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SEATIDE ANALYSIS PROCESS. VOLUME III E. CRUISE MISSILE - CONCEP--ETC(U)
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UNCLASSIFIED VSD-00.1636-VOL-3E-REV-A NL

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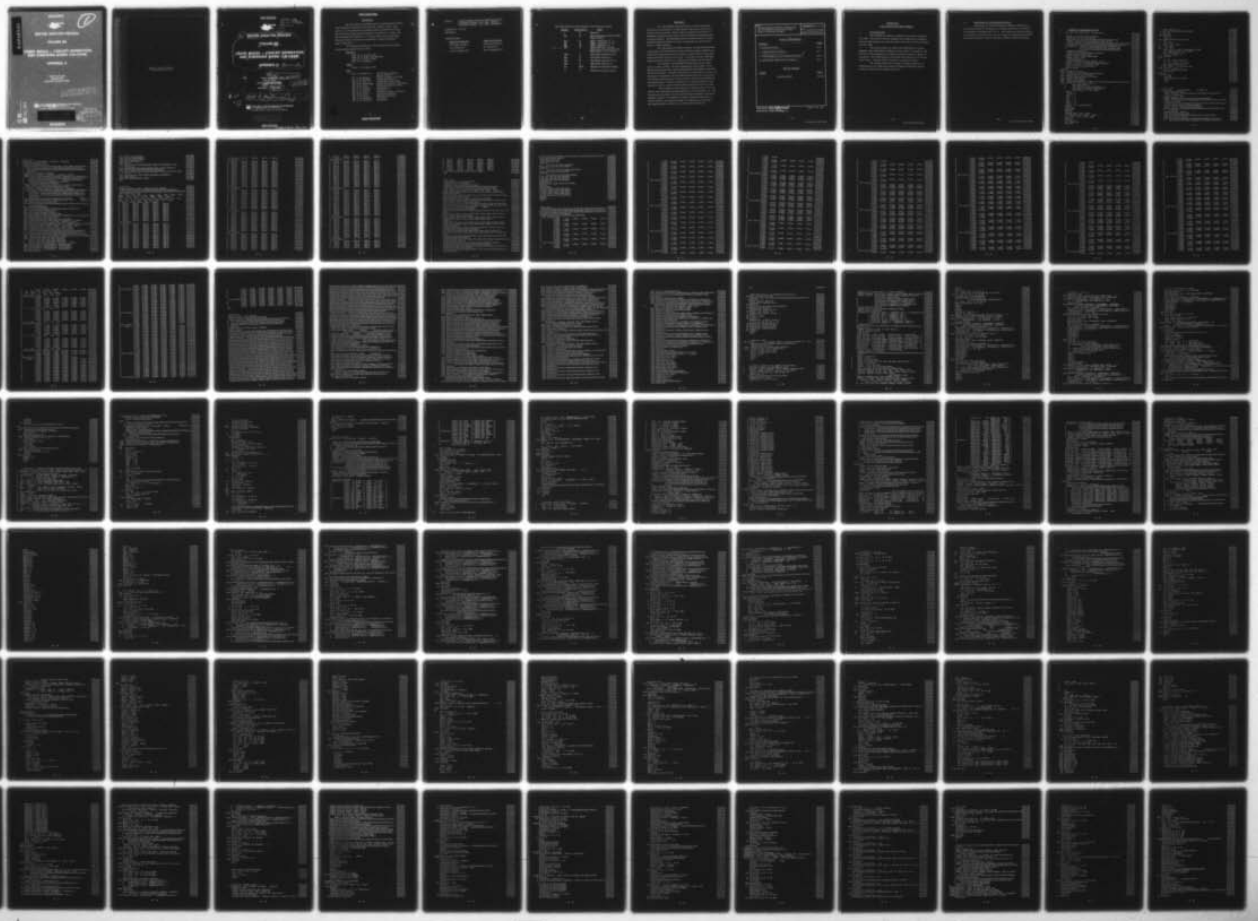

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SEATIDE

SEATIDE ANALYSIS PROCESS

VOLUME IIIE

CRUISE MISSILE – CONCEPT GENERATION AND SCREENING MODEL (CM-CGSM)

APPENDIX H

REPORT NO. 00.1636
JANUARY 1974
(CONTRACT DAAB09-72-C-0062)

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VOLUME IIIE.

CRUISE MISSILE – CONCEPT GENERATION AND SCREENING MODEL (CM-CGSM).

APPENDIX H. Revision A,

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(14) VSD-REPORT NO. 00.1636-VOL-3E-REV-A
JANUARY 1974
(CONTRACT DAAB09-72-C-0062)
(15) (11) REVISION A – 20 FEB 1975
(12) 325 p.

(10) R. K. McDonough

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FOREWORD

(U) This report was prepared by the Vought Systems Division, LTV Aerospace Corporation, P.O. Box 6267, Dallas, Texas 75222 under U. S. Army Electronics Command Contract DAAB09-72-C-0062. The work was initiated under the direction of Captain R. A. Dowd, USN and completed under Captain W. A. Greene, USN, Chief, Long Range Forecast Division, Directorate of Estimates, Defense Intelligence Agency (DIA-DE-1).

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TITLE: CRUISE MISSILE CONCEPT GENERATION AND SCREENING MODEL (CM-CGSM) - SOURCE PROGRAM LISTING - VOL. IIIE, APPENDIX H

REPORT NO. 00.1636

REVISION A

INSTRUCTIONS:

Pages to be removed:	Pages to be inserted:
Title page through iv	Title page through iv
H-1 through H-3	H-1 through H-3
H-473 through H-479	HA-1 through HA-317

(U) This report has been prepared in the following volumes:

Volume	Classification	Title
I	S	Summary
IIA	U	Naval Engagement Model (NEM) - Users Manual
IIB	U	NEM - Appendices A - I
IIC	S	NEM - Appendices J - M
IID	U	NEM - Appendix N
IIIA	U	Cruise Missile - Concept Generation and Screening Model (CM-CGSM) - Users Manual
IIIB	U	CM-CGSM Appendices A-B
IIIC	S	CM-CGSM Appendix C
IIID	U	CM-CGSM Appendices D-G
IIIE	U	CM-CGSM Appendix H
IV	~~S~~ U	Relative Worth Model (RWM)
V	U	Relative Cost Model (RCM)

AD 48343

ABSTRACT

(U) The SEATIDE Analysis Process is a semi-automated procedure for the generation of time-phased, high value cruise missile weapon systems concepts, together with the supporting technology and intelligence indicators which would reflect that these technological goals are being achieved. The SEATIDE process can also be used to evaluate the effectiveness of fixed force levels, existing forces in SAL environments, or Naval defenses.

(U) The Defense Intelligence Agency, through its Directorate of Estimates, and The Advanced Research Projects Agency (ARPA) have sponsored the development of this computer based analysis at the weapon system and Naval force structure level. A previous process, RIPTIDE, was developed for DIA for use in analysis of strategic missile systems.

(U) Generic to the SEATIDE Analysis Process are three major computer models: The Naval Engagement Model (NEM), Cruise Missile Concept Generation and Screening Model (CM-CGSM) and Relative Worth Model (RWM). The NEM evaluates force effectiveness, tactics, and task force configurations; the CM-CGSM enables definition and selection of candidate, advanced cruise missile system concepts; and the RWM permits assessment of worth in accordance with a variety of objective and subjective criteria. Each of these models has been checked out by DIA.

(U) In addition to exercising the computer models, there are several other analytical and engineering tasks to be performed, e.g., the identification of areas of current interest and the associated criteria and potential concepts, the creation of a foreign technology data bank in a format needed by the computer models, the engineering of concepts to the required detail, and the use of a verification analysis loop.

TITLE	Appendix H
CRUISE MISSILE CONCEPT GENERATION AND SCREENING MODEL (CM-CGSM) - SOURCE PROGRAM LISTING	NO.
	DATE 20 February 1975

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PREPARED BY R.K. McDonough

APPROVED BY L.D. Gregory

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APPENDIX H

CGSM SOURCE PROGRAM LISTING

1. INTRODUCTION

This appendix presents the complete source program listing of the CGSM. Data and Job Control Language cards required for compilation and use of this program have been discussed in the body of the Users Manual (see Vol. IIIE).

The source program is coded in the FORTRAN IV Computer language. Each subprogram is labeled in card columns 73 through 76, and each card in the subprogram is assigned a sequence number in columns 77 through 80. The CGSM includes 193 modules, and consists of over 28,000 source cards. An index of those modules is contained in Table 1.

The original CGSM source listing is included as Section 2.0. Modifications to the CGSM made during the Enhanced SEATIDE contract period are reflected in the listing of Section 4.

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3.0 DISCUSSION OF CGSM MODIFICATIONS

Modifications to the CGSM during the Enhanced SEATIDE contract period include I/O refinements, screening refinements, and addition of the Relative Cost Model (see Vol. V). All modules are marked in Table 1 by an asterisk. Modules which were not changed during Enhanced SEATIDE are listed in Section 2.0 and are tabulated in Table 1 without an asterisk.

