT1,FTKTS,            TINI0080
     *                HUBKM(2,2),HUBKI(2,2),                          TINI0090
     7                KREAD,PIU30,TSTAB(14),ZMAX2,ZMAX3,              TINI0100
     8                ASECOL,CYPWIC,GEARAT,PSD550,                    TINI0110
     9                PSISTP,QXBRAK,RUDIND,ZDELT1,ZDELT2              TINI0120
      COMMON /STAMAN/ HL(2),XX,YY,AY1,GOV,KPD,QPC,QQQ,                 TINI0130
     1                RIY,APBG,ARBG,ASEP,AYBG,BWTC,                   TINI0140
     2               RC,BWTK,BWTM,CGBL,DPIX,DPIZ,                     TINI0150
     3                FHPT(2),R55D,ALERT,AYDMX,DELT2,                 TINI0160
     4                DPIXZ,DTBWT,DWLCG,HDELT,HGUST,                  TINI0170
     5                HLTR1,HLTR2,ITORS,KTCTR,OMEGM,                  TINI0180
     6                PCDEL,QMRSA,RMASS,TRALT,TWOPI,VGUST,            TINI0190
     7                ISTOP,XAGUN,XAPYL,XARSP(2),YAGUN,               TINI0200
     8                YARSP(2),YGUST,ZAGUN,ZAPYL,ZARSP(2),            TINI0210
     9                DELT2R,DSTACG,EIMAST,GPRELD,HLPYLD,             TINI0220
     A                IBRAKE,OMEGMD,QBRAKE,BETAZS(2),                 TINI0230
     B                PCGDED,PCGMAX,PCRATE,P01DTR,RDELT1,             TINI0240
     C                RDELT2,RITORS,TRIND2                            TINI0250
      DIMENSION TAIR(14)                                               TINI0260
      ARBG=0.                                                          TINI0270
      ASECOL=0.                                                        TINI0280
      AYDMX=0.                                                         TINI0290
      DTZMT=0.                                                         TINI0300
      DTZM1=0.                                                         TINI0310
      DTZT1=0.                                                         TINI0320
      DT1(1)=0.                                                        TINI0330
      DT1(2)=0.                                                        TINI0340
      DT2(1)=0.                                                        TINI0350
      DT2(2)=0.                                                        TINI0360
      DTBWT=0.                                                         TINI0370
      HGUST=0.                                                         TINI0380
      ISTOP=0                                                          TINI0390
      IBRAKE=1                                                         TINI0400
      KPD=0                                                            TINI0410
      VGUST=0.                                                         TINI0420
      ALERT=0.                                                         TINI0430
      ASEP=0.                                                          TINI0440
      KTCTR  =  0                                                      TINI0450
      OMEGMD=0.                                                        TINI0460
      PCDEL=0.                                                         TINI0470
      PCRATE=0.                                                        TINI0480
      QQQ=2.                                                           TINI0490
      RITORS=0.                                                        TINI0500
      FTKTS=.5925                                                      TINI0510
      R550=.181818181AE-02                                             TINI0520
      YGUST=0.                                                         TINI0530
      QMRSA=QMAX                                                       TINI0540
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      HLTR2=HL(2)*TRIND2                                                TINI0550
      VH=SQRT(XXD**2+YYD**2)                                            TINI0560
      AYFP=0.                                                           TINI0570
      APFP=0.                                                           TINI0580
      IF(VH.NE.0.) AYFP=ATAN2(YYD,XXD)                                  TINI0590
      IF(VH.NE.0..OR.ZZD.NE.0.) APFP=ATAN2(-ZZD,VH)                     TINI0600
      TRALT=100*TRIND2                                                  TINI0610
      DO 45 I=2,14                                                      TINI0620
      IF(TSTAB(I).EQ.0.) TSTAB(I)=9999.                                 TINI0630
      IF(TAIR(I).EQ.0.) TAIR(I)=9999.                                   TINI0640
   45 CONTINUE                                                          TINI0650
      RETURN                                                            TINI0660
      END                                                               TINI0670
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      SUBROUTINE TRIM                                                   TRIM0010
      COMMON /FORCE/ XF,XFRWG,XFLWG,XFELE,XFFUS,XFRJET,                 TRIM0020
     1               XFLJET,XFMR,XFTR,XFGUN,XFFIN,XFW,                  TRIM0030
     2               YF,YFFUS,YFRJET,YFLJET,YFMR,YFTR,                  TRIM0040
     3               YFGUN,YFFIN,YFW,                                   TRIM0050
     4               ZF,ZFRWG,ZFLWG,ZFELE,ZFFUS,ZFRJET,                 TRIM0060
     5               ZFLJET,ZFMR,ZFTR,ZFGUN,ZFW,                        TRIM0070
     6               QL,LRWG,LLWG,LELE,LFUS,LRJET,LLJET,                TRIM0080
     7               LMR,LTR,LGUN,LFIN,LQMR,LQTR,                       TRIM0090
     8               QM,MRWG,MLWG,MELE,MFUS,MRJET,MLJET,                TRIM0100
     9               MMR,MTR,MGUN,MFIN,MQMR,MQTR,                       TRIM0110
     A               QN,NRWG,NLWG,NELE,NFUS,NRJET,NLJET,                TRIM0120
     B               NMR,NTR,NGUN,NFIN,NQMR,NQTR                        TRIM0130
      COMMON /STRIAB/ D(21),DT(21),E(79),F(10),X(10),                   TRIM0140
     1               DL,DM,DN,DX,DY,DZ,IX,IY,IZ,PD(10,11),              TRIM0150
     2               DTR,EPD,ERR(10),KM1,RHO,                           TRIM0160
     3               R12,SPD(6,6,3),XBW(21),XEL(14),                    TRIM0170
     4               XER(7),XFC(28),XFN(7),XFS(35),                     TRIM0180
     5               XGN(7),XIT(21),XMR(49),XTR(49),                    TRIM0190
     6               XWG(21),YMR(21),YTR(21),YWG(21),                   TRIM0200
     7               YEL(21),YFN(21),BLCG,DAMP,DEPD(10),                TRIM0210
     8               EPDS,EPDX(10),MASS,QSV1,TMRS,TTRS,                 TRIM0220
     9               WLCG,XCON(63),XJET(14),XMIN,AYEFP,                 TRIM0230
     A               BETAES(2),CNPCD,DHADQ,DYBDR,GUESS,                 TRIM0240
     B               NPASS,PDPHI(10,11),STACG,TZERD,                    TRIM0250
     C               XMAST,DHADAQ,QQDCDL,DTRRSQ,DYBDBR,                 TRIM0260
     D               ENGRPM,MXPASS,PSD30P,TRIND1,XLIMIT                 TRIM0270
      COMMON /STRIMA/ AY,VH,AGW,DT1(2),DT2(2),IXZ,                      TRIM0280
     1               QMR,XXD,YYD,ZZD,ALGF,APFP,AYFP,                    TRIM0290
     2               CGWL,COLL(6),CYCF(3),CYCL(3),                      TRIM0300
     3               DIST,KCIT(20),PEQA(3),QMAX,                        TRIM0310
     4               QMRS,TIME,TMAX,XCIT(20,6),ALGEZ,                   TRIM0320
     5               ALGE1,ALGE2,CGSTA,CPWIC,DIXIZ,                     TRIM0330
     6               DIYIX,DIZIY,DTZMT,DTZM1,DTZT1,FTKTS,               TRIM0340
     *               HUBKM(2,2),HUBKI(2,2),                             TRIM0350
     7               KREAD,PIU30,TSTAB(14),ZMAX2,ZMAX3,                 TRIM0360
     8               ASECOL,CYPWIC,GEARAT,PS0550,                       TRIM0370
     9               PSISTP,QXBRAK,RUDIND,ZDELT1,ZDELT2                 TRIM0380
      COMMON /MANAL/  Q,AP,PED,QWG,TZM,T1M,T2M,                         TRIM0390
     1               TZT,T1T,T2T,ALEL,CZET,PSDD,                        TRIM0400
     2               SZET,TAXL,TAXR,XAWG,XLNK(16),ZAWG,                 TRIM0410
     3               ALCYP,ALFIN,ALLWG,ALRWG,CDELE,CDFIN,               TRIM0420
     4               CDLWG,CDRWG,CLELE,CLFIN,CLLWG,CLRWG,CWING,         TRIM0430
     5               CYCR1,CYCR2,CZET4,CZET6,CZET9,RANGE,               TRIM0440
     6               SZET5,SZET7,SZET8,WGCOL,XAELE,XAFIN,               TRIM0450
     7               XAFUS,XAJET,YAFIN,ZAELE,ZAFIN,ZAFUS,               TRIM0460
     *               YAELE,YAFUS,YALWG,YARWG,YALJET,YARJET,             TRIM0470
     8               ZAJET,ALECR1,ALGFPD,BDTTOM,CZET11,                 TRIM0480
     9               CZET12,CZET13,EIZETA,HALFPI,SZET10,                TRIM0490
     A               XAPYLD,YGUSTW,ZAPYLD,ZFLWG1,ZFRWG1                 TRIM0500
     B               ,TZMS,T1MS,T2MS,TZTS,T1TS,T2TS,                    TRIM0510
     C               CLOCK,FLOCK,XLOCK,TCLOCK                           TRIM0520
      COMMON /ROMAN/  ZZ,VXS(2),VYS(2),VZS(2),BETA(12,2),               TRIM0530
     *               T,PCC(2),CDSE(7,7,2),BETAN(2),BETAX(2),BETAZ(2),   TRIM0540
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*                 AIB(2),APDD,ARDD,AYDD,AIR(2),                          TRIM0550
1                 DPSI(12,2),DTRR,NPSI(2),ZZTR,                          TRIM0560
2                 BETAD(12,2),BNPSI(2),                                  TRIM0570
3                 CDND2,GMAXV,RATE1,RATE2,STOP2,                         TRIM0580
4                 THROT(2),TRIND,XGUST,BETAZD(2),GMAXV1,                 TRIM0590
5                 GMAXV2,GMAXV3,GUSTYP,HNPSIR(2),                        TRIM0600
6                 HUBKPS,HUBKRS,HUBTPS,HUBTRS,                           TRIM0610
7                 KONFIG,LNGTH1,PILGH1,PSIREF(2),                        TRIM0620
8                 START2,XMOMLI(12,2),                                   TRIM0630
9                 RM,RTR,ORM,ORTR,T1MT,T1TT,                             TRIM0640
A                 T2MT,T2TT,TZMT,TZTT,XMA1,XMA1T,                        TRIM0650
B                 XMB1,XMB1T,AIBPM,AIBPT,AIBRM,AIBRT,                    TRIM0660
C                 APTD,APTTD,ARTD,ARTTD,PSD,PSDT,                        TRIM0670
D                 XSTAHM,XSTAHT,YSTAHM,YSTAHT,                           TRIM0680
E                 HUBKP,HUBKTP,HUBKR,HUBKTR                              TRIM0690
F                 ,AZETA,AZETAT,VZETA,VZETAT                             TRIM0700
 COMMON /MANARO/ I,V,INO,NWAG,APBMT,ARBMT,AYBMT,BETAD(2),TDELT,          TRIM0710