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4. MODIFIED CGSM SOURCE LISTING

```
C      CM-CGSM MAIN SUBROUTINE   29 JAN 1975                                  CM-C0010
C                                                                             CM-C0020
       DEFINE  FILE 11( 160,175,U,JD11)                                       CM-C0030
       DEFINE FILE 12(500,300,U,JD12)                                         CM-C0040
       COMMON/DEVICE/ N1,N2,N3,N4,N5,N6,N7,N8,N9,N10,N11,N12                  CM-C0050
        INTEGER  ZIP,ZCODE,Z1,Z2,Z3,Z4,Z5,Z6,Z7,Z8,Z9                         CM-C0060
        COMMON/INOUT/NLINE,NPAGE,PCODE(20),MISC(7),XMISC(7),ZIP,ZCODE(19)CM-C0070
      1, JRASH(20),TRASH(20),IR(8),IC(8),DUM(8),IDUM(8),NFLAG,NFLAG2          CM-C0080
        EQUIVALENCE  (ZCODE(1),Z1),(ZCODE(2),Z2),(ZCODE(3),Z3)                CM-C0090
      1             ,(ZCODE(4),Z4),(ZCODE(5),Z5),(ZCODE(6),Z6)              CM-C0100
      2             ,(ZCODE(7),Z7),(ZCODE(8),Z8),(ZCODE(9),Z9)              CM-C0110
        COMMON/SECID/CLAS(20)                                                 CM-C0120
        COMMON/INOU1/IPR(16),JPAR(16),PAR(16)                                 CM-C0130
        COMMON/FASTAB/KZARL,KZARS                                             CM-C0140
       COMMON/FILING/ KONPL,KSAVPL,KEND                                       CM-C0150
       COMMON /INOUU/ LABEL                                                   CM-C0160
        COMMON/INOU4/JD4                                                      CM-C0170
C       COMMON/INOU9/JD9,ND9,NB9,INDX9(  10,6)                                CM-C0180
       COMMON /INOU11/ JD11,ND11,NB11,INDX11(100,7)                           CM-C0190
       COMMON / INOU12 / JD12,ND12, NB12                                      CM-C0200
       COMMON /NFILES/ N55, NFILZ(5)                                          CM-C0210
       DATA BLANK/4H    /                                                     CM-C0220
CFORMATS                                                                      CM-C0230
 1000  FORMAT(1X,19A4,A3)                                                     CM-C0240
 2000  FORMAT(1H1,71X, 4HPAGE,I4/6X,19A4,A3)                                  CM-C0250
 1002  FORMAT(A4,3I2,I10,4I5,10A4)                                            CM-C0260
 2002  FORMAT(/6X,A4,3I2,I10,4I5,10A4)                                        CM-C0270
 1003  FORMAT (10X,7G10.3)                                                    CM-C0280
 2003  FORMAT (10X,7G13.6)                                                    CM-C0290
 2005  FORMAT(1H0,20HERROR IN MAIN AT E1=,F8.2,3X,A4,3I2,I10,4I5,10A4)        CM-C0300
 2006  FORMAT(////////////44X, 4HNUK //                                        CM-C0310
     1        44X, 7HCM-CGSM//                                                CM-C0320
     2        35X,'VOUGHT SYSTEMS DIVISION',  //                              CM-C0330
     3        34X,25HLTV AEROSPACE CORPORATION          //                    CM-C0340
     4        37X,19HDALLAS, TEXAS 75222 )                                    CM-C0350
       NFLAG = 0                                                              CM-C0360
       NFLAG2= 0                                                              CM-C0370
       ND11  = 1                                                              CM-C0380
       NB11  = 0                                                              CM-C0390
       ND9   = 1                                                              CM-C0400
       NB9   = 0                                                              CM-C0410
       LAA1 =  31                                                             CM-C0420
       MAA1 =  12                                                             CM-C0430
       KZARL=  96 + LAA1*(5+MAA1)                                             CM-C0440
      KONPL=0                                                                 CM-C0450
      KSAVPL=500                                                              CM-C0460
      KEND=500                                                                CM-C0470
      IMAGE=1                                                                 CM-C0480
      READ(N5,1000) CLAS, PCODE                                               CM-C0490
      IF (PCODE(1) .EQ. BLANK)  IMAGE = 0                                     CM-C0500
      IF ( IMAGE .EQ. 0) GO TO 380                                            CM-C0510
      NPAGE=1                                                                 CM-C0520
      CALL PAGE                                                               CM-C0530
      WRITE(N6,2006)                                                          CM-C0540
      CALL PAGE                                                               CM-C0550
```

```
C       CARD IMAGE PRINT                                                CM-C0560
   38   CALL CARD(N5,N6,N9,CLAS,PCODE)                                  CM-C0570
        N5 = N9                                                         CM-C0580
  380   CONTINUE                                                        CM-C0590
        N55 = N5                                                        CM-C0600
 1       NPAGE = 1                                                      CM-C0610
  101    READ (N5,1000)CLAS, PCODE                                      CM-C0620
        NIT = 0                                                         CM-C0630
 2       CALL PAGE                                                      CM-C0640
        WRITE ( N6, 2006 )                                              CM-C0650
 900    CALL PAGE                                                      CM-C0660
 902    E1 = 902.                                                      CM-C0670
        READ (N5,1002, END= 10,ERR=9021) ZCODE                          CM-C0680
         IF (IPR(1).EQ.0)  GO TO 9022                                   CM-C0690
        WRITE (N6,2002) ZCODE                                           CM-C0700
         NLINE = NLINE + 2                                              CM-C0710
 9022   CONTINUE                                                        CM-C0720
C**                                                                     CM-C0730
        IF ( Z2  .EQ.1 ) GO TO 1                                        CM-C0740
        IF ( Z2  .EQ.2 ) GO TO 2                                        CM-C0750
        IF ( Z2  .EQ.10) GO TO 10                                       CM-C0760
        CALL CMGSM ( NIT, KRET )                                        CM-C0770
   14   IF ( KRET - 1 ) 900, 900, 902                                   CM-C0780
 9021   NFLAG = NFLAG + 1                                              CM-C0790
        WRITE (N6,2005) E1,ZCODE                                        CM-C0800
         GO TO 902                                                      CM-C0810
C**STOP                                                                 CM-C0820
    10  CONTINUE                                                        CM-C0830
        CALL PAGE                                                       CM-C0840
         WRITE(N6,2003) ND9,NR9                                         CM-C0850
         STOP                                                           CM-C0860
         END                                                            CM-C0870
```

```
        BLOCK DATA                                                      DATA0010
C   NU6.CM-CGSM      R.K.MCDONOUGH        28 MARCH 73                   DATA0020
         COMMON/DEVICE/ND(12)                                           DATA0030
        COMMON /SCRNNL/ NPTS(20),PARVNL(7,20),DWNL(7,20),DUMMY(50)      DATA0040
       1  ,NSCOST,IDU4M4(4)                                             DATA0050
        COMMON /INOUU/ LABEL                                            DATA0060
        COMMON /CONSTA/ RE,TWOPI,GM,PI,RAD,FPNM,RENM,WE                 DATA0070
        COMMON /SCREEN/NLEVEL,LWF1,LWF2,LDES,NDES,LPERF,NPERF,LSAV,NSAV DATA0080
        INTEGER ZIP,ZCODE                                               DATA0090
        COMMON/INOUT/NLINE,NPAGE,P(20),MISC(7),XMISC(7),ZIP,ZCODE(19) , DATA0100
       1 JR(20),TR(20),IRC(16),DUM(8),IDUM(10)                          DATA0110
        COMMON /INOU1/ IPR(16),JPAR(16),PAR(16)                         DATA0120
        COMMON /SWORTH/ KBASE,W2(2),NPAR,KPAR(20),PARV(20),DERV1(20),   DATA0130
       1      DERV2(20)                                                 DATA0140
        COMMON /NFILES/ NUKY(6)                                         DATA0150
        DATA NSCOST,IDU4M4/1,4*0/                                       DATA0160
        DATA NPTS,PARVNL,DWNL,DUMMY/20*0,140*0.,140*0.,50*0./           DATA0170
        DATA NUKY/5,6,7,11,12,1/                                        DATA0180
        DATA RE,FPNM,RAD,RENM,WE,PI,TWOPI,GM/20925688.,6076.1155,       DATA0190
       1      57.2957795,3443.9253,.004178075,3.14159265,6.2831853,     DATA0200
```

```
2      1.40765E16/                                                      DATA0210
 DATA KBASE,W2/0,2*100./                                                DATA0220
 DATA NLEVEL,LWF1 ,LWF2 ,LDES,NDFS,LPERF,NPERF,LSAV, NSAV/10,100,0,     DATA0230
1      1,10,1,10,10,100/                                               DATA0240
 DATA PARV,DERV1,DERV2,KPAR,NPAR/60*0.,20*0,11/                         DATA0250
 DATA XMISC,MISC/ 7*0., 7*0/                                            DATA0260
  DATA  ND/1,2,3,4,5,6,7,8,9,10,11,12/                                  DATA0270
 DATA IPR/1,2,1,1,0,11*1/                                               DATA0280
  DATA JPAR/16*1/                                                       DATA0290
  DATA  PAR/16*1.0/                                                     DATA0300
  DATA LABEL/ 1/                                                        DATA0310
 END                                                                    DATA0320


 BLOCK DATA                                                             DATA0010
 COMMON /AERO/ X91(93),SLET, X10(10), BRAX, XXZZ                        DATA0020
 COMMON /AERPRO/ CDODES(10), CLADES(10)                                 DATA0030
 COMMON /AERZ/ AERZ9(9), ERBTX, ERB, NAERO(30)                          DATA0040
 COMMON/ALFBLK/ AMACH, A, ALT, GAMRAD, ACCN, ACCT, CDC, C, SREF,        DATA0050
1  ACWT, ALPHA, CENREQ, DEG, CLALFD                                    DATA0060
 COMMON /DRG/ XAZZ(2),FINF,XAZZ(7),ITX,AM5(5),IBTL,AZMZ3(3),            DATA0070
1   ITSECT,IWSECT,RXINT,RXINW,ARV9(9),DE,UMPT(2),NWX,Z4(4),            DATA0080
2   ART,ARW,TRT,TRW,ZSXC2(2)                                           DATA0090
 COMMON /FORNOW/ NRM,NALT,RMV(20),ALTV(10),FRBT,FACTOR                  DATA0100
 COMMON /LET/ SET3(3),SET,SET2(2),RL4,RL5,SFF2(2),IARX,                 DATA0110
1   ICNTRL,XZ2X(2)                                                     DATA0120
 COMMON /NAERC/ TNAZZL                                                  DATA0130
P    ,STE,STET,TRAT,SWF ,TRAW,DCASE,DEOD,ARL6 ,AL5X ,XMSX,             DATA0140
Q   STEW,        XSTA,FSOVCW,FSOVCT,WMISS,SMRL,SMRH,WWINX,IARWX,       DATA0150
R     IPLOT,NCGVAR                                                     DATA0160
S    ,THNGL,TNOZL,TLTHEO                                               DATA0170
 COMMON /ROLL/ RNW,RNQ,IARWQ,BWH,BTH                                    DATA0180
 COMMON /SEVEN/  ITN,APHI,CLR,IRADAR,IPAY,DANT,XLVOID,WFQ,WMISC,        DATA0190
1  RHOWH,RHOEQ,FQCLR,WHCLR,XLMISC,XLEQ,XLWH,                           DATA0200
2          IART,NW,IARW, PIVOT,INTYPE,XLPAYI,WPAYI,WWH,XLEHT,          DATA0210
3   XLEW,XLEVT,XLET,EXTRSV(25)                                         DATA0220
 COMMON /SUREX/ RMDES,WDG,GULT,IWTS,WWINGI,WTI,WOVAW,WOVAHT,            DATA0230
1      WOVAVT,WOVAT,WXW3(3), VTALOC, WXW5(5)                           DATA0240
2   ,SLEW,SLEVT,ISUREW,IPLANW,ISURFT,IPLANT                            DATA0250
 COMMON /UPINLT/ PRAMB(129), XCGD1                                      DATA0260
 COMMON/XINERT/ XPROP,DELTAN,RL3,XPAY,XMOTOR,WARRAY,XA,PANWW,           DATA0270
1PW,CRW,CTW,NPANEL,PANWHT,CRHT,CTHT,RNT,BZ,PANWVT,CRVT,CTVT,           DATA0280
2BVT,R1,IZRT,CRT,CTT,WINL,WBST,XBST,YBST,ZBST,XINL,YINL,ZINL,           DATA0290
3XW,YW,ZW,XVT,YVT,ZVT,XHT,YHT,ZHT,IZN,IBST,XT,YT,ZT,                   DATA0300
4 PARRAY, XIXINL,XIYINL,XIZINL,XIXBST,XIYBST,XIZBST,C1,                 DATA0310
7RL1,WM,WVT,WWING,WHT,PANWT,XTANK,BRAT,THETAC,XCYL,XBT,DAN7            DATA0320
8,XPROP1, XPROP2, XPROP3, XPROP4, WPROP1, WPROP2, WPROP3, WPROP4       DATA0330
 DIMENSION WARRAY(20), XA(20), PARRAY(20)                               DATA0340
 EQUIVALENCE   (  X91(18), CLAT ), ( Z4(3), BT  )                       DATA0350
       EQUIVALENCE ( X91(58), XDLT   )                                  DATA0360
 COMMON /TUB/       BCLR,CLRA,CLRF,DELVX,FCLR,GCLR,KMAIR,               DATA0370
1      PAKSUB,RATCLR, REHTUB,THEAD, THERST, TURTHK,                    DATA0380
2      KMTAIL, WINGCL, WTMAX, XLTMAX, DTUBMX, XLTBMX, ZPYLON           DATA0390
C      FOR PACKAGING SUBMODEL                                          DATA0400
```

```
 DATA BCLR,CLRA,CLRF,DELVX/1.,3*6./                                    DATA0410
 DATA FCLR,GCLR,KMAIR,PAKSUB/60.,12.,2 ,0./                            DATA0420
 DATA RATCLR,REHTUB,THEAD,THEBST/2.,2.,4.,40./                         DATA0430
 DATA TURTHK,KMTAIL,WINGCL,WTMAX/4.,2,90.,20000./                      DATA0440
 DATA XLTMAX,DTUBMX,XLTBMX,ZPYLON/500.,50.,500.,18./                   DATA0450
 DATA CDODES,CLADES/0.12,9*0.,0.12,9*0./                               DATA0460
 DATA XDIT/9.5/                                                        DATA0470
  DATA NAERO/ 2, 0, 0, 0, 1, 4, 0, 0, 0, 1, 1, 0, 0, 0, 1, 15*0/      DATA0480
 DATA XCGDI,CLAT,BT,SET/5.,.0515,24.,234./                             DATA0490
 DATA CDO,CLALFD/0.18, 0.17/                                           DATA0500
 DATA XIXINL, XIYINL, XIZINL, XIXBST, XIYBST, XIZBST,IBST/             DATA0510
1  1520., 56045., 56045., 8810., 605000., 605000.,0/                  DATA0520
 DATA XPROP1, XPROP2, XPROP3, XPROP4, WPROP1, WPROP2, WPROP3,          DATA0530
1 WPROP4/ 21.15, 4.0,22.0,22.0, 146., 46., 192., 192./                DATA0540
 DATA RL1, WM,WVT,WWING,WHT,       XTANK,     THETAC,C1,XBT/         DATA0550
1    37.5,1000., 0.0,0.0, 0.0,        21.15,    0.165, 15.,0.0/       DATA0560
 DATA XPROP, DELTAN,RL3,XPAY,XMOTOR,       BW,CRW,CTW/                 DATA0570
1      69.0, 0.0,149.,80.,44.,3*0.0/                                  DATA0580
 DATA NPANEL, PANWHT,CRHT,CTHT,RNT,BT,PANWVT,CRVT,CTVT,BVT/            DATA0590
1    0,25.,0.0,0.0,4.0,24.5,25.,0.0,0.0,0.0/                         DATA0600
 DATA R1,        CRT,CTT,WINL,WBST,XBST,YBST,ZBST/                     DATA0610
1   7.5,    15., 4.5, 95.,0.0,0.0, 0.0, 0.0/                         DATA0620
 DATA XINL,YINL,XW,YW,ZW,XVT,YVT,ZVT,XHT,YHT,ZHT,ZINL/                 DATA0630
1 100.,10.,0.0,0.0,0.0,0.0,0.0,0.0,0.0,0.0,0.0,0.0/                   DATA0640
 DATA XT,YT,ZT,PARRAY, WARRAY/0.0, 0.0, 0.0,20*0.0,20*0.0/             DATA0650
 DATA     APPI,CLR,IRADAR,IPAY,DANT/  20.,1.,1,1,11./                 DATA0660
 DATA XLVOID,WEQ,WMISC,RHOWH,RHOEQ/27.,92.,125.,.06,.03/               DATA0670
 DATA EQCLR,WHCLR,XLMISC,XLEQ,XLWH/1.,1.,2.,29.,22./                   DATA0680
 DATA PIVOT,INTYPE,XLPAYI,WPAYI,WWH,XLEHT,XLEW,XLEVT,XLET/1.,          DATA0690
1      2,80.,354.,137.,134.,0.,134.,134./                             DATA0700
 DATA IARW,IART,ICNTRL,ITN,NW,ART,SLET/0,4,1,2,0,2.57,38./             DATA0710
 DATA ITSECT,IWSECT/1,1/                                               DATA0720
 DATA IARX,NWX,BRAX,ITX/4,0,0.,2/                                      DATA0730
  DATA RTH, RXINT, STE, STET, TRT, TRAT, BWH, RXINW, SWE/              DATA0740
1 19.75, 0.50, 117., 0.0, 0.32, 0.04, 25.50, 0.50, 0.0/               DATA0750
  DATA TRW, TRAW, DCASE, DEOD, DE, THNGL, TNOZL,  ARL6, AL5X/         DATA0760
1 0.3, .05, 15.0, 14.50, 14.20, 141.0, 10.0, 113.0, 85.0/             DATA0770
  DATA XMSX, BRAT, FINE, TLTHEC, STEW, RL4, RL5, FACTOR/              DATA0780
1 2.40, 0.0, 2.50, 149.0, 0.0, 134.0,  50.0, 0.50/                    DATA0790
 DATA NRM,RMV/6,.4,.9,1.,1.5,2.,4.,14*0./                              DATA0800
 DATA NALT,ALTV/3,0.,40000.,100000.,7*0./                              DATA0810
 DATA RNQ,RNW,PANWT,PANWW/4.,2.,20.,40./                               DATA0820
 DATA XSTA,FRBT,FSOVCW,FSOVCT,WMISS/4*0.,1000./                        DATA0830
 DATA WWINX,IARWX,BZ/0.,0,24./                                         DATA0840
 DATA SMRL,SMRH/0.,0./                                                 DATA0850
 DATA IPLOT,NCGVAR/2*0/                                                DATA0860
 DATA RMDES,WDG,GULT,IWTS,WTI,WWINGI/2.,1000.,10.,3,25.,50./           DATA0870
 DATA WOVAW,WOVAHT,WOVAVT,WOVAT,VTALOC/4*6.,.5/                        DATA0880
 DATA SLEW,SLEVT/50.,45./                                              DATA0890
 DATA ISURFW,IPLANW,ISURFT,IPLANT/4*1/                                 DATA0900
 DATA IRADAR,CLR,DANT,XLVOID/0,0.,1.,1./                               DATA0910
 END                                                                   DATA0920
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      BLOCK DATA                                                        DATA0010
C     NUK.CM-CGSM  R.K.MCDONOUGH  FIV/EBCD   10/18/73                   DATA0020
C       PRESTORE NAMELIST DATA                                          DATA0030
C       FILL VEHPER COMMON BLOCKS                                       DATA0040
        COMMON /NEWVPM/ DALPH,DALT,DCEN,DELMAX, DHCL,DMACH,DMIN,DSTART, DATA0050
       C    DVCL,FREE,ERRFAC,IPROP1, JPRINT,MXSTEP,NTRYS,RANGEI,RTOL,   DATA0060
       D    TIMEI,GKG,GKV,GKVCRU,GTOPT,SLOPE(20),TPHASE(20),TTOTAL(20),  DATA0070
       E    PMOPE(20)                                                   DATA0080
        DIMENSION ZPERF(670), ZTOVP(72)                                 DATA0090
        EQUIVALENCE (ZPERF(1), KBYPSM), ( ZTOVP(1), BOOWP )             DATA0100
        COMMON /PERF/ KBYPSM,KBYDRG,VELI,XMACHI,GAMMAI,ALTI,MOPT,NLPHAZ, DATA0110
       1      NCPHAZ,NDPHAZ,XMACHF(20),ALTF(20),GAMMAF(20),FVALUE(20),  DATA0120
       2      XPITCH(10,20),YPITCH(10,20),     ITERM(20),NAERO(20),     DATA0130
       3      IPTYPE(20),MODES(20),MHGEN(20),ICONT(20)                  DATA0140
       4  ,   ALPMAX(20),ANZMAX(20),FUSY(20)                            DATA0150
        COMMON /TOVPER/ BOOWP,BISPV,BTHVAC,BEXIT,SUSWP,SEXIT,BCANTA,    DATA0160
       1  WTINT,DROPST,DROPEB,KIND,A5A3,A6A3,ACA3,D3,                   DATA0170
       2   TVACMX,  TVACMN,YISP(20), XTHRTL(20), EXTRA(15)              DATA0180
        COMMON /PYAIR/ SREF,SMACH1(20),SMACH2(20),SMACH3(20),SMACH4(20), DATA0190
       1      SMACH5(20), CLALF1(20),CLALF2(20),CLALF3(20),CLALF4(20),  DATA0200
       2      CLALF5(20), DMACH1(20),DMACH2(20),DMACH3(20),DMACH4(20),  DATA0210
       3      DMACH5(20), CD01(20,5),CD02(20,5),CD03(20,5),CD04(20,5),  DATA0220
       4      CD05(20,5)                                                DATA0230
        DATA BOOWP,BISPV,BTHVAC,BEXIT,SUSWP,SEXIT,BCANTA,       DROPST,  DATA0240
       1 DROPEB/348.4,276.06,37940.,1.4092,550., 0.0  ,0.,       98.6,0./ DATA0250
        DATA A5A3,A6A3,ACA3/.55,.93,.272/                               DATA0260
        DATA TVACMX,TVACMN,YISP,XTHRTL/50000.,5000.,0.,276.06,325.,17*0., DATA0270
       1      0.,.73,1.,17*0./                                          DATA0280
        DATA  KBYPSM,KBYDRG/2*0/                                        DATA0290
        DATA VELI,XMACHI,GAMMAI,ALTI,MOPT/861.9,.8,0.,10000.,1/         DATA0300
        DATA  NLPHAZ,NCPHAZ,NDPHAZ/7,4,2/                               DATA0310
        DATA XMACHF/2.4,4*4.,2*2.5,13*0./                               DATA0320
        DATA ALTF/10000.,3*80000.,3*50C.,13*0./                         DATA0330
        DATA GAMMAF/20*0./, NAERO/1,6*2,13*0/, ITERM/6,7,1,4,7,1,4,13*0/ DATA0340
        DATA FVALUE/3*0.,5.,3.,0.,1.,13*0./                             DATA0350
        DATA IPTYPE/1,6*4,13*0/, MODES/0,1,0,0,-1,15*0/                 DATA0360
        DATA ALPMAX/20.,2*5.,2C.,3*5.,13*0./, ANZMAX/10.,3.,18*10./     DATA0370