1                 BETAE(2),HGUSTE,HGUSTF,HGUSTW,VGUSTE,                  TRIM0720
2                 VGUSTW,VGUSTF,GFWD,GLAT,GVERT,                         TRIM0730
3                 VXB,VZB,APD,VYB,ARD,AYD,                               TRIM0740
4                 COLSTK,CYSTK1,CYSTK2,PEDAL,AYE,                        TRIM0750
5                 APE,ARE,A1M,B1M,A1TR,B1TR,                             TRIM0760
6                 XAR(2),YAR(2),ZAR(2),                                  TRIM0770
7                 VIMR,VITR,ZETA,ZETATR,HMR,HTR,                         TRIM0780
8                 TMR,TTR,QMX,QTR,YMRF,YTRF                              TRIM0790
 COMMON /STANRO/ J,W,ITM,VHS(2),LINK,QELE,VROT(2),                       TRIM0800
1                 VSND,YFIN(2),ZFEL(2),A1BAL(2),                         TRIM0810
2                 B1BAL(2),CDND1,SWING,PILGH2,PWGEL1,                    TRIM0820
3                 BM,BTR,PMOMM,PMOMT,RMOMM,RMOMT                         TRIM0830
 COMMON /TOPLOT/ AH(3),AL(3),EXIT,ICOM(49),IPSN,                         TRIM0840
1                 NPART,NVARA,NVARB,NVARC,NSCALE                         TRIM0850
1                 ,NVARS,NPRINT,NTIME                                    TRIM0860
 COMMON /FORY/    Y(4,150)                                               TRIM0870
 DIMENSION VAR(11),HEAD2(6,7),PSID(2),APDR(2),ARDR(2)                    TRIM0880
 EQUIVALENCE (VAR(1),COLSTK),(PSID(1),PSD) ,(APDR(1),APTD),              TRIM0890
1                                           (ARDR(1),ARTD)              TRIM0900
 DATA HEAD2/'*******COLLECTIVE STICK *******F/A CYCLIC STICK ******      TRIM0910
1*LAT CYCLIC STICK ******************PEDAL POSITION EXCEEDS STOPS (      TRIM0920
2  PERCENT FULL THROW COMPUTED)                    '/                    TRIM0930
 LOGICAL AYEFP                                                           TRIM0940
 REAL MASS,IXZ                                                           TRIM0950
 AYEFP=.TRUE.                                                            TRIM0960
 IF(ABS(AYE-AYEFP).LE..01.AND.Y(1,85).EQ.0.) AYEFP=.FALSE.               TRIM0970
 LPASS=5                                                                 TRIM0980
 IF(XIT(3).EQ.0.) LPASS=1                                                TRIM0990
 EPDX(1)=1./RANGE                                                        TRIM1000
 EPDX(2)=1./CYCF(3)                                                      TRIM1010
 EPDX(3)=1./CYCL(3)                                                      TRIM1020
 EPDX(4)=1./PEDA(3)                                                      TRIM1030
C                  EPDX IS IN UNITS OF PERCENT PER RADIAN                TRIM1040
 DX=0.                                                                   TRIM1050
 DY=0.                                                                   TRIM1060
 DZ=0.                                                                   TRIM1070
 DL=0.                                                                   TRIM1080
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      DM=0.                                                              TRIM1090
      DN=0.                                                              TRIM1100
      BETAES(1)=BETAE(1)                                                 TRIM1110
      BETAES(2)=BETAE(2)                                                 TRIM1120
      TMRS=TMR                                                           TRIM1130
      TTRS=TTR                                                           TRIM1140
      DO 4 I=5,10                                                        TRIM1150
      EPDX(I)=1.                                                         TRIM1160
    4 CONTINUE                                                           TRIM1170
      CALL DAMPER                                                        TRIM1180
      CALL PDZ1 (KONFIG)                                                 TRIM1190
      DO 6 K=1,10                                                        TRIM1200
      X(K)=0.                                                            TRIM1210
      DO 6 L=1,11                                                        TRIM1220
      PD(K,L)=0.                                                         TRIM1230
      POPHI(K,L)=0.                                                      TRIM1240
    6 CONTINUE                                                           TRIM1250
      LINK=2                                                             TRIM1260
      CALL ITRIM(LPASS)                                                  TRIM1270
      DO 175 I=1,4                                                       TRIM1280
      IF(VAR(I).GE.0.0.AND.VAR(I).LE.100.) GO TO 175                     TRIM1290
      WRITE (6,176) (HEAD2(J,I),J=1,6),(HEAD2(J,5),J=1,6),VAR(I),        TRIM1300
     1              ((HEAD2(J,K),J=1,6),K=6,7)                           TRIM1310
      EXIT=1.                                                            TRIM1320
  175 CONTINUE                                                           TRIM1330
      DL=0.                                                              TRIM1340
      DM=0.                                                              TRIM1350
      DN=0.                                                              TRIM1360
      DX=0.                                                              TRIM1370
      DY=0.                                                              TRIM1380
      DZ=0.                                                              TRIM1390
      IF(NPART.NE.2.OR.EXIT.NE.0.) RETURN                                TRIM1400
      IND=0                                                              TRIM1410
      Y(1, 1)=VXB                                                        TRIM1420
      Y(1, 2)=VYB                                                        TRIM1430
      Y(1, 3)=VZB                                                        TRIM1440
      Y(1,4)=AYD                                                         TRIM1450
      Y(1,5)=APD                                                         TRIM1460
      Y(1,6)=ARD                                                         TRIM1470
      Y(1,10)=AYE                                                        TRIM1480
      Y(1,11)=APE                                                        TRIM1490
      Y(1,12)=ARE                                                        TRIM1500
      NPSI(1)=BM                                                         TRIM1510
      NPSI(2)=BTR                                                        TRIM1520
      CALL NOPSI1 (NPSI,HNPSIR,BNPSI,DPSI)                              TRIM1530
      TDELT  =  ZDELT1                                                   TRIM1540
      TIME=TZERO-.95*TDELT                                               TRIM1550
      DIST= TZERO*V                                                      TRIM1560
      AY=0.                                                              TRIM1570
      IF(VXB.NE.0.0.OR .VYB.NE.0.) AY=ATAN2(-VYB,VXB)                    TRIM1580
      OMR=OMX+OTR*GEARAT                                                 TRIM1590
      OMRS=OMR                                                           TRIM1600
      CALL IVAR (EXIT,LINK,TAXL,TAXR,PILGH2,A1M,B1M,A1TR,B1TR)           TRIM1610
      ZFEL(1)=ZFELE                                                      TRIM1620
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      YFIN(1)=YFFIN                                                    TRIM1630
      REWIND 3                                                         TRIM1640
      ITM=0                                                            TRIM1650
      RETURN                                                           TRIM1660
  176 FORMAT (1H0,12A4,F7.1,12A4)                                      TRIM1670
      END                                                              TRIM1680
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      SUBROUTINE TURN (XFC,V,ARE)                                       TURN0010
      COMMON /FORY/   Y(4,150)                                          TURN0020
      DIMENSION XFC(28)                                                 TURN0030
      DATA G/32.17/,DTR/.1745329E-01/                                   TURN0040
      Y(2,86)=1.                                                        TURN0050
      IF(XFC(21).NE.0.) GO TO 5                                         TURN0060
      DO 100 I=12,14                                                    TURN0070
      IF(XFC(I).EQ.0.) GO TO 100                                        TURN0080
      J=I-11                                                            TURN0090
      GO TO (1,2,3),J                                                   TURN0100
  100 CONTINUE                                                          TURN0110
      RETURN                                                            TURN0120
    1 CONTINUE                                                          TURN0130
      GLEVEL=XFC(12)                                                    TURN0140
      IF(GLEVEL.LE.1.) GO TO 5                                          TURN0150
      ARE=ARCOS(1./GLEVEL)                                              TURN0160
      ARED=ARE/DTR                                                      TURN0170
      TRAD=V**2/(G*TAN(ARE))                                            TURN0180
      GO TO 4                                                           TURN0190
    2 CONTINUE                                                          TURN0200
      ARED=XFC(13)                                                      TURN0210
      ARE=ARED*DTR                                                      TURN0220
      GLEVEL=1./COS(ARE)                                                TURN0230
      TRAD=V**2/(G*TAN(ARE))                                            TURN0240
      GO TO 4                                                           TURN0250
    3 CONTINUE                                                          TURN0260
      TRAD=XFC(14)                                                      TURN0270
      ARE=ATAN2(V**2,G*TRAD)                                            TURN0280
      ARED=ARE/DTR                                                      TURN0290
      GLEVEL=1./COS(ARE)                                                TURN0300
    4 CONTINUE                                                          TURN0310
      Y(1,85)=V/TRAD                                                    TURN0320
      PSID=Y(1,85)/DTR                                                  TURN0330