        DATA ICONT/1,12,14,13,12,14,13,13*0/, MHGEN/0,1,18*0/           DATA0380
        DATA XPITCH/0.,.01,3.5,5.,16*0., 20*0., 0.,1000000.,18*0., 140*0./DATA0390
        DATA YPITCH/2*0.,2*15.,16*0., 20*0.,  2*4.,18*0., 140*0./       DATA0400
        DATA  DMACH1/.5,.8,1.,1.1,1.2,1.5,2.,2.5,3.,11*0./              DATA0410
        DATA  SMACH1/.5,.8,1.,1.1,1.2,1.5,2.,2.5,3.,11*0./              DATA0420
        DATA  CD01/0.,.157,.245,.4,.495,.505,.48,.402,.356,.329,10*0.,  DATA0430
       1      40000.,.188,.27,.42,.54,.548,.502,.427,.378,.345,70*0./   DATA0440
        DATA  CLALF1/.141,.161,.174,.184,.187,.162,.134,.122,.115,11*0./ DATA0450
        DATA  SMACH2/1.5,2.,3.,4.,5.,15*0./, DMACH2/1.5,2.,3.,4.,5.,15*0./DATA0460
        DATA  CLALF2/.146,.116,.09,.08,.076,15*0./                      DATA0470
        DATA CD02/0.,.26,.228,.18,.152,.134,14*0.,                      DATA0480
       1      40000.,.284,.247,.197,.164,.145,14*0.,                    DATA0490
       2      80000.,.341,.297,.237,.198,.175,14*0.,   40*0./           DATA0500
        DATA SMACH3/20*0./, SMACH4/20*0./, SMACH5/20*0./                DATA0510
        DATA DMACH3/20*0./, DMACH4/20*0./, DMACH5/20*0./                DATA0520
        DATA CLALF3/20*0./, CLALF4/20*0./, CLALF5/20*0./                DATA0530
        DATA CD03/100*0./,  CD04/100*0./,  CD05/100*0./                 DATA0540
        DATA SPEF/1.6667/                                               DATA0550
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      DATA DMACH1,DMACH2/40*0./                                          DATA0560
      DATA SMACH1,SMACH2/40*0./                                          DATA0570
      DATA CLALF1,CLALF2/40*0./                                          DATA0580
      DATA CD01,CD02/200*0./                                             DATA0590
      DATA MOPT/1/                                                       DATA0600
      DATA DALPH,DALT,DCFN,DELMAX,DHCL,DMACH/.035,10000.,.1,60.,         DATA0610
     1     10000.,.4/                                                    DATA0620
      DATA DMIN,DSTART,DVCL,EREF,ERRFAC/.001,.1,100.,.0005,5./           DATA0630
      DATA IPROP1,JPRINT,MXSTEP,NTRYS/0,1,2000,10/                       DATA0640
      DATA RANGE1,RTOL,TIME1,GKG,GKV,GKVCRU,GTOPT/0.,10.,0.,1.,.001,     DATA0650
     1     .1,1./                                                        DATA0660
      DATA SLOPE,TPHASE,TTOTAL/20*0.,20*10000.,20*10000./                DATA0670
      DATA PMORE/20*0./                                                  DATA0680
      DATA ZPERF,ZTOVP/670*0.,72*0./                                     DATA0690
      END                                                                DATA0700


      BLOCK DATA                                                         DATA0010
      COMMON /SOLMIS/ CSTAR1, CSTAR2, ETSISP, DUM7(7)                    DATA0020
      COMMON/PINSOL/TAISP1(99),TAISP2(80),TAISP3(80),TAISP4(60),         DATA0030
     1TAISP5(60),TAISP6(60),TAISP7(80),TAISP8(80),TAISP9(60),TAISPA(60)  DATA0040
      DATA TAISP1/1.0, 2.0,                                              DATA0050
     1 20.,  30.,  40.,  50.,  75.,  100.,  150.,  200.,  300.,  400.,   DATA0060
     2500.,  750.,  1000.,  1250.,  1500.,  1750.,  2000.,               DATA0070
     3 4.,  6.,  8.,  10.,  12.,  14.,  16.,  18.,  20.,  25.,  30.,     DATA0080
     435.,  40.,  45.,  50.,  60.,  70.,  80.,  90.,  100.,              DATA0090
     5  254.6,  266.7, 274.6,  280.5,  286.0,                           DATA0100
     6   288.9,     292.0,     294.7,     297.0,     301.8,             DATA0110
     7   305.4,     308.4,     310.9,     313.0,     314.8,             DATA0120
     8   317.9,     320.5,     322.6,     324.4,     325.9,             DATA0130
     9   255.6,     267.7,     275.5,     281.4,     286.0,             DATA0140
     A   289.8,     292.9,     295.5,     297.9,     302.6,             DATA0150
     B   306.2,     309.2,     311.6,     313.8,     315.6,             DATA0160
     C   318.7,     321.2,     323.2,     325.0,     326.6,             DATA0170
     D   256.3,     268.4,     276.2,     282.0,     289.6,             DATA0180
     E   290.4,     293.5,     296.1,     298.4,     303.1,             DATA0190
     F   306.8,     309.7,     312.2,     314.3,     316.1,             DATA0200
     G   319.2,     321.6,     323.7,     325.5,     327.0/             DATA0210
      DATA TAISP2/                                                       DATA0220
     1   256.8,     268.9,     276.7,     282.5,     274.9,             DATA0230
     2   290.8,     293.9,     296.6,     298.9,     303.6,             DATA0240
     3   307.2,     310.1,     312.6,     314.7,     316.5,             DATA0250
     4   319.5,     322.0,     324.0,     325.8,     327.3,             DATA0260
     5   257.8,     269.8,     277.5,     283.4,     288.0,             DATA0270
     6   291.6,     294.7,     297.4,     299.7,     304.3,             DATA0280
     7   307.9,     310.8,     313.3,     315.3,     317.1,             DATA0290
     8   320.2,     322.6,     324.6,     326.4,     327.9,             DATA0300
     9   258.4,     270.4,     278.1,     283.9,     288.5,             DATA0310
     A   292.2,     295.2,     297.9,     300.2,     304.8,             DATA0320
     B   308.4,     311.3,     313.7,     315.8,     317.6,             DATA0330
     C   320.6,     323.0,     325.0,     326.7,     328.3,             DATA0340
     D   259.2,     271.3,     278.9,     284.6,     289.2,             DATA0350
     E   292.9,     296.0,     298.6,     300.9,     305.5,             DATA0360
     F   309.0,     311.9,     314.3,     316.4,     318.2,             DATA0370
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G   321.1,     323.5,     325.5,     327.3,     328.7/                    DATA0380
 DATA TAISP3/                                                             DATA0390
1    259.8,     271.8,     279.4,     285.2,     289.7,                    DATA0400
2    293.4,     296.4,     299.1,     301.3,     306.0,                    DATA0410
3    309.5,     312.3,     314.7,     316.8,     318.5,                    DATA0420
4    321.5,     323.9,     325.9,     327.6,     329.1,                    DATA0430
5    260.6,     272.5,     280.1,     285.8,     290.4,                    DATA0440
6    294.0,     297.1,     299.7,     301.9,     306.5,                    DATA0450
7    310.0,     312.9,     315.3,     317.3,     319.1,                    DATA0460
8    322.0,     324.4,     326.3,     328.0,     329.5,                    DATA0470
9    261.1,     273.0,     280.6,     286.3,     290.8,                    DATA0480
A    294.5,     297.5,     300.1,     302.4,     306.9,                    DATA0490
B    310.4,     313.3,     315.6,     317.6,     319.4,                    DATA0500
C    322.3,     324.7,     326.6,     328.3,     329.8,                    DATA0510
D    261.5,     273.4,     281.0,     286.5,     291.2,                    DATA0520
E    294.8,     297.8,     300.4,     302.7,     307.2,                    DATA0530
F    310.7,     313.5,     315.9,     317.9,     319.6,                    DATA0540
G    322.5,     324.9,     326.8,     328.5,     330.0/                    DATA0550
 DATA TAISP4/                                                             DATA0560
1    262.2,     274.0,     281.6,     287.2,     291.7,                    DATA0570
2    295.3,     298.4,     300.9,     303.2,     307.7,                    DATA0580
3    311.2,     314.0,     316.3,     318.3,     320.0,                    DATA0590
4    322.9,     325.3,     327.2,     328.9,     330.3,                    DATA0600
5    262.6,     274.4,     281.9,     287.5,     292.0,                    DATA0610
6    295.7,     298.7,     301.3,     303.5,     308.0,                    DATA0620
7    311.5,     314.3,     316.6,     318.6,     320.3,                    DATA0630
8    323.2,     325.5,     327.4,     329.1,     330.5,                    DATA0640
9    262.9,     274.7,     282.1,     287.8,     292.3,                    DATA0650
A    295.9,     299.0,     301.5,     303.7,     308.2,                    DATA0660
B    311.7,     314.5,     316.8,     318.8,     320.5,                    DATA0670
C    323.4,     325.7,     327.6,     329.3,     330.7/                    DATA0680
 DATA TAISP5/                                                             DATA0690
1    263.2,     275.0,     282.5,     288.0,     292.5,                    DATA0700
2    296.1,     299.1,     301.7,     303.9,     308.4,                    DATA0710
3    311.8,     314.6,     317.0,     318.9,     320.6,                    DATA0720
4    323.5,     325.8,     327.7,     329.4,     330.8,                    DATA0730
5    263.4,     275.2,     282.7,     288.2,     292.7,                    DATA0740
6    296.3,     299.3,     301.9,     304.1,     308.5,                    DATA0750
7    312.0,     314.8,     317.1,     319.1,     320.8,                    DATA0760
8    323.6,     325.9,     327.9,     329.5,     330.9,                    DATA0770
9    263.6,     275.3,     282.9,     288.4,     292.8,                    DATA0780
A    296.4,     299.4,     302.0,     304.2,     308.7,                    DATA0790
B    312.1,     314.9,     317.2,     319.2,     320.9,                    DATA0800
C    323.7,     326.0,     327.9,     329.6,     331.0/                    DATA0810
 DATA TAISP6/                                                             DATA0820
5    254.6,     266.7,     274.6,     280.5,     276.0,                    DATA0830
6    288.9,     292.0,     294.7,     297.0,     301.8,                    DATA0840
7    305.4,     308.4,     310.9,     313.0,     314.8,                    DATA0850
8    317.9,     320.5,     322.6,     324.4,     325.9,                    DATA0860
9    255.6,     267.7,     275.5,     281.4,     286.0,                    DATA0870
A    289.8,     292.9,     295.5,     297.9,     302.6,                    DATA0880
B    306.2,     309.2,     311.6,     313.8,     315.6,                    DATA0890
C    318.7,     321.2,     323.2,     325.0,     326.6,                    DATA0900