      TURNT=360./ABS(PSID)                                              TURN0340
      TRAD=ABS(TRAD)                                                    TURN0350
      WRITE (6,170) GLEVEL,ARED,TRAD,PSID,TURNT                         TURN0360
      RETURN                                                            TURN0370
    5 CONTINUE                                                          TURN0380
      Y(2,86)=XFC(12)                                                   TURN0390
      IF(XFC(12)-1.) 6,7,8                                              TURN0400
    6 CONTINUE                                                          TURN0410
      WRITE (6,180) XFC(12)                                             TURN0420
    7 CONTINUE                                                          TURN0430
      RETURN                                                            TURN0440
    8 WRITE (6,190) XFC(12)                                             TURN0450
      RETURN                                                            TURN0460
  170 FORMAT(//' G-LEVEL     = 'G12.5,10X,' BANK ANGLE = 'G12.5//,      TURN0470
     1          ' TURN RADIUS = 'G12.5,10X,' YAW RATE   = 'G12.5//,     TURN0480
     2          ' TIME USED TO COMPLETE 360 DEGREE TURN = 'G12.5)        TURN0490
  180 FORMAT(//' PUSH-OVER WITH G-LEVEL = ',G12.5)                      TURN0500
  190 FORMAT (//' PULL-UP WITH G-LEVEL = ',G12.5)                       TURN0510
      END                                                               TURN0520
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      SUBROUTINE VARI                                                   VARI0010
      COMMON /FORCE/ XF,XFRWG,XFLWG,XFFLE,XFFUS,XFRJET,                 VARI0020
     1               XFLJET,XFMR,XFTR,XFGUN,XFFIN,XFW,                  VARI0030
     2               YF,YFFUS,YFRJET,YFLJET,YFMR,YFTR,                  VARI0040
     3               YFGUN,YFFIN,YFW,                                   VARI0050
     4               ZF,ZFRWG,ZFLWG,ZFFLE,ZFFUS,ZFRJET,                 VARI0060
     5               ZFLJET,ZFMR,ZFTR,ZFGUN,ZFW,                        VARI0070
     6               QL,LRWG,LLWG,LELF,LFUS,LRJET,LLJET,                VARI0080
     7               LMR,LTR,LGUN,LFIN,LQMR,LQTR,                       VARI0090
     8               QM,MRWG,MLWG,MELF,MFUS,MRJET,MLJET,                VARI0100
     9               MMR,MTR,MGUN,MFIN,MQMR,MQTR,                       VARI0110
     A               QN,NRWG,NLWG,NELF,NFUS,NRJET,NLJET,                VARI0120
     B               NMR,NTR,NGUN,NFIN,NQMR,NQTR                        VARI0130
      COMMON /STRIAB/ D(21),OT(21),E(79),F(10),X(10),                   VARI0140
     1                DL,DM,DN,DX,DY,DZ,IX,IY,IZ,PD(10,11),             VARI0150
     2                DTR,EPD,ERR(10),KM1,RHO,                          VARI0160
     3                R12,SPO(6,6,3),XBW(21),XEL(14),                   VARI0170
     4                XER(7),XFC(28),XFN(7),XFS(35),                    VARI0180
     5                XGN(7),XIT(21),XMR(49),XTR(49),                   VARI0190
     6                XWG(21),YMR(21),YTR(21),YWG(21),                  VARI0200
     7                YEL(21),YFN(21),BLCG,OAMP,DEPD(10),               VARI0210
     8                EPOS,EPOX(10),MASS,OSV1,TMRS,TTRS,                VARI0220
     9                WLCG,XCON(63),XJET(14),XMIN,AYEFP,                VARI0230
     A                BETAES(2),CNPCO,DHADO,DYDBR,GUESS,                VARI0240
     B                NPASS,POPHI(10,11),STACG,TZERO,                   VARI0250
     C                XMAST,DHADAO,DQDCOL,DTRRSO,DYBDBR,                VARI0260
     D                ENGRPM,MXPASS,PSD30P,TRIND1,XLIMIT                VARI0270
      COMMON /STRIMA/ AY,VH,AGW,OT1(2),OT2(2),IXZ,                      VARI0280
     1                QMR,XXD,YYD,ZZD,ALGF,APFP,AYFP,                   VARI0290
     2                CGWL,COLL(6),CYCF(3),CYCL(3),                     VARI0300
     3                OIST,KCIT(20),PEDA(3),QMAX,                       VARI0310
     4                QMRS,TIME,TMAX,XC1T(20,6),ALGEZ,                  VARI0320
     5                ALGE1,ALGE2,CGSTA,CPWIC,OIXIZ,                    VARI0330
     6                DIYIX,OIZIY,OTZMT,DTZM1,OTZT1,FTKTS,              VARI0340
     *                HUBKM(2,2),HUBKI(2,2),                            VARI0350
     7                KREAO,PIU30,TSTAB(14),ZMAX2,ZMAX3,                VARI0360
     8                ASECOL,CYPWIC,GEARAT,PSD550,                      VARI0370
     9                PSISTP,QXBRAK,RUOIND,ZOELT1,ZDELT2                VARI0380
      COMMON /STAMAN/ HL(2),XX,YY,AY1,GOV,KPO,OPC,QQQ,                  VARI0390
     1                RIY,APBG,ARBG,ASEP,AYBG,BWTC,                     VARI0400
     2               RC,BWTK,BWTM,CGBL,DPIX,OPIZ,                       VARI0410
     3                  FHPT(2),R550,ALERT,AYDMX,DELT2,                 VARI0420
     4                  DPIXZ,DTBWT,DWLCG,HDELT,HGUST,                  VARI0430
     5                  HLTR1,HLTR2,ITORS,KTCTR,OMEGM,                  VARI0440
     6                  PCOEL,QMRSA,RMASS,TRALT,TWOPI,VGUST,            VARI0450
     7                  ISTOP,XAGUN,XAPYL,XARSP(2),YAGUN,               VARI0460
     8                  YARSP(2),YGUST,ZAGUN,ZAPYL,ZARSP(2),            VARI0470
     9                  DELT2R,OSTACG,EIMAST,GPRELD,HLPYLD,             VARI0480
     A                  IBRAKE,OMEGMD,QBRAKE,BETAZS(2),                 VARI0490
     B                  PCGDEO,PCGMAX,PCRATE,PO1OTR,ROELT1,             VARI0500
     C                  RDELT2,RITORS,TRIN02                            VARI0510
      COMMON /MANAL/  Q,AP,PEO,QWG,TZM,T1M,T2M,                         VARI0520
     1                TZT,T1T,T2T,ALEL,CZET,PSOO,                       VARI0530
     2                SZET,TAXL,TAXR,XAWG,XLNK(16),ZAWG,                VARI0540
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     3                ALCYP,ALFIN,ALLWG,ALRWG,CDELE,CDFIN,                    VARI0550
     4                COLWG,CDRWG,CLELE,CLFIN,CLLWG,CLRWG,CWING,              VARI0560
     5                CYCR1,CYCR2,CZET4,CZET6,CZET9,RANGE,                    VARI0570
     6                SZET5,SZET7,SZET8,WGCOL,XAELE,XAFIN,                    VARI0580
     7                XAFUS,XAJET,YAFIN,ZAELE,ZAFIN,ZAFUS,                    VARI0590
     *                YAELE,YAFUS,YALWG,YARWG,YALJET,YARJET,                  VARI0600
     8                ZAJET,ALECR1,ALGFPO,BOTTOM,CZET11,                      VARI0610
     9                CZET12,CZET13,EIZETA,HALFPI,SZET10,                     VARI0620
     A                XAPYLO,YGUSTW,ZAPYLO,ZFLWG1,ZFRWG1                      VARI0630
     B                ,TZMS,T1MS,T2MS,TZTS,T1TS,T2TS,                         VARI0640
     C                CLOCK,FLOCK,XLOCK,TCLOCK                                VARI0650
      COMMON /ROMAN/  ZZ,VXS(2),VYS(2),VZS(2),BETA(12,2),                     VARI0660
     *                T,PCC(2),CDSE(7,7,2),BETAN(2),BETAX(2),BETAZ(2),        VARI0670
     *                AIB(2),APDO,AROD,AYDO,AIR(2),                           VARI0680
     1                DPSI(12,2),OTRR,NPSI(2),ZZTR,                           VARI0690
     2                BETAO(12,2),BNPSI(2),                                   VARI0700
     3                COND2,GMAXV,RATE1,RATE2,STOP2,                          VARI0710
     4                THROT(2),TRINO,XGUST,BETAZO(2),GMAXV1,                  VARI0720
     5                GMAXV2,GMAXV3,GUSTYP,HNPSIR(2),                         VARI0730
     6                HUBKPS,HUBKRS,HUBTPS,HUBTRS,                            VARI0740
     7                KONFIG,LNGTH1,PILGH1,PSIREF(2),                         VARI0750
     8                START2,XMOMLI(12,2),                                    VARI0760
     9                RM,RTR,ORM,ORTR,T1MT,T1TT,                              VARI0770
     A                T2MT,T2TT,TZMT,TZTT,XMA1,XMA1T,                         VARI0780
     B                XMB1,XMB1T,AIBPM,AIBPT,AIBRM,AIBRT,                     VARI0790
     C                APTO,APTTO,ARTO,ARTTO,PSO,PSDT,                         VARI0800
     D                XSTAHM,XSTAHT,YSTAHM,YSTAHT,                            VARI0810
     F                HUBKP,HUBKTP,HUBKR,HUBKTR                               VARI0820
     F                ,AZETA,AZETAT,VZETA,VZETAT                              VARI0830
      COMMON /MANARO/ I,V,INO,NWAG,APBMT,ARBMT,AYBMT,BETAO(2),TDELT,          VARI0840
     1                BETAE(2),HGUSTE,HGUSTF,HGUSTW,VGUSTE,                   VARI0850
     2                VGUSTW,VGUSTF,GFWO,GLAT,GVERT,                          VARI0860
     3                VXB,VZB,APO,VYB,ARD,AYD,                                VARI0870
     4                COLSTK,CYSTK1,CYSTK2,PEDAL,AYE,                         VARI0880
     5                APE,ARE,A1M,B1M,A1TP,B1TR,                              VARI0890
     6                XAR(2),YAR(2),ZAP(2),                                   VARI0900
     7                VIMR,VITR,ZETA,ZETATR,HMR,HTR,                          VARI0910
     8                TMR,TTR,QMX,QTR,YMRF,YTRF                               VARI0920
      COMMON /TDPLOT/ AH(3),AL(3),EXIT,ICOM(49),IPSN,                         VARI0930
     1                NPART,NVARA,NVARB,NVARC,NSCALE                          VARI0940
     1                ,NVARS,NPRINT,NTIMF                                     VARI0950
      COMMON /FORY/   Y(4,150)                                                VARI0960
      REAL LGUN,MGUN,NGUN                                                     VARI0970
      DIMENSION TAX(2),PSID(2),HUBK(2,2)                                      VARI0980
      DIMENSION CONLOK(4),THETS(6),THET(6),XMOM(3),PDM(3,4),DTHETO(3)         VARI0990
      EQUIVALENCE (TAX(1),TAXL),(PSID(1),PSO),(HUBK(1,1),HUBKP)               VARI1000
      EQUIVALENCE (CONLOK(1),CLOCK),(THETS(1),TZMS),(THET(1),TZM)             VARI1010
      XDELIM(X1,X2,X3)=AMAX1(X1,AMIN1(X2,X3))                                 VARI1020
      OMEGMD=0.                                                               VARI1030
      IF(I.GT.2) GO TO 221                                                    VARI1040
      QPC=0.                                                                  VARI1050
      GOV=0.                                                                  VARI1060
      QQQ=1.                                                                  VARI1070
      IF(ABS(Y(I,9)-OMEGM).LT..01) QQQ=2                                      VARI1080
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  221 DO 220 L=I,KREAD                                                    VARI1090
      J=KCIT(L)                                                           VARI1100
      IF(J.EQ.28) GO TO 282                                               VARI1110
      IF(J.EQ.31) GO TO 295                                               VARI1120
      IF(J.EQ.6.OR.J.GT.26) GO TO 273                                     VARI1130
      IF(J.GT.23) GO TO 220                                               VARI1140
      IF(J.EQ.23) GO TO 219                                               VARI1150
      IF(J.EQ.13) GOV=-I.                                                 VARI1160
      IF(J.LT.9.OR.J.GT.12) GO TO 223                                     VARI1170
      CALL GUST (J)                                                       VARI1180
      GO TO 220                                                           VARI1190
  223 CONTINUE                                                            VARI1200
      IF(J.EQ.18) GO TO 214                                               VARI1210
      IF(TIME.LT.XCIT(L,I)) GO TO 220                                     VARI1220
      IF(J.GT.12) GO TO 413                                               VARI1230
      RATE=XCIT(L,2)                                                      VARI1240
C        J.EQ.1    IS FOR MR. COLLECTIVE INPUT                          VARI1250
C        J.EQ.2    IS FOR MR. F/A CYCLIC INPUT                          VARI1260
C        J.EQ.3    IS FOR MR. LATERAL CYCLIC INPUT                      VARI1270
      IF(TIME.GT.XCIT(L,3)) RATE=0.                                       VARI1280
      IF(TIME.GE.XCIT(L,4))RATE     =+XCIT(L,5)                           VARI1290
      IF(TIME.GT.XCIT(L,6)) RATE=0.                                       VARI1300
      DA=RATE*HDELT                                                       VARI1310
      IF(J.EQ.5) GO TO 264                                                VARI1320
      IF(RATE.EQ.0.) GO TO 220                                            VARI1330
      GO TO (260,261,262,263,264,265,266,267),J                           VARI1340
  260 CONTINUE                                                            VARI1350
      COLSTK=XDELIM(0.,100.,COLSTK+DA)                                    VARI1360
      WGCOL=CPWIC*COLSTK+AGW                                              VARI1370
      GO TO 220                                                           VARI1380
  261 CONTINUE                                                            VARI1390
      CYSTK1=XDELIM(0.,100.,CYSTK1+DA)                                    VARI1400
      CYCR1=CYSTK1*CYCF(3)+CYCF(2)                                        VARI1410
      ALECR1=ALGE2+CYCR1*(ALGE1+ALGE2*CYCR1)                              VARI1420
      GO TO 220                                                           VARI1430
  262 CONTINUE                                                            VARI1440
      CYSTK2=XDELIM(0.,100.,CYSTK2+DA)                                    VARI1450
      CYCR2=CYSTK2*CYCL(3)+CYCL(2)                                        VARI1460
      ALCYP=CYPWIC*CYCR2                                                  VARI1470
      GO TO 220                                                           VARI1480
  263 CONTINUE                                                            VARI1490
      PEDAL=XDELIM(0.,100.,PEDAL+DA)                                      VARI1500
      PED=PEDAL*PEDA(3)+PEDA(2)                                           VARI1510
      ALGFPD=ALGF+RUDIND*PED                                              VARI1520
      GO TO 220                                                           VARI1530
  264 PCRATE=PCGMAX *HDELT**2                                             VARI1540
      IF(XCIT(L,3).LT.TIME.AND.TIME.LT.XCIT(L,4)) GO TO 220               VARI1550
      IF(XCIT(L,6).LT.TIME) GO TO 220                                     VARI1560
      OPC=10.                                                             VARI1570
      IF((DA*PSD550).EQ.0.) GO TO 220                                     VARI1580
      QMRS=XDELIM(0.,QMRSA,QMRS+DA/PSD550)                                VARI1590
      GO TO 220                                                           VARI1600
  273 CONTINUE                                                            VARI1610
      IF(ISTOP.NE.0.AND.I.EQ.4) GO TO 274                                 VARI1620
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      IF(PSD.EQ.0.) GO TO 223                                          VARI1630
      IF(J.EQ.29) GO TO 276                                            VARI1640
      GO TO 220                                                        VARI1650
  274 CONTINUE                                                         VARI1660
      ISTOP=2                                                          VARI1670
      IF(J.EQ.29) GO TO 275                                            VARI1680
      XCIT(L,1)=XCIT(L,1)+T                                            VARI1690
      IF(J.EQ.30) GO TO 279                                            VARI1700
      XCIT(L,3)=XCIT(L,3)+T                                            VARI1710
      IF(J.EQ.27) GO TO 220                                            VARI1720
      XCIT(L,4)=XCIT(L,4)+T                                            VARI1730
      XCIT(L,6)=XCIT(L,6)+T                                            VARI1740
      GO TO 220                                                        VARI1750
  275 CONTINUE                                                         VARI1760
      IF(XCIT(L,3).NE.0.) XCIT(L,1)=XCIT(L,1)+T                        VARI1770
      IF(XCIT(L,4).NE.0.) XCIT(L,2)=XCIT(L,2)+T                        VARI1780
  276 CONTINUE                                                         VARI1790
      IF(XCIT(L,3).EQ.0.) GO TO 223                                    VARI1800
      GO TO 220                                                        VARI1810
  279 CONTINUE                                                         VARI1820
      XCIT(L,2)=XCIT(L,2)+T                                            VARI1830
      GO TO 220                                                        VARI1840
  265 CONT'NUE                                                         VARI1850
      DO 269 N=1,2                                                     VARI1860
      BETAZD(N)=-RATE                                                  VARI1870
      IF(NPSI(N).EQ.0) GO TO 269                                       VARI1880
      BETAZ(N)=BETAZ(N)-DA                                             VARI1890
      BETAN(N)=BETAZ(N)                                                VARI1900
      BETAX(N)=BETAN(N)                                                VARI1910
  269 CONTINUE                                                         VARI1920
      CALL TFFA (XAR,BETAZ,CGSTA)                                      VARI1930
      GO TO 220                                                        VARI1940
  266 OMEGM=OMEGM+DA                                                   VARI1950
      OMEGMD=RATE+OMEGMO                                               VARI1960
      DDD=1.                                                           VARI1970
      GO TO 220                                                        VARI1980
  267 ZETATR=ZETATR+DA                                                 VARI1990
  205 XAR(2)=XARSP(2)+HL(2)*SIN(ZETATR)                                VARI2000
      CZTR=COS(ZETATR)                                                 VARI2010
      YAR(2)=YARSP(2)-HLTR2*CZTR                                       VARI2020
      ZAR(2)=ZARSP(2)-HLTR1*CZTR                                       VARI2030
      AYBMT=ZETATR*TRIND2                                              VARI2040
      APBMT=-ZETATR*TRIND                                              VARI2050
      VZETAT=RATE                                                      VARI2060
      IF(J.EQ.20) AZETAT=AZ                                            VARI2070
      GO TO 220                                                        VARI2080
  413 CONTINUE                                                         VARI2090
      IF(J.EQ.27) GO TO 226                                            VARI2100
      IF(J.EQ.29) GO TO 283                                            VARI2110
      IF(J.EQ.30) GO TO 284                                            VARI2120
      K=J-12                                                           VARI2130
      GO TO (209,210,211,212,213,214,215,216,217,218,219),K            VARI2140
  209 IF(TIME.GE.XCIT(L,3)) GO TO 270                                  VARI2150
      DDD=XCIT(L,2)                                                    VARI2160
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      QMRSA=XDELIM(0.,QMAX,XCIT(L,6))                                    VARI2170
      QMRS=QMRSA                                                         VARI2180
      GO TO 220                                                          VARI2190
  270 GOV=XCIT(L,5)                                                      VARI2200
      GO TO 220                                                          VARI2210
  210 IF(TIME.LT.XCIT(L,1)) GO TO 220                                    VARI2220
      DA=XCIT(L,3)*HDELT                                                 VARI2230
      N=XCIT(L,6)+.01                                                    VARI2240
      IF(XCIT(L,2).EQ.0.) GO TO 225                                      VARI2250
      TAX(N)=TAX(N)+DA                                                   VARI2260
      IF(SIGN(1.,DA).EQ.SIGN(1.,(XCIT(L,5)-TAX(N)))) GO TO 220           VARI2270
      TAX(N)=XCIT(L,5)                                                   VARI2280
  222 XCIT(L,1)=9999.                                                    VARI2290
      GO TO 220                                                          VARI2300
  225 IF(TIME.GE.XCIT(L,4)) GO TO 222                                    VARI2310
      TAX(N)=TAX(N)+DA                                                   VARI2320
      GO TO 220                                                          VARI2330
  211 IF(ALERT.EQ.0.0.AND.ABS(AY).LT.XCIT(L,2)) GO TO 220                VARI2340
      IF(TIME.GE.XCIT(L,6)) GO TO 220                                    VARI2350
      ALERT=1.                                                           VARI2360
      AY1D=(AY-AY1)*DELT2R                                               VARI2370