D    256.3,     268.4,     276.2,     282.0,     289.6,                    DATA0910
E    290.4,     293.5,     296.1,     298.4,     303.1,                    DATA0920
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F    306.8,     309.7,     312.2,     314.3,     316.1,                    DATA0930
G    319.2,     321.6,     323.7,     325.5,     327.0/                    DATA0940
 DATA TAISP7/                                                              DATA0950
1    256.8,     268.9,     276.7,     282.5,     274.9,                    DATA0960
2    290.8,     293.9,     296.6,     298.9,     303.6,                    DATA0970
3    307.2,     310.1,     312.6,     314.7,     316.5,                    DATA0980
4    319.5,     322.0,     324.0,     325.8,     327.3,                    DATA0990
5    257.8,     269.8,     277.5,     283.4,     288.0,                    DATA1000
6    291.6,     294.7,     297.4,     299.7,     304.3,                    DATA1010
7    307.9,     310.8,     313.3,     315.3,     317.1,                    DATA1020
8    320.2,     322.6,     324.6,     326.4,     327.9,                    DATA1030
9    258.4,     270.4,     278.1,     283.9,     288.5,                    DATA1040
A    292.2,     295.2,     297.9,     300.2,     304.8,                    DATA1050
B    308.4,     311.3,     313.7,     315.8,     317.6,                    DATA1060
C    320.6,     323.0,     325.0,     326.7,     328.3,                    DATA1070
D    259.2,     271.3,     278.9,     284.6,     289.2,                    DATA1080
E    292.9,     296.0,     298.6,     300.9,     305.5,                    DATA1090
F    309.0,     311.9,     314.3,     316.4,     318.2,                    DATA1100
G    321.1,     323.5,     325.5,     327.3,     328.7/                    DATA1110
 DATA TAISP8/                                                              DATA1120
1    259.8,     271.8,     279.4,     285.2,     289.7,                    DATA1130
2    293.4,     296.4,     299.1,     301.3,     306.0,                    DATA1140
3    309.5,     312.3,     314.7,     316.8,     318.5,                    DATA1150
4    321.5,     323.9,     325.9,     327.6,     329.1,                    DATA1160
5    260.6,     272.5,     280.1,     285.8,     290.4,                    DATA1170
6    294.0,     297.1,     299.7,     301.9,     306.5,                    DATA1180
7    310.0,     312.9,     315.3,     317.3,     319.1,                    DATA1190
8    322.0,     324.4,     326.3,     328.0,     329.5,                    DATA1200
9    261.1,     273.0,     280.6,     286.3,     290.8,                    DATA1210
A    294.5,     297.5,     300.1,     302.4,     306.9,                    DATA1220
B    310.4,     313.3,     315.6,     317.6,     319.4,                    DATA1230
C    322.3,     324.7,     326.6,     328.3,     329.8,                    DATA1240
D    261.5,     273.4,     281.0,     286.5,     291.2,                    DATA1250
E    294.8,     297.8,     300.4,     302.7,     307.2,                    DATA1260
F    310.7,     313.5,     315.9,     317.9,     319.6,                    DATA1270
G    322.5,     324.9,     326.8,     328.5,     330.0/                    DATA1280
 DATA TAISP9/                                                              DATA1290
1    262.2,     274.0,     281.6,     287.2,     291.7,                    DATA1300
2    295.3,     298.4,     300.9,     303.2,     307.7,                    DATA1310
3    311.2,     314.0,     316.3,     318.3,     320.0,                    DATA1320
4    322.9,     325.3,     327.2,     328.9,     330.3,                    DATA1330
5    262.6,     274.4,     281.9,     287.5,     292.0,                    DATA1340
6    295.7,     298.7,     301.3,     303.5,     308.0,                    DATA1350
7    311.5,     314.3,     316.6,     318.6,     320.3,                    DATA1360
8    323.2,     325.5,     327.4,     329.1,     330.5,                    DATA1370
9    262.9,     274.7,     282.1,     287.8,     292.3,                    DATA1380
A    295.9,     299.0,     301.5,     303.7,     308.2,                    DATA1390
B    311.7,     314.5,     316.8,     318.8,     320.5,                    DATA1400
C    323.4,     325.7,     327.6,     329.3,     330.7/                    DATA1410
 DATA TAISPA/                                                              DATA1420
1    263.2,     275.0,     282.5,     288.0,     292.5,                    DATA1430
2    296.1,     299.1,     301.7,     303.9,     308.4,                    DATA1440
3    311.8,     314.6,     317.0,     318.9,     320.6,                    DATA1450
4    323.5,     325.8,     327.7,     329.4,     330.8,                    DATA1460
5    263.4,     275.2,     282.7,     288.2,     292.7,                    DATA1470
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6    296.3,     299.3,     3C1.9,     304.1,     308.5,                    DATA1480
7    312.0,     314.8,     317.1,     319.1,     320.8,                    DATA1490
8    323.6,     325.9,     327.9,     329.5,     330.9,                    DATA1500
C    263.6,     275.3,     282.9,     288.4,     292.8,                    DATA1510
A    296.4,     299.4,     302.0,     304.2,     308.7,                    DATA1520
B    312.1,     314.9,     317.2,     319.2,     320.9,                    DATA1530
C    323.7,     326.0,     327.9,     329.6,     331.0/                    DATA1540
 DATA ETSISP,CSTAR1,CSTAR2/.95,37.,4946./                                  DATA1550
 END                                                                       DATA1560


 BLOCK DATA                                                                DATA0010
 COMMON/BLKTX/ F2,X2,Y2,NX2,NY2                                            DATA0020
 COMMON/BLKTJ/ F,X,Y,NX,NY                                                 DATA0030
 DIMENSION F(20,2C),X(20,20),NX(20)                                        DATA0040
 DIMENSION F2(15,15,5),X2(15,5),Y2(15,5),NX2(5),NY2(5)                     DATA0050
 DATA NX/11,C,9,2,18,12,15,14,16,9,0,8,17,14,17,5*0/                       DATA0060
 DATA X/0.,1.,2.,3.,4.,5.,6.,7.,8.,9.,10.,9*0.,   20*0.,                   DATA0070
A1940.,1952.,1956.,1960.,1964.,1968.,1975.,1980.,1982.,11*0.,              DATA0080
B-300.,300.,18*0.,                                                         DATA0090
C22.,32.,40.,6C.,70.,80.,90.,100.,120.,150.,160.,180.,200.,240.,           DATA0100
D320.,400.,48C.,6CC.,2*C.,                                                 DATA0110
E0.,.25,.50,1.,1.5,2.,2.5,3.,3.5,5.,7.,10.,8*0.,                           DATA0120
F1949.,1950.6,1952.4,1954.,1956.,1958.,1960.,1962.,1964.,1966.,            DATA0130
G1968.,1970.,1974.,1978.,1984.,5*0.,                                       DATA0140
H0.,2.0,2.1,2.2,2.3,2.35,2.4,2.45,2.5,2.6,2.7,2.8,2.9,3.0,6*0.,            DATA0150
I4.,5.,6.,7.,8.,9.,10.,11.,13.,15.,17.,20.,24.,28.,32.,35.,4*0.,           DATA0160
J.1,.2,.3,.4,.5,.6,.7,.8,2.,11*0.,     20*0.,                             DATA0170
K0.,1.,2.,3.,4.,5.,6.,10.,12*0.,                                           DATA0180
L3.5,5.,6.,7.,8.,8.5,9.,9.5,10.,10.5,11.,12.,13.,14.,15.,16.,22.,          DATA0190
L3*0.,                                                                     DATA0200
M1945.,1949.,1953.,1955.,1957.,1959.,1961.,1963.,1965.,1967.,              DATA0210
N1969.,1973.,1977.,1981.,6*0.,                                             DATA0220
O1940.,1944.,1948.,1952.,1956.,1960.,1964.,1967.,1970.,1971.,              DATA0230
P1972.,1973.,1974.,1975.,1976.,1978.,1980.,3*0.,                           DATA0240
Q100*0./                                                                   DATA0250
 DATA F/1.,.82,.67,.56,.48,.41,.36,.32,.29,.26,.24,9*0.,20*0.,             DATA0260
A1920.,2060.,2120.,2200.,2315.,2460.,2745.,2980.,3075.,11*0.,              DATA0270
B.91,1.09,18*0.,                                                           DATA0280
C1.02,.965,.94,.91,.902,.9,.905,.914,.945,1.,1.02,1.045,1.07,              DATA0290
D1.105,1.165,1.218,1.264,1.320,2*0.,                                       DATA0300
E1.,.85,.77,.66,.59,.538,.498,.472,.456,.428,.4,.38,8*0.,                  DATA0310
F3.,2.6,2.2,1.925,1.63,1.38,1.17,1.,.89,.8,.73,.67,.58,.52,.46,            DATA0320
F5*0.,                                                                     DATA0330
G1.,1.,1.001,1.003,1.0055,1.0075,1.01,1.013,1.0175,1.027,1.037,            DATA0340
H1.0485,1.0612,1.0745,6*C.,                                                DATA0350
I.79,.78,.772,.778,.787,.804,.827,.854,.922,.986,1.042,1.121,1.22,         DATA0360
J1.31,1.386,1.43,4*0.,                                                     DATA0370
K.525,.6,.668,.728,.78,.828,.872,.912,1.412,11*0.,20*0.,                   DATA0380
L2.44,2.56,2.71,2.87,3.C4,3.22,3.41,4.21,12*0.,                            DATA0390
M3.75,3.43,3.25,3.1,2.978,2.922,2.88,2.845,2.82,2.8,2.78,2.75,             DATA0400
N2.73,2.72,2.71,2.7,2.7,3*C.,                                              DATA0410
O1.2,1.15,1.1,1.078,1.058,1.042,1.03,1.02,1.010,1.004,.999,.99,            DATA0420
P.983,.98,6*C.,                                                            DATA0430
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C2.4,2.25,2.0E,1.85,1.69,1.49,1.27,1.11,.94,.89,.85,.82,.78,.76,    DATA0440
R.72,.7,.67,3*0.,100*0./                                            DATA0450
 DATA NX2/6,6,0,0,0/                                                DATA0460
 DATA NY2/6,4,0,0,0/                                                DATA0470
 DATA X2                                                            DATA0480
1      /5.,7.,9.,11.,14.,30.,9*0.,                                  DATA0490
A0.,2.,4.,6.,8.,10.,9*0.,45*0./                                     DATA0500
 DATA Y2                                                            DATA0510
1      /25.,50.,125.,200.,400.,600.,9*0.,                           DATA0520
A1.3,1.5,1.65,1.9,11*0.,45*0./                                      DATA0530
 DATA F2                                                            DATA0540
1      /.71,.72,.75,.795,.89,.89,9*0.,                              DATA0550