      AYDABS=ABS(AY1D)                                                   VARI2380
      AYDMX=AMAX1(AYDMX,AYDABS)                                          VARI2390
C                              ......... SAVES LARGEST YAW RATE (ABS.),  VARI2400
C                                        UNTIL PILOT GOES OFF ALERT.     VARI2410
      IF(ABS(AY).GE.XCIT(L,2)) GO TO 710                                 VARI2420
      IF(AYDABS  .GE.(XCIT(L,5)*AYDMX))GO TO 710                         VARI2430
      ALERT=0.                                                           VARI2440
      AYDMX=0.                                                           VARI2450
      GO TO 220                                                          VARI2460
  710 DA=(AY*XCIT(L,3)+AY1D*XCIT(L,4))*HDELT                             VARI2470
      GO TO 263                                                          VARI2480
C     WEAPONS GROUP                                                      VARI2490
  212 FGUN=0.                                                            VARI2500
      IF(XCIT(L,2).LT.TIME) GO TO 250                                    VARI2510
      RMPLTH=XCIT(L,4)                                                   VARI2520
      TIMEIN=T-XCIT(L,1)                                                 VARI2530
      IF(TIMEIN.LT.RMPLTH) FGUN=TIMEIN*XCIT(L,5)                         VARI2540
      IF(TIMEIN.GE.RMPLTH) FGUN=XCIT(L,3)                                VARI2550
  250 CALL RATS (FGUN,0.,0.,AYBG,APBG,ARBG,XFGUN,YFGUN,ZFGUN,1)          VARI2560
      CALL DOGS (XAGUN,YAGUN,ZAGUN,XFGUN,YFGUN,ZFGUN,LGUN,MGUN,NGUN)     VARI2570
      GO TO 220                                                          VARI2580
  213 IF(XCIT(L,3).LT.TIME) GO TO 220                                    VARI2590
      RATE=XCIT(L,2)                                                     VARI2600
      DA=RATE*HDELT                                                      VARI2610
  271 ZETA=ZETA+DA                                                       VARI2620
      VZETA=RATE                                                         VARI2630
      IF(J.EQ.20) AZETA=AZ                                               VARI2640
      ZETATR=ZETA                                                        VARI2650
      CALL TILT (XAR,ZAR,CGWL,COLL,ZETA,CGSTA)                           VARI2660
      ALF=XCIT(L,5)                                                      VARI2670
      IF(ZETA.LE.ALF) GO TO 205                                          VARI2680
      BET=XCIT(L,4)                                                      VARI2690
      DOMEG=XCIT(L,6)*SIN((ZETA-ALF)*BET)*DA                             VARI2700
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      OMEGM=OMEGM+DOMEG                                                 VARI2710
      OMEGMD=DOMEG*ROELT2+OMEGMD                                        VARI2720
      QQQ=1.                                                            VARI2730
      GO TO 205                                                         VARI2740
  214 CONTINUE                                                          VARI2750
      IBRAKE=0                                                          VARI2760
      IF(TIME.GT.XCIT(L,4).OR.PSIO(1).GT.XCIT(L,2)) IBRAKE=1            VARI2770
      GO TO 220                                                         VARI2780
  215 OLOASE=ASEP                                                       VARI2790
      TLAG=XCIT(L,6)*ROELT2                                             VARI2800
      ASEP=(XCIT(L,2)*(XCIT(L,5)-APE)+XCIT(L,3)*APD+XCIT(L,4)*Y(I-1,80) VARI2810
     1      +OLOASE*TLAG)/(1.+TLAG)                                     VARI2820
      DA=ASEP                                                           VARI2830
      GO TO 261                                                         VARI2840
  216 IF(TIME.GT.XCIT(L,4)) GO TO 220                                   VARI2850
      OT=XCIT(L,2)*(T-XCIT(L,1))                                        VARI2860
      RATE=XCIT(L,3)*COS(OT)                                            VARI2870
      DA=RATE*HDELT                                                     VARI2880
      K=XCIT(L,5)+.1                                                    VARI2890
      IF(K.EQ.5) AZ=-XCIT(L,2)*XCIT(L,3)*SIN(OT)                        VARI2900
      GO TO (260,261,262,263,271),K                                     VARI2910
  217 IF(ABS(HALFPI -ZETA).GT.0.001) GO TO 220                          VARI2920
      DA1=XCIT(L,3)*HDELT                                               VARI2930
      Q1=A1M-XCIT(L,4)                                                  VARI2940
      IF(ABS(Q1).GT.XCIT(L,2)) OT1(1)=OT1(1)+DA1*Q1                     VARI2950
      Q1=B1M-XCIT(L,5)                                                  VARI2960
      IF(ABS(Q1).GT.XCIT(L,2)) OT2(1)=OT2(1)-DA1*Q1                     VARI2970
      GO TO 220                                                         VARI2980
  218 IF(ABS(HALFPI -ZETATR).GT.0.001) GO TO 220                        VARI2990
      DA1=XCIT(L,3)*HDELT                                               VARI3000
      Q1=A1TR-XCIT(L,4)                                                 VARI3010
      IF(ABS(Q1).GT.XCIT(L,2)) OT1(2)=OT1(2)+DA1*Q1                     VARI3020
      Q1=B1TR-XCIT(L,5)                                                 VARI3030
      IF(ABS(Q1).GT.XCIT(L,2)) OT2(2)=OT2(2)-DA1*Q1                     VARI3040
      GO TO 220                                                         VARI3050
  219 CONTINUE                                                          VARI3060
      N=XCIT(L,1)+.1                                                    VARI3070
      HUBK(N,1)=XDELIM(XCIT(L,3),XCIT(L,2),                             VARI3080
     1                 HUBKM(1,N)*PSIO(N)+HUBKI(1,N))                   VARI3090
      HUBK(N,2)=XDELIM(XCIT(L,3),XCIT(L,2),                             VARI3100
     1                 HUBKM(2,N)*PSIO(N)+HUBKI(2,N))                   VARI3110
      GO TO 220                                                         VARI3120
  282 CONTINUE                                                          VARI3130
      N=XCIT(L,1)+.1                                                    VARI3140
      BETANN=XDELIM(XCIT(L,3),XCIT(L,2),XCIT(L,4)+XCIT(L,5)*PSIO(N))    VARI3150
      IF(BETANN.EQ.XCIT(L,2).AND.XCIT(L,6).GT..5) GO TO 220             VARI3160
      IF(BETANN.EQ.XCIT(L,3).AND.XCIT(L,6).LT.-.5) GO TO 220            VARI3170
      BETAN(N)=BETANN                                                   VARI3180
      NPSIN=NPSI(N)                                                     VARI3190
      IF(BETANN.EQ.XCIT(L,2)) XCIT(L,6)=1.                              VARI3200
      IF(BETANN.EQ.XCIT(L,3)) XCIT(L,6)=-1.                             VARI3210
      DA=0.                                                             VARI3220
      IF(BETAZ(N).GT.(-BETANN)) DA=BETAZ(N)+BETANN                      VARI3230
      IF(BETAZ(N).LT.(-BETANN).AND.BETAZ(N).LT.BETAZS(N))               VARI3240
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      1DA=BETAZ(N)-AMIN1(BETAZS(N),(-BETANN))                            VARI3250
       BETAZ(N)=BETAZ(N)-DA                                             VARI3260
       BETAX(N)=BETAZ(N)*2.-BETANN                                      VARI3270
       DO 301 K=1,NPSIN                                                 VARI3280
       BETA(K,N)=BETA(K,N)-DA                                           VARI3290
       Y(1,7*N+K+10)=Y(1,7*N+K+10)-DA                                   VARI3300
  301 CONTINUE                                                          VARI3310
       IF(KONFIG.EQ.3) CALL TFFA (XAR,BETAZ,CGSTA)                      VARI3320
       GO TO 220                                                        VARI3330
  283 CONTINUE                                                          VARI3340
       XLOK=1.                                                          VARI3350
       IF(XCIT(L,6).EQ.0.) GO TO 277                                    VARI3360
       XLOK=0.                                                          VARI3370
       XCIT(L,2)=9999.                                                  VARI3380
  277 CONTINUE                                                          VARI3390
       N=XCIT(L,5)                                                      VARI3400
       DO 278 M=1,4                                                     VARI3410
       N1=5-M                                                           VARI3420
       N2=2**(N1-1)                                                     VARI3430
       IF(N.LT.N2) GO TO 278                                            VARI3440
       CONLOK(N1)=XLOK                                                  VARI3450
       THETS(N1)=THET(N1)                                               VARI3460
       IF(N1.GT.2) THETS(N1+2)=THET(N1+2)                               VARI3470
       N=N-N2                                                           VARI3480
  278 CONTINUE                                                          VARI3490
       XCIT(L,1)=XCIT(L,2)                                              VARI3500
       XCIT(L,3)=XCIT(L,4)                                              VARI3510
       XCIT(L,6)=1.                                                     VARI3520
       GO TO 220                                                        VARI3530
  284 CONTINUE                                                          VARI3540
       IF(TIME.LE.XCIT(L,2)) GO TO 285                                  VARI3550
       KPO=0                                                            VARI3560
       XCIT(L,1)=9999.                                                  VARI3570
       GO TO 220                                                        VARI3580
  285 CONTINUE                                                          VARI3590
       IF(I.NE.2) GO TO 292                                             VARI3600
       XMOM(1)=ZF                                                       VARI3610
       XMOM(2)=XMB1                                                     VARI3620
       XMOM(3)=XMA1                                                     VARI3630
       IF(KPO.NE.0) GO TO 288                                           VARI3640
       DO 287 K=1,3                                                     VARI3650
       DO 286 M=1,3                                                     VARI3660
       POM(K,M)=0.                                                      VARI3670
  286 CONTINUE                                                          VARI3680