A.74,.77,.785,.83,.90,.90,9*0.,                                     DATA0560
B.78,.82,.84,.88,.92,.92,9*0.,                                      DATA0570
C.85,.88,.90,.92,.95,.95,9*0.,                                      DATA0580
D6*1.,9*0.,                                                         DATA0590
E2.065,1.785,1.64,1.47,1.4,1.4,9*0.,                                DATA0600
F135*0.,                                                            DATA0610
G4*1.,11*0.,                                                        DATA0620
H1.111,1.128,1.138,1.154,11*0.,                                     DATA0630
I1.221,1.255,1.275,1.302,11*0.,                                     DATA0640
J1.328,1.378,1.403,1.438,11*0.,                                     DATA0650
K1.429,1.500,1.533,1.561,11*0.,                                     DATA0660
L1.522,1.614,1.635,1.677,11*0.,                                     DATA0670
M135*0.,                                                            DATA0680
N675*0./                                                            DATA0690
 END                                                                DATA0700


 BLOCK DATA                                                         DATA0010
 COMMON/AA/CP37AL(45),CP314A(45),CP27AL(45),CP214A(45),XCPBEN(36),   DATA0020
6XCPBPP(36),XCPNC1(76),XCPNC2(57),XCP64(45),XCP65(45),XCP751(76),   DATA0030
7XCP752(57),CNA211(45),CNA212(45),CNA22(78),CNA231(60),CNA232(45),  DATA0040
8CNA24(77),VOLRA(78),EKFRB(34)                                      DATA0050
A,CNA721(76),CNA722(76),CNA731(76),CNA732(76)                       DATA0060
  DATA CP37AL/C.000,                                                DATA0070
1             4.000,   2.860,   5.000,   3.380,   8.000,   2.530,   DATA0080
2            10.000,   2.060,                                       DATA0090
3             5.000,                                                DATA0100
4             4.000,   3.550,   5.000,   4.100,   8.000,   3.650,   DATA0110
5            10.000,   3.460,                                       DATA0120
6            10.000,                                                DATA0130
7             4.000,   4.360,   5.000,   4.500,   8.000,   4.270,   DATA0140
8            10.000,   4.200,                                       DATA0150
9            20.000,                                                DATA0160
A             4.000,   4.980,   5.000,   4.950,   8.000,   4.900,   DATA0170
B            10.000,   4.860,                                       DATA0180
C            30.000,                                                DATA0190
D             4.000,   5.180,   5.000,   5.160,   8.000,   5.100,   DATA0200
E            10.000,   5.060/                                       DATA0210
  DATA CP314A/0.000,                                                DATA0220
1             4.000,   3.270,   5.000,   3.800,   8.000,   2.800,   DATA0230
2            10.000,   2.370,                                       DATA0240
3             5.000,                                                DATA0250
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4                4.000,    4.610,    5.000,    5.150,    8.000,    5.450,    DATA0260
5               10.000,    5.700,                                            DATA0270
6               10.000,                                                      DATA0280
7                4.000,    6.950,    5.000,    6.950,    8.000,    6.980,    DATA0290
8               10.000,    7.000,                                            DATA0300
9               20.000,                                                      DATA0310
A                4.000,    8.300,    5.000,    8.250,    8.000,    8.200,    DATA0320
B               10.000,    8.140,                                            DATA0330
C               30.000,                                                      DATA0340
D                4.000,    8.530,    5.000,    8.520,    8.000,    8.460,    DATA0350
F               10.000,    8.430/                                            DATA0360
   DATA CP27AL/0.000,                                                        DATA0370
1                4.000,    2.650,    5.000,    3.200,    8.000,    2.400,    DATA0380
2               10.000,    1.900,                                            DATA0390
3                5.000,                                                      DATA0400
4                4.000,    3.370,    5.000,    3.900,    8.000,    3.480,    DATA0410
5               10.000,    3.300,                                            DATA0420
6               10.000,                                                      DATA0430
7                4.000,    4.100,    5.000,    4.230,    8.000,    4.100,    DATA0440
8               10.000,    4.000,                                            DATA0450
9               20.000,                                                      DATA0460
A                4.000,    4.700,    5.000,    4.650,    8.000,    4.600,    DATA0470
B               10.000,    4.540,                                            DATA0480
C               30.000,                                                      DATA0490
D                4.000,    4.900,    5.000,    4.850,    8.000,    4.800,    DATA0500
F               10.000,    4.750/                                            DATA0510
   DATA CP214A/0.000,                                                        DATA0520
1                4.000,    2.960,    5.000,    3.470,    8.000,    2.500,    DATA0530
2               10.000,    2.060,                                            DATA0540
3                5.000,                                                      DATA0550
4                4.000,    4.300,    5.000,    4.830,    8.000,    5.170,    DATA0560
5               10.000,    5.400,                                            DATA0570
6               10.000,                                                      DATA0580
7                4.000,    6.630,    5.000,    6.640,    8.000,    6.670,    DATA0590
8               10.000,    6.700,                                            DATA0600
9               20.000,                                                      DATA0610
A                4.000,    8.000,    5.000,    7.970,    8.000,    7.880,    DATA0620
B               10.000,    7.840,                                            DATA0630
C               30.000,                                                      DATA0640
D                4.000,    8.220,    5.000,    8.200,    8.000,    8.170,    DATA0650
F               10.000,    8.130/                                            DATA0660
   DATA XCPBFN/1.000,                                                        DATA0670
1                0.200,    0.397,    0.600,    0.454,    0.800,    0.467,    DATA0680
2                1.000,    0.472,                                            DATA0690
3                2.000,                                                      DATA0700
4                0.200,    0.258,    0.600,    0.332,    0.800,    0.350,    DATA0710
5                1.000,    0.365,                                            DATA0720
6                3.000,                                                      DATA0730
7                0.200,    0.195,    0.600,    0.265,    0.800,    0.285,    DATA0740
8                1.000,    0.297,                                            DATA0750
9                5.000,                                                      DATA0760
A                0.200,    0.126,    0.600,    0.180,    0.800,    0.197,    DATA0770
B                1.000,    0.209/                                            DATA0780
   DATA XCPBPP/1.000,                                                        DATA0790
1                0.200,    0.453,    0.600,    0.478,    0.800,    0.480,    DATA0800
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2              1.000,   0.475,                                          DATA0810
3              2.000,                                                   DATA0820
4              0.200,   0.383,   0.600,   0.385,   0.800,   0.375,      DATA0830
5              1.000,   0.365,                                          DATA0840
6              3.000,                                                   DATA0850
7              0.200,   0.330,   0.600,   0.315,   0.800,   0.308,      DATA0860
8              1.000,   0.297,                                          DATA0870
9              5.000,                                                   DATA0880
A              0.200,   0.273,   0.600,   0.239,   0.800,   0.223,      DATA0890
B              1.000,   0.209/                                          DATA0900
  DATA XCPNC1/1.000,                                                    DATA0910
1              0.000,   0.830,   0.100,   0.805,   0.200,   0.780,      DATA0920
2              0.300,   0.753,   0.400,   0.727,   0.500,   0.698,      DATA0930
3              0.600,   0.670,   0.700,   0.640,   0.800,   0.613,      DATA0940
4              2.000,                                                   DATA0950
5              0.000,   0.668,   0.100,   0.642,   0.200,   0.615,      DATA0960
6              0.300,   0.589,   0.400,   0.560,   0.500,   0.525,      DATA0970
7              0.600,   0.485,   0.700,   0.435,   0.800,   0.365,      DATA0980
8              3.000,                                                   DATA0990
9              0.000,   0.667,   0.100,   0.639,   0.200,   0.611,      DATA1000
A              0.300,   0.580,   0.400,   0.548,   0.500,   0.510,      DATA1010
B              0.600,   0.466,   0.700,   0.410,   0.800,   0.338,      DATA1020
C              4.000,                                                   DATA1030
D              0.000,   0.666,   0.100,   0.637,   0.200,   0.610,      DATA1040
E              0.300,   0.576,   0.400,   0.543,   0.500,   0.503,      DATA1050
F              0.600,   0.456,   0.700,   0.398,   0.800,   0.321/      DATA1060
  DATA XCPNC2/5.000,                                                    DATA1070
1              0.000,   0.666,   0.100,   0.636,   0.200,   0.607,      DATA1080
2              0.300,   0.573,   0.400,   0.539,   0.500,   0.498,      DATA1090
3              0.600,   0.448,   0.700,   0.390,   0.800,   0.311,      DATA1100
4              6.000,                                                   DATA1110
5              0.000,   0.666,   0.100,   0.635,   0.200,   0.606,      DATA1120
6              0.300,   0.572,   0.400,   0.536,   0.500,   0.495,      DATA1130
7              0.600,   0.444,   0.700,   0.386,   0.800,   0.305,      DATA1140
8              7.000,                                                   DATA1150
9              0.000,   0.666,   0.100,   0.635,   0.200,   0.605,      DATA1160
A              0.300,   0.570,   0.400,   0.535,   0.500,   0.493,      DATA1170
B              0.600,   0.443,   0.700,   0.385,   0.800,   0.300/      DATA1180
  DATA XCP64/ 1.000,                                                    DATA1190
1              0.200,   0.294,   0.400,   0.335,   0.700,   0.366,      DATA1200
2              1.000,   0.380,                                          DATA1210
3              2.000,                                                   DATA1220
4              0.200,   0.178,   0.400,   0.232,   0.700,   0.270,      DATA1230
5              1.000,   0.288,                                          DATA1240
6              3.000,                                                   DATA1250
7              0.200,   0.125,   0.400,   0.178,   0.700,   0.215,      DATA1260
8              1.000,   0.233,                                          DATA1270
9              4.000,                                                   DATA1280
A              0.200,   0.095,   0.400,   0.144,   0.700,   0.179,      DATA1290
B              1.000,   0.197,                                          DATA1300
C              5.000,                                                   DATA1310
D              0.200,   0.080,   0.400,   0.121,   0.700,   0.150,      DATA1320
E              1.000,   0.167/                                          DATA1330
  DATA XCP65/ 1.000,                                                    DATA1340
1              0.300,   0.333,   0.500,   0.373,   0.700,   0.381,      DATA1350
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2              1.000,   0.380,                                          DATA1360
3              2.000,                                                   DATA1370
4              0.300,   0.277,   0.500,   0.295,   0.700,   0.297,      DATA1380
5              1.000,   0.285,                                          DATA1390
6              3.000,                                                   DATA1400
7              0.300,   0.235,   0.500,   0.246,   0.700,   0.243,      DATA1410
8              1.000,   0.232,                                          DATA1420
9              4.000,                                                   DATA1430
A              0.300,   0.204,   0.500,   0.213,   0.700,   0.208,      DATA1440
B              1.000,   0.197,                                          DATA1450
C              5.000,                                                   DATA1460
D              0.300,   0.177,   0.500,   0.186,   0.700,   0.181,      DATA1470
E              1.000,   0.167/                                          DATA1480
   DATA XCP751/1.000,                                                    DATA1490
1              0.000,   0.496,   0.100,   0.487,   0.200,   0.475,      DATA1500
2              0.300,   0.463,   0.400,   0.451,   0.500,   0.438,      DATA1510
3              0.600,   0.422,   0.700,   0.405,   0.800,   0.381,      DATA1520
4              2.000,                                                   DATA1530
5              0.000,   0.470,   0.100,   0.457,   0.200,   0.441,      DATA1540
6              0.300,   0.426,   0.400,   0.409,   0.500,   0.390,      DATA1550
7              0.600,   0.368,   0.700,   0.318,   0.800,   0.297,      DATA1560
8              3.000,                                                   DATA1570
9              0.000,   0.469,   0.100,   0.453,   0.200,   0.436,      DATA1580
A              0.300,   0.419,   0.400,   0.400,   0.500,   0.379,      DATA1590
B              0.600,   0.353,   0.700,   0.317,   0.800,   0.273,      DATA1600
C              4.000,                                                   DATA1610
D              0.000,   0.468,   0.100,   0.451,   0.200,   0.433,      DATA1620
E              0.300,   0.415,   0.400,   0.394,   0.500,   0.371,      DATA1630
F              0.600,   0.344,   0.700,   0.305,   0.800,   0.260/      DATA1640
   DATA XCP752/5.000,                                                    DATA1650
1              0.000,   0.467,   0.100,   0.450,   0.200,   0.430,      DATA1660
2              0.300,   0.410,   0.400,   0.389,   0.500,   0.364,      DATA1670
3              0.600,   0.336,   0.700,   0.298,   0.800,   0.250,      DATA1680
4              6.000,                                                   DATA1690
5              0.000,   0.467,   0.100,   0.449,   0.200,   0.428,      DATA1700
6              0.300,   0.408,   0.400,   0.385,   0.500,   0.360,      DATA1710
7              0.600,   0.330,   0.700,   0.291,   0.800,   0.243,      DATA1720
8              7.000,                                                   DATA1730
9              0.000,   0.467,   0.100,   0.447,   0.200,   0.427,      DATA1740
A              0.300,   0.405,   0.400,   0.382,   0.500,   0.356,      DATA1750
B              0.600,   0.325,   0.700,   0.285,   0.800,   0.236/      DATA1760
   DATA CNA211/0.000,                                                    DATA1770
1              0.200,   2.430,   0.300,   2.410,   0.400,   2.380,      DATA1780
2              0.500,   2.360,   0.600,   2.340,   0.800,   2.290,      DATA1790
3              1.000,   2.220,                                          DATA1800
4              0.500,                                                   DATA1810
5              0.200,   2.780,   0.300,   2.810,   0.400,   2.820,      DATA1820
6              0.500,   2.825,   0.600,   2.830,   0.800,   2.800,      DATA1830
7              1.000,   2.760,                                          DATA1840
8              1.000,                                                   DATA1850
9              0.200,   2.890,   0.300,   2.920,   0.400,   2.960,      DATA1860
A              0.500,   2.990,   0.600,   3.020,   0.800,   3.040,      DATA1870
B              1.000,   3.045/                                          DATA1880
   DATA CNA212/2.000,                                                    DATA1890
1              0.200,   2.880,   0.300,   2.950,   0.400,   3.020,      DATA1900
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2                0.500,   3.090,   0.600,   3.140,   0.800,   3.220,  DATA1910
3                1.000,   3.290,                                      DATA1920
4                3.000,                                               DATA1930
5                0.200,   2.860,   0.300,   2.950,   0.400,   3.030,  DATA1940
6                0.500,   3.120,   0.600,   3.190,   0.800,   3.320,  DATA1950
7                1.000,   3.390,                                      DATA1960
8                4.000,                                               DATA1970
9                0.200,   2.840,   0.300,   2.930,   0.400,   3.030,  DATA1980
A                0.500,   3.140,   0.600,   3.220,   0.800,   3.350,  DATA1990
B                1.000,   3.410/                                      DATA2000
    DATA CNA22/  0.000,                                              DATA2010
1                0.200,   1.250,   0.300,   1.530,   0.400,   1.730,  DATA2020
2                0.600,   1.960,   0.800,   2.110,   1.000,   2.220,  DATA2030
3                0.500,                                               DATA2040
4                0.200,   1.560,   0.300,   1.900,   0.400,   2.160,  DATA2050
5                0.600,   2.470,   0.800,   2.650,   1.000,   2.760,  DATA2060
6                1.000,                                               DATA2070
7                0.200,   1.630,   0.300,   2.040,   0.400,   2.380,  DATA2080
8                0.600,   2.820,   0.800,   3.020,   1.000,   3.060,  DATA2090
9                2.000,                                               DATA2100
A                0.200,   1.720,   0.300,   2.200,   0.400,   2.580,  DATA2110
B                0.600,   3.070,   0.800,   3.290,   1.000,   3.290,  DATA2120
C                3.000,                                               DATA2130
D                0.200,   1.790,   0.300,   2.280,   0.400,   2.670,  DATA2140
E                0.600,   3.180,   0.800,   3.390,   1.000,   3.390,  DATA2150
F                4.000,                                               DATA2160
G                0.200,   1.800,   0.300,   2.300,   0.400,   2.690,  DATA2170
H                0.600,   3.190,   0.800,   3.430,   1.000,   3.410/  DATA2180
    DATA CNA231/0.000,                                               DATA2190
2                0.300,   1.930,   0.400,   1.900,   0.600,   1.880,  DATA2200
3                0.700,   1.870,   0.800,   1.860,   0.900,   1.860,  DATA2210
4                1.000,   1.860,                                      DATA2220
5                0.500,                                               DATA2230
6                0.300,   2.580,   0.400,   2.600,   0.600,   2.620,  DATA2240
7                0.700,   2.610,   0.800,   2.605,   0.900,   2.600,  DATA2250
8                1.000,   2.580,                                      DATA2260
9                1.000,                                               DATA2270
A                0.300,   2.690,   0.400,   2.790,   0.600,   2.910,  DATA2280
B                0.700,   2.940,   0.800,   2.980,   0.900,   2.990,  DATA2290
C                1.000,   3.000,                                      DATA2300
D                2.000,                                               DATA2310
E                0.300,   2.730,   0.400,   2.860,   0.600,   3.060,  DATA2320
F                0.700,   3.130,   0.800,   3.200,   0.900,   3.240,  DATA2330
G                1.000,   3.290/                                      DATA2340
    DATA CNA232/3.000,                                               DATA2350