       POM(K,K)=XCIT(L,K+2)                                             VARI3690
       POM(K,4)=-XMOM(K)                                                VARI3700
  287 CONTINUE                                                          VARI3710
       GO TO 290                                                        VARI3720
  288 CONTINUE                                                          VARI3730
       DO 289 K=1,3                                                     VARI3740
       POM(K,KPO)=(XMOM(K)+POM(K,4))/DTHET                              VARI3750
       POM(K,4)=-XMOM(K)                                                VARI3760
  289 CONTINUE                                                          VARI3770
       DTHETO(KPO)=DTHET                                                VARI3780
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290 CONTINUE                                                          VARI3790
    KPD=KPD+1                                                         VARI3800
    IF(KPD.EQ.4) KPD=1                                                VARI3810
    DO 291 K=1,4                                                      VARI3820
    DO 291 M=1,3                                                      VARI3830
    PDPHI(M,K)=PDM(M,K)                                               VARI3840
291 CONTINUE                                                          VARI3850
    KM1=3                                                             VARI3860
    CALL SOLVE                                                        VARI3870
    IF(EXIT.EQ.0.) GO TO 293                                          VARI3880
    DTHET=0.                                                          VARI3890
    EXIT=0.                                                           VARI3900
    GO TO 294                                                         VARI3910
293 CONTINUE                                                          VARI3920
    DTHET=X(KPD)                                                      VARI3930
    XLIMD=XCIT(L,6)*TDELT                                             VARI3940
    DTHET=XDELIM(-XLIMD,XLIMD,DTHET)                                  VARI3950
294 CONTINUE                                                          VARI3960
    DXMIN=.8726646E-02*TDELT                                          VARI3970
    IF(ABS(DTHET).LT.DXMIN) DTHET=SIGN(DXMIN,DTHETO(KPD))             VARI3980
292 CONTINUE                                                          VARI3990
    THETS(KPD)=THETS(KPD)+.5*DTHET                                    VARI4000
    GO TO 220                                                         VARI4010
295 CONTINUE                                                          VARI4020
    DO 296 K=1,5,2                                                    VARI4030
    IF(TIME.GE.XCIT(L,K)) NPRINT=XCIT(L,K+1)                          VARI4040
296 CONTINUE                                                          VARI4050
    IF(NPRINT.LE.0) NPRINT=1                                          VARI4060
    GO TO 220                                                         VARI4070
226 CONTINUE                                                          VARI4080
    IF(XCIT(L,3).LT.TIME) GO TO 220                                   VARI4090
    DA=XCIT(L,2)*HDELT                                                VARI4100
    K=XCIT(L,4)+.1                                                    VARI4110
    K1=K                                                              VARI4120
    NPSI1=NPSI(1)                                                     VARI4130
    IF(K.NE.1) GO TO 228                                              VARI4140
    PSIREF(1)=PSIREF(1)+DA                                            VARI4150
    Y(1,7)=Y(1,7)+DA                                                  VARI4160
    DO 227 M=2,NPSI1                                                  VARI4170
    DPSI(M,1)=DPSI(M,1)-DA                                            VARI4180
227 CONTINUE                                                          VARI4190
    K1=NPSI1                                                          VARI4200
    GO TO 231                                                         VARI4210
228 CONTINUE                                                          VARI4220
    DPSI(K,1)=DPSI(K,1)+DA                                            VARI4230
231 CONTINUE                                                          VARI4240
    IF(HUBKPS.NE.0.) GO TO 220                                        VARI4250
    DO 230 N=K,K1                                                     VARI4260
    DO 229 M=1,NPSI1                                                  VARI4270
    COSE(M,N,1)=COS(DPSI(M,1)-DPSI(N,1))                              VARI4280
229 CONTINUE                                                          VARI4290
    COSE(N,N,1)=1.                                                    VARI4300
230 CONTINUE                                                          VARI4310
    CALL HSAF (XAR,YAR,DPSI,NPSI,CGSTA,PSIREF)                        VARI4320
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```
  220 CONTINUE                                                          VARI4330
      RETURN                                                            VARI4340
      END                                                               VARI4350
```

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      SUBROUTINE VIND (N,EXIT)                                          VIN00010
      COMMON /ROMAN/  ZZ,VXS(2),VYS(2),VZS(2),BETA(12,2),               VIND0020
     *                T,PCC(2),COSE(7,7,2),BETAN(2),BETAX(2),BETAZ(2),  VIND0030
     *                AIB(2),APDD,ARDD,AYDD,AIR(2),                     VIND0040
     1                DPSI(12,2),DTRR,NPSI(2),ZZTR,                     VIND005D
     2                BETAD(12,2),BNPSI(2),                             VIND0060
     3                COND2,GMAXV,RATE1,RATE2,STOP2,                    VIND007D
     4                THROT(2),TRIND,XGUST,BETAZO(2),GMAXV1,            VIND0080
     5                GMAXV2,GMAXV3,GUSTYP,HNPSIR(2),                   VIND009D
     6                HUBKPS,HUBKRS,HUBTPS,HUBTRS,                      VIND010D
     7                KONFIG,LNGTH1,PILGH1,PSIREF(2),                   VIND011D
     8                START2,XMOMLI(12,2),                              VIND012D
     9                R(2),OR(2),T1(2),                                 VIND013D
     A                T2(2),TZR(2),XMA(2),                              VIND014D
     B                XMB(2),AIBP(2),AIBR(2),                           VIND015D
     C                APDR(2),ARDR(2),PSIO(2),                          VIND016D
     D                XSTAH(2),YSTAH(2),                                VIND017D
     E                HUBKPR(2),HUBKRR(2)                               VIND018D
     F                ,AZETAR(2),VZETAR(2)                              VIND019D
      COMMON /MANARO/ I,V,IND,NWAG,APBMT,ARBMT,AYBMT,BETAD(2),TDELT,    VIND020D
     1                BETAE(2),HGUSTE,HGUSTF,HGUSTW,VGUSTE,             VIND021D
     2                VGUSTW,VGUSTF,GFWD,GLAT,GVERT,                    VIND022D
     3                VXB,VZB,APD,VYB,ARD,AYD,                          VIND023D
     4                COLSTK,CYSTK1,CYSTK2,PEDAL,AYE,                   VIND024D
     5                APE,ARE,A1M,B1M,A1TR,B1TR,                        VIND025D
     6                XAR(2),YAR(2),ZAR(2),                             VIND026D
     7                VIR(2),ZETAR(2),HFORCE(2),                        VIND027D
     8                THRUST(2),TORQUE(2),YFORCE(2)                     VIND028D
      COMMON /STANRO/ J,W,ITM,VHS(2),LINK,QELE,VROT(2),                 VIND029D
     1                VSND,YFIN(2),ZFEL(2),A1BAL(2),                    VIND030D
     2                B1BAL(2),COND1,SWING,PILGH2,PWGEL1,               VIND031D
     3                B(2),PMOM(2),RMOM(2)                              VIND032D
      COMMON /ROSTAR/ AM(2),CT,PI,XB(2),ALT,AOR(2),EXH(2),              VIND033D
     1                NXR(2),RBH(2),SWC(2),UHS,CDHB(2),LROT(2),         VIND034D
     2                RAIB(2),RTRP(2),TAIR(14),CONEK(2),DCAFR(2),FVINO, VIND035D
     *                NVARD,                                            VIND036D
     3                SWKR1(2),SWKR2(2),TIP1B(2),TIP3B(2),              VIND037D
     4                TWIST(20,2),CLRAOK(2),DELTA3(2),                  VIND038D
     5                LAMBDA(2),UPGUST,URGUST,UTGUST,WROTOR,            VIND039D
     6                ER(2),ERX(2),                                     VIND040D
     7                XLIMAX(2),XLIMIN(2)                               VIND041D
      REAL LAMBDA,LAM2                                                  VIND042D
      BB=1.-2.*SQRT(ABS(CT))/(ABS(OR(N))*B(N))                          VIND043D
      CB=CT/(BB*BB-AOR(N))                                              VIND044D
      Q1=ABS(CB)                                                        VIND045D
      Q2=.6*Q1*SQRT(Q1)                                                 VIND046D
      Q3=Q1+R.*UHS                                                      VIND047D
      Q4=Q2/Q3                                                          VIND048D
      Q5=Q1*Q4                                                          VIND049D
      Q6=2.666667*Q4                                                    VIND050D
      LAMBDA(N)=VZS(N)                                                  VIND051D
      L=100                                                             VIND052D
   10 CONTINUE                                                          VIND053D
      L=L-1                                                             VIND054D
```

```
      IF(L.LE.0) GO TO 30                                                    VIN00550
      VIRS=VIR(N)                                                            VIN00560
      LAM2=LAMBDA(N)**2                                                      VIN00570
      VIR(N)=CB/(SQRT(.866*LAM2+UHS)+(Q5-Q5*LAMBDA(N)*ABS(LAMBDA(N)))/       VIN00580
     1      (Q1+8.*LAM2))                                                    VIN00590
      LAMBDA(N)=VZS(N)-VIR(N)                                                VIN00600
      IF(ABS(VIR(N)-VIRS).GT..0001) GO TO 10                                 VIN00610
C                                                                            VIN00620
C     GROUND EFFECT - FOR V.LT.30 AND IF H IS FROM .25 TO 1. ROTOR DIAME     VIN00630
C                                                                            VIN00640
      GRE=.25+.5*ALT/R(N)                                                    VIN00650
      IF(GRE.GT.1.) RETURN                                                   VIN00660
      IF(VROT(N).LE.30.) VIR(N)=VIR(N)*(1.+(GRE-1.)*((VROT(N)-30.)           VIN00670
     1                   /30.)**2)                                         VIN00680
      IF(GRE.GE..25) RETURN                                                  VIN00690
      EXIT=1.                                                                VIN00700
      WRITE(6,9000)                                                          VIN00710
      RETURN                                                                 VIN00720
   30 WRITE(6,9001)                                                          VIN00730
      VIR(N)=0.                                                              VIN00740
      LAMBDA(N)=VZS(N)                                                       VIN00750
      RETURN                                                                 VIN00760
 9000 FORMAT(28H0.......SHIP CONTACTS GROUND)                                VIN00770
 9001 FORMAT(27H0INDUCED VELOCITY SET TO 0./28H CALCULATIONS NON-CONVERG     VIN00780
     1ENT)                                                                   VIN00790
      END                                                                    VIN00800
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      SUBROUTINE WAG1                                                   WAG00010
      DIMENSION HEAD(2),FX(61,4),XD(4),DETH(31,4),KFLAG(4)              WAG00020
      DATA HEAD /'MAINTAIL'/                                            WAG00030
      DO 100 L=1,4                                                      WAG00040
      KFLAG(L)=0                                                        WAG00050
  100 CONTINUE                                                          WAG00060
      RETURN                                                            WAG00070
      ENTRY WAG (CHR,K,I,V,TDELT,RED,DLIFT)                             WAG00080
      RED=0.                                                            WAG00090
      IF(KFLAG(I).EQ.1) GO TO (40,40,30,30),I                           WAG00100
    1 K2=(K-1)/2+1                                                      WAG00110
      K4=(K-1)/4+1                                                      WAG00120
      DETH(K4,I)=DLIFT                                                  WAG00130
      IF(I.GT.2) GO TO 8                                                WAG00140
      DD=TDELT*.5*V/(2.*CHR)                                            WAG00150
      IF(K2.GT.2) GO TO 2                                               WAG00160
      IF(DD.GT..5) GO TO 41                                             WAG00170
      GO TO 9                                                           WAG00180
    8 DD=TDELT*V/CHR                                                    WAG00190
      IF(K2.GT.2) GO TO 2                                               WAG00200
      IF(DD.GT.7.5) GO TO 31                                            WAG00210
    9 IF(K2.NE.1) GO TO 2                                               WAG00220
      XD(I)=DD                                                          WAG00230
      GO TO 3                                                           WAG00240
    2 IF(MOD(K,2).EQ.1) XD(I)=DD+XD(I)                                  WAG00250
    3 A=XD(I)                                                           WAG00260
      IF(I.GT.2) GO TO 4                                                WAG00270
      IF(A.GT.1.) GO TO 5                                               WAG00280
                  FX(K2,I)=1.-(.5+A*(6.011997+A*(-28.92326+A*(72.13591  WAG00290
     1+A*(-97.5837+A*(67.39273+A*(-18.53368))))))                       WAG00300
      IF(K.LE.10) GO TO 10                                              WAG00310
      GO TO 5                                                           WAG00320
    4 IF(A.GT.15.) GO TO 5                                              WAG00330
      FX(K2,I)=.2838*EXP(-.49*A)                                        WAG00340
      IF(K.LE.120) GO TO 10                                             WAG00350
    5 DO 6 J=2,K4                                                       WAG00360
    6 DETH(J-1,I)=DETH(J,I)                                             WAG00370
      K=K-1                                                             WAG00380
      K2=K2-1                                                           WAG00390
      K4=K4-1                                                           WAG00400
   10 DO 20 J=1,K4                                                      WAG00410
      M=K2-2*(J-1)                                                      WAG00420
   20 RED=RED+DETH(J,I)*FX(M,I)                                         WAG00430
   50 RETURN                                                            WAG00440
   31 KFLAG(I)=1                                                        WAG00450
   30 WRITE (6,60)                                                      WAG00460
   60 FORMAT (1H0,13X,'ALLEVIATION DEVICE FOR WINGS BYPASSED BECAUSE WINWAG00470
     1G CHORD IS TOO SMALL FOR THIS TIME INCREMENT AND VELOCITY.')       WAG00480
      RETURN                                                            WAG00490
   41 KFLAG(I)=1                                                        WAG00500
   40 WRITE (6,70) HEAD(I)                                              WAG00510
   70 FORMAT (1H0,    'ALLEVIATION DEVICE FOR ROTORS BYPASSED FOR ',A4, WAG00520
     1    ' ROTOR BECAUSE ROTOR DIAMETER IS TOO SMALL FOR THIS TIME INCRWAG00530
     2EMENT AND VELOCITY.')                                             WAG00540
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      RETURN
      END
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WAG00550
WAG00560

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      SUBROUTINE WRFM                                                   WRFM0010
      COMMON /FORCE/ A(71)                                              WRFM0020
      COMMON /ROMAN/  ZZ,VXS(2),VYS(2),VZS(2),BETA(12,2),               WRFM0030
     *                T,PCC(2),COSE(7,7,2),BETAN(2),BETAX(2),BETAZ(2),  WRFM0040
     *                AIB(2),APDD,ARDO,AYDD,AIR(2),                     WRFM0050
     1                DPSI(12,2),DTRR,NPSI(2),ZZTR,                     WRFM0060
     2                BETAD(12,2),BNPSI(2),                             WRFM0070
     3                COND2,GMAXV,RATE1,RATE2,STOP2,                    WRFM0080
     4                THROT(2),TRIND,XGUST,BETAZD(2),GMAXV1,            WRFM0090
     5                GMAXV2,GMAXV3,GUSTYP,HNPSIR(2),                   WRFM0100
     6                HUBKPS,HUBKRS,HUBTPS,HUBTRS,                      WRFM0110
     7                KONFIG,LNGTH1,PILGH1,PSIREF(2),                   WRFM0120
     8                START2,XMOMLI(12,2),                              WRFM0130
     9                RM,RTR,ORM,ORTR,T1MT,T1TT,                        WRFM0140
     A                T2MT,T2TT,TZMT,TZTT,XMA1,XMA1T,                   WRFM0150
     B                XMB1,XMB1T,AIBPM,AIBPT,AIBRM,AIBRT,               WRFM0160
     C                APTD,APTTD,ARTD,ARTTO,PSO,PSOT,                   WRFM0170
     D                XSTAHM,XSTAHT,YSTAHM,YSTAHT,                      WRFM0180
     E                HUBKP,HUBKTP,HUBKR,HUBKTR                         WRFM0190
     F                ,AZETA,AZETAT,VZETA,VZETAT                        WRFM0200
      WRITE (6,10) A,XMB1,XMA1,XMB1T,XMA1T                              WRFM0210
      RETURN                                                            WRFM0220
   10 FORMAT (1HO,54X,'FORCE AND MOMENT SUMMARY'//                      WRFM0230
     1        1H ,15X,'TOTAL    R.WING    L.WING       ELE       FUS',  WRFM0240
     2        4X,'R.JET     L.JET      M.R.      T.R.       GUN       FIN',  WRFM0250
     3        4X,'W/QMR       QTR'//                                   WRFM0260
     4        1H ,' X-FORCE    ',12F9.1/                               WRFM0270
     5        1H ,' Y-FORCE    ',F9.1,27X,8F9.1/                       WRFM0280
     6        1H ,' Z-FORCE    ',10F9.1,9X,F9.1/                       WRFM0290
     7        1H ,' ROLL       ',13F9.1/                               WRFM0300
     8        1H ,' PITCH      ',13F9.1/                               WRFM0310
     9        1H ,' YAW        ',13F9.1/                               WRFM0320
     A        1H ,' MR F/A MOM',F9.1/                                  WRFM0330
     B        1H ,' MR LAT MOM',F9.1/                                  WRFM0340
     C        1H ,' TR F/A MOM',F9.1/                                  WRFM0350
     D        1H ,' TR LAT MOM',F9.1///)                               WRFM0360
      END                                                               WRFM0370
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      SUBROUTINE WROT1                                                  WROT0010
      COMMON /TOPLOT/ AH(3),AL(3),EXIT,ICOM(49),IPSN,                   WROT0020
     1                NPART,NVARA,NVARB,NVARC,NSCALE                   WROT0030
     1                ,NVARS,NPRINT,NTIME                              WROT0040
      DIMENSION NDATE(2)                                                WROT0050
      CALL DATE (NDATE)                                                 WROT0060
      RETURN                                                            WROT0070
      ENTRY WROT                                                        WROT0080
      WRITE (6,1000) NDATE,NPART,IPSN,ICOM                              WROT0090
      RETURN                                                            WROT0100
 1000 FORMAT (1H1,46X,'BELL HELICOPTER IBM 360/ PROGRAM ASAJO1'/        WROT0110
     1        1H ,46X,'HELICOPTER RIGID BODY DYNAMICS ANALYSIS'/        WROT0120
     2        1H ,57X,'COMPILED  10/30/69'/                             WROT0130
     3        1H ,57X,'COMPUTED  ',2A4//                                WROT0140
     4       1H0,18X,I4,4X,I9,5X,15A4/1H ,32X,17A4,/1H ,32X,17A4)       WROT0150
      END                                                               WROT0160
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C                                                                       WRVP0010
C     THE ACTION TAKEN IN THIS SUBROUTINE DEPENDS ENTIRELY UPON N:      WRVP0020
C                                                                       WRVP0030
C         IF N=1 - WRITE VARIABLES INDICATED IN TRIM AND STAB AND ROTOR WRVP0040
C                  DATA ONLY                                            WRVP0050
C                                                                       WRVP0060
C         IF N=2 - WRITE PARTIAL DERIVATIVES ONLY                       WRVP0070
C                                                                       WRVP0080
C         IF N=3 - DO BOTH                                              WRVP0090
C                                                                       WRVP0100
      SUBROUTINE WRVP1(HEAD1,K)                                         WRVP0110
      COMMON /MANARO/ I,V,IND,NWAG,APBMT,ARBMT,AYBMT,BETAO(2),TDELT,    WRVP0120
     1                BETAE(2),HGUSTE,HGUSTF,HGUSTW,VGUSTE,            WRVP0130
     2                VGUSTW,YGUSTF,GFWD,GLAT,GVERT,                   WRVP0140
     3                VXB,VZB,APD,VYB,ARD,AYD,                         WRVP0150
     4                COLSTK,CYSTK1,CYSTK2,PEDAL,AYE,                  WRVP0160
     5                APE,ARE,A1M,B1M,A1TR,B1TR,                       WRVP0170
     6                XAR(2),YAR(2),ZAR(2),                            WRVP0180
     7                VIMR,VITR,ZETA,ZETATR,HMR,HTR,                   WRVP0190
     8                TMR,TTR,QMX,QTR,YMRF,YTRF                        WRVP0200
      COMMON /KVARTR/ KVAR(10)                                          WRVP0210
C                                                                       WRVP0220
C         N DETERMINES WHICH TYPE OF OUTPUT                             WRVP0230
C         KM1  = RANK OF PARTIAL DERIVATIVE MATRIX                      WRVP0240
C                                                                       WRVP0250
      DIMENSION VAR(11),PD(10,11),HEAD(3,21)                            WRVP0260
      DIMENSION HEAD1(2,2),VARD(11)                                     WRVP0270
      DATA DTRR/ 57.2957795/                                            WRVP0280
      DATA HEAD/ '     X-FORCE     Y-FORCE     Z-FORCE     YAW MOM   PITWRVP0290
     1CH MOM    ROLL MOM  MR F/A MOM  MR LAT MOM  TR F/A MOM  TR LAT MOMWRVP0300
     2 COLLECTIVE  F/A CYCLIC  LAT CYCLIC  PEDAL       PITCH       YAW  WRVP0310
     3       MR F/A FLAP MR LAT FLAP TR F/A FLAP TR LAT FLAP -ERROR     WRVP0320
     4'/                                                                WRVP0330
      DO 48 I=1,2                                                       WRVP0340
      HEAD(I,16)=HEAD1(I,K)                                             WRVP0350
   48 CONTINUE                                                          WRVP0360
      RETURN                                                            WRVP0370
      ENTRY WRVP (N,VAR,KM1,PD,TAXL,TAXR)                               WRVP0380
      IF(N.EQ.2) GO TO 40                                               WRVP0390
      DO 39 L=1,11                                                      WRVP0400
      DA=1.                                                             WRVP0410
      IF(L.GT.4) DA=DTRR                                                WRVP0420
      VARD(L)=VAR(L)*DA                                                 WRVP0430
   39 CONTINUE                                                          WRVP0440
      BETAOM=BETAO(1)*DTRR                                              WRVP0450
      BETAOT=BETAO(2)*DTRR                                              WRVP0460
      WRITE (6,20) (VARD(KVAR(L)),L=1,KM1)                              WRVP0470
      WRITE (6,10) TMR,HMR,YMRF,QMX,VIMR,BETAOM,TAXR,TTR,HTR,           WRVP0480
     1             YTRF,QTR,VITR,BETAOT,TAXL                            WRVP0490
      IF(N.EQ.1) RETURN                                                 WRVP0500
   40 WRITE (6,30)  ((HEAD(I,J),I=1,3),J=1,KM1)                         WRVP0510
      DO 50 J=1,KM1                                                     WRVP0520
      WRITE (6,60)   (HEAD(I,J+10),I=1,3),(PD(I,J),I=1,KM1)             WRVP0530
   50 CONTINUE                                                          WRVP0540
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      WRITE (6,60)   (HEAD(I,21),I=1,3),(PD(I,KM1+1),I=1,KM1)          WRVP0550
      RETURN                                                           WRVP0560
   20 FORMAT (1HO,11X,'VAR(I)     ',10F10.5)                          WRVP0570
   10 FORMAT (//1H ,30X,'THRUST   H-FORCE   Y-FORCE   TORQUE   ',     WRVP0580
     1        'IND. V.    CONING     JET THRUST'/16X,                 WRVP0590
     2        'MAIN ROTOR',4F10.0,2F10.3,5X,'RIGHT/CENTER',F10.0/16X, WRVP0600
     3        'TAIL ROTOR',4F10.0,2F10.3,5X,'LEFT        ',F10.0)     WRVP0610
   30 FORMAT (1HO,53X,'PARTIAL DERIVATIVE MATRIX'/1HO,11X,30A4/)       WRVP0620
   60 FORMAT (1H ,3A4,10F12.0)                                         WRVP0630
      END                                                              WRVP0640
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      SUBROUTINE YFIX (YIN,YAERO)                                       YFIX0010
      DIMENSION HEAD(9),YIN(21,5),YAERO(31,5)                           YFIX0020
      DATA HEAD / 'M.R.T.R.WING ELE FINNORMAL  REVERSED' /              YFIX0030
      DATA DTRR,PI23,DTRRSQ /57.29578,2.0943951,3282.806/               YFIX0040
      DO 15 I=1,18                                                      YFIX0050
      DD=1.                                                             YFIX0060
      IF(I.EQ.13.OR.I.EQ.17) DD=DTRR                                    YFIX0070
      IF(I.EQ.14) DD=DTRRSQ                                             YFIX0080
      DO 18 J=1,5                                                       YFIX0090
      YAERO(I,J)=YIN(I,J)*DD                                            YFIX0100
   18 CONTINUE                                                          YFIX0110
   15 CONTINUE                                                          YFIX0120
      DO 20 J=1,5                                                       YFIX0130
      IF(YAERO(17,J).EQ.0.) GO TO 20                                    YFIX0140
      YAERO(18,J) = YAERO(18,J)*PI23                                    YFIX0150
      ALB1MR=YAERO(17,J)*YIN(18,J)/(2.+YIN(18,J))                       YFIX0160
      IW1=-1                                                            YFIX0170
      IW2=2                                                             YFIX0180
      DO 25 IW=22,23                                                    YFIX0190
      IW1=IW1+4                                                         YFIX0200
      IW2=IW2+2                                                         YFIX0210
      YAERO(IW,J)=YAERO(IW1,J)/ALB1MR+.08727                            YFIX0220
      IF(YAERO(IW,J).LE..69813)  GO TO 25                               YFIX0230
      YAERO(IW1,J)=.61087*ALB1MR                                        YFIX0240
      YAERO(IW,J) = .69813                                              YFIX0250
      WRITE (6,26) HEAD(J),(HEAD(IW2+K),K=2,3),YAERO(IW1,J)             YFIX0260
   25 CONTINUE                                                          YFIX0270
   27 CONTINUE                                                          YFIX0280
      YAERO(20,J)=SIN(YAERO(22,J))                                      YFIX0290
      YAERO(24,J)=SIN(2.*YAERO(22,J))                                   YFIX0300
      YAERO(26,J)=COS(YAERO(22,J))                                      YFIX0310
      YAERO(21,J)=SIN(YAERO(23,J))                                      YFIX0320
      YAERO(25,J)=SIN(2.*YAERO(23,J))                                   YFIX0330
      YAERO(27,J)=COS(YAERO(23,J))                                      YFIX0340
      IF(YAERO(1,J).LT.1.) GO TO 12                                     YFIX0350
      YAERO(1,J)=.99                                                    YFIX0360
      WRITE(6,101) HEAD(J),YAERO(1,J)                                   YFIX0370
   12 SM = SQRT(1.+(1.-YAERO(1,J)**2)*16./YAERO(17,J)**2)               YFIX0380
      IF(YAERO(2,J).GT.SM) GO TO 29                                     YFIX0390
      YAERO(2,J)=SM                                                     YFIX0400
      WRITE (6,102) HEAD(J),YAERO(2,J)                                  YFIX0410
   29 YY1 = YAERO(17,J)/SQRT(1.-YAERO(1,J)**2)                          YFIX0420
      YY2 = 4./SQRT(YAERO(2,J)**2-1.)                                   YFIX0430
      YY3 = -YY2*YAERO(2,J)/ (YAERO(2,J)**2-1.)                         YFIX0440
      DEN = 1./(YAERO(2,J)-YAERO(1,J))**2                               YFIX0450
      YAERO(31,J) =( YY1-YY2-YY3*(YAERO(1,J)-YAERO(2,J)))*DEN           YFIX0460
      YAERO(30,J) = YY3 - 2.*YAERO(31,J)*YAERO(2,J)                     YFIX0470
      YAERO(29,J) = YY1-YAERO(30,J)*YAERO(1,J)-YAERO(31,J)*YAERO(1,J)**2YFIX0480
   20 CONTINUE                                                          YFIX0490
      RETURN                                                            YFIX0500
   26 FORMAT (1HO,10X,A4,' CLZ FOR ',2A4,' FLOW HAS BEEN RESET TO       YFIX0510
     1        F6.3,' ALB = 40 DEGREES.')                                YFIX0520
  101 FORMAT (1HO,10X,A4,' DRAG DIVERGENCE MACH NUMBER HAS BEEN RESET TOYFIX0530
     1 ',F6.3)                                                          YFIX0540
```

```
122 FORMAT (1H0,10X,A4,' MACH NUMBER FOR LOWER BOUND OF SUPERSONIC REGYFIX0550
   1ION HAS BEEN RESET TO ',F6.3)                                    YFIX0560
    END                                                              YFIX0570
```

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13. ABSTRACT

This report describes a mathematical model of rotorcraft that may be used to determine characteristics of performance, stability, response, and rotor blade loads. The complexity of the equations used requires the use of a digital computer for efficient solution. This four volume report describes the computer program in detail and illustrates the method of computing rotorcraft characteristics by specific example.

This volume contains the Appendices. Volume III describes the contents and use of these appendices in detail. The first and second volumes contain a discussion of the mathematical model and detailed instructions for the users of the program.

These appendices, which originate from card images for easy updating, are necessary tools for any programmer working on this program.

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14. KEY WORDS	LINK A		LINK B		LINK C	
	ROLE	WT	ROLE	WT	ROLE	WT
Helicopter Stability and Control Stoppable Rotor Aircraft Stability and Control V/STOL Aircraft Rotorcraft Simulation						