1                0.300,   2.760,   0.400,   2.910,   0.600,   3.140,  DATA2360
2                0.700,   3.220,   0.800,   3.290,   0.900,   3.360,  DATA2370
3                1.000,   3.430,                                      DATA2380
4                4.000,                                               DATA2390
5                0.300,   2.770,   0.400,   2.920,   0.600,   3.160,  DATA2400
6                0.700,   3.240,   0.800,   3.320,   0.900,   3.380,  DATA2410
7                1.000,   3.475,                                      DATA2420
8                5.000,                                               DATA2430
9                0.300,   2.790,   0.400,   2.940,   0.600,   3.165,  DATA2440
A                0.700,   3.245,   0.800,   3.325,   0.900,   3.408,  DATA2450
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2              1.000,   0.380,                                          DATA1360
3              2.000,                                                   DATA1370
4              0.300,   0.277,   0.500,   0.295,   0.700,   0.297,      DATA1380
5              1.000,   0.285,                                          DATA1390
6              3.000,                                                   DATA1400
7              0.300,   0.235,   0.500,   0.246,   0.700,   0.243,      DATA1410
8              1.000,   0.232,                                          DATA1420
9              4.000,                                                   DATA1430
A              0.300,   0.204,   0.500,   0.213,   0.700,   0.208,      DATA1440
B              1.000,   0.197,                                          DATA1450
C              5.000,                                                   DATA1460
D              0.300,   0.177,   0.500,   0.186,   0.700,   0.181,      DATA1470
E              1.000,   0.167/                                          DATA1480
  DATA XCP751/1.000,                                                     DATA1490
1              0.000,   0.496,   0.100,   0.487,   0.200,   0.475,      DATA1500
2              0.300,   0.463,   0.400,   0.451,   0.500,   0.438,      DATA1510
3              0.600,   0.422,   0.700,   0.405,   0.800,   0.381,      DATA1520
4              2.000,                                                   DATA1530
5              0.000,   0.470,   0.100,   0.457,   0.200,   0.441,      DATA1540
6              0.300,   0.426,   0.400,   0.409,   0.500,   0.390,      DATA1550
7              0.600,   0.368,   0.700,   0.318,   0.800,   0.297,      DATA1560
8              3.000,                                                   DATA1570
9              0.000,   0.469,   0.100,   0.453,   0.200,   0.436,      DATA1580
A              0.300,   0.419,   0.400,   0.400,   0.500,   0.379,      DATA1590
B              0.600,   0.353,   0.700,   0.317,   0.800,   0.273,      DATA1600
C              4.000,                                                   DATA1610
D              0.000,   0.468,   0.100,   0.451,   0.200,   0.433,      DATA1620
E              0.300,   0.415,   0.400,   0.394,   0.500,   0.371,      DATA1630
F              0.600,   0.344,   0.700,   0.305,   0.800,   0.260/      DATA1640
  DATA XCP752/5.000,                                                     DATA1650
1              0.000,   0.467,   0.100,   0.450,   0.200,   0.430,      DATA1660
2              0.300,   0.410,   0.400,   0.389,   0.500,   0.364,      DATA1670
3              0.600,   0.336,   0.700,   0.298,   0.800,   0.250,      DATA1680
4              6.000,                                                   DATA1690
5              0.000,   0.467,   0.100,   0.449,   0.200,   0.428,      DATA1700
6              0.300,   0.408,   0.400,   0.385,   0.500,   0.360,      DATA1710
7              0.600,   0.330,   0.700,   0.291,   0.800,   0.243,      DATA1720
8              7.000,                                                   DATA1730
9              0.000,   0.467,   0.100,   0.447,   0.200,   0.427,      DATA1740
A              0.300,   0.405,   0.400,   0.382,   0.500,   0.356,      DATA1750
B              0.600,   0.325,   0.700,   0.285,   0.800,   0.236/      DATA1760
  DATA CNA211/0.000,                                                     DATA1770
1              0.200,   2.430,   0.300,   2.410,   0.400,   2.380,      DATA1780
2              0.500,   2.360,   0.600,   2.340,   0.800,   2.290,      DATA1790
3              1.000,   2.220,                                          DATA1800
4              0.500,                                                   DATA1810
5              0.200,   2.780,   0.300,   2.810,   0.400,   2.820,      DATA1820
6              0.500,   2.825,   0.600,   2.830,   0.800,   2.800,      DATA1830
7              1.000,   2.760,                                          DATA1840
8              1.000,                                                   DATA1850
9              0.200,   2.890,   0.300,   2.920,   0.400,   2.960,      DATA1860
A              0.500,   2.990,   0.600,   3.020,   0.800,   3.040,      DATA1870
B              1.000,   3.045/                                          DATA1880
  DATA CNA212/2.000,                                                     DATA1890
1              0.200,   2.880,   0.300,   2.950,   0.400,   3.020,      DATA1900
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2                0.500,   3.090,   0.600,   3.140,   0.800,   3.220,  DATA1910
3                1.000,   3.290,                                       DATA1920
4                3.000,                                                DATA1930
5                0.200,   2.860,   0.300,   2.950,   0.400,   3.030,  DATA1940
6                0.500,   3.120,   0.600,   3.190,   0.800,   3.320,  DATA1950
7                1.000,   3.390,                                       DATA1960
8                4.000,                                                DATA1970
9                0.200,   2.840,   0.300,   2.930,   0.400,   3.030,  DATA1980
A                0.500,   3.140,   0.600,   3.220,   0.800,   3.350,  DATA1990
B                1.000,   3.410/                                       DATA2000
   DATA CNA22/   0.000,                                                DATA2010
1                0.200,   1.250,   0.300,   1.530,   0.400,   1.730,  DATA2020
2                0.600,   1.960,   0.800,   2.110,   1.000,   2.220,  DATA2030
3                0.500,                                                DATA2040
4                0.200,   1.560,   0.300,   1.900,   0.400,   2.160,  DATA2050
5                0.600,   2.470,   0.800,   2.650,   1.000,   2.760,  DATA2060
6                1.000,                                                DATA2070
7                0.200,   1.630,   0.300,   2.040,   0.400,   2.380,  DATA2080
8                0.600,   2.820,   0.800,   3.020,   1.000,   3.060,  DATA2090
9                2.000,                                                DATA2100
A                0.200,   1.720,   0.300,   2.200,   0.400,   2.580,  DATA2110
B                0.600,   3.070,   0.800,   3.290,   1.000,   3.290,  DATA2120
C                3.000,                                                DATA2130
D                0.200,   1.790,   0.300,   2.280,   0.400,   2.670,  DATA2140
E                0.600,   3.180,   0.800,   3.390,   1.000,   3.390,  DATA2150
F                4.000,                                                DATA2160
G                0.200,   1.800,   0.300,   2.300,   0.400,   2.690,  DATA2170
H                0.600,   3.190,   0.800,   3.430,   1.000,   3.410/  DATA2180
   DATA CNA231/  0.000,                                                DATA2190
2                0.300,   1.930,   0.400,   1.900,   0.600,   1.880,  DATA2200
3                0.700,   1.870,   0.800,   1.860,   0.900,   1.860,  DATA2210
4                1.000,   1.860,                                       DATA2220
5                0.500,                                                DATA2230
6                0.300,   2.580,   0.400,   2.600,   0.600,   2.620,  DATA2240
7                0.700,   2.610,   0.800,   2.605,   0.900,   2.600,  DATA2250
8                1.000,   2.580,                                       DATA2260
9                1.000,                                                DATA2270
A                0.300,   2.690,   0.400,   2.790,   0.600,   2.910,  DATA2280
B                0.700,   2.940,   0.800,   2.980,   0.900,   2.990,  DATA2290
C                1.000,   3.000,                                       DATA2300
D                2.000,                                                DATA2310
E                0.300,   2.730,   0.400,   2.860,   0.600,   3.060,  DATA2320
F                0.700,   3.130,   0.800,   3.200,   0.900,   3.240,  DATA2330
G                1.000,   3.290/                                       DATA2340
   DATA CNA232/  3.000,                                                DATA2350
1                0.300,   2.760,   0.400,   2.910,   0.600,   3.140,  DATA2360
2                0.700,   3.220,   0.800,   3.290,   0.900,   3.360,  DATA2370
3                1.000,   3.430,                                       DATA2380
4                4.000,                                                DATA2390
5                0.300,   2.770,   0.400,   2.920,   0.600,   3.160,  DATA2400
6                0.700,   3.240,   0.800,   3.320,   0.900,   3.380,  DATA2410
7                1.000,   3.475,                                       DATA2420
8                5.000,                                                DATA2430
9                0.300,   2.790,   0.400,   2.940,   0.600,   3.165,  DATA2440
A                0.700,   3.245,   0.800,   3.325,   0.900,   3.408,  DATA2450
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2CDABT4(86),CDABT5(86),FLRM7(22),CDP701(102),CDP702(84),CDP703(42),BLK10040
3CDP711(102),CDP712(84),CDP713(42),CDSPHR(30)                        BLK10050
   DATA CDP51/ 0.000,    0.000,   10.000,   0.200,   20.000,   0.370,  BLK10060
1              30.000,   0.500,   40.000,   0.670,   50.000,   0.800,  BLK10070
2              60.000,   0.870,   70.000,   0.920,   80.000,   0.980,  BLK10080
3              90.000,   1.000/                                        BLK10090
   DATA CDP50/ 0.000,    0.000,   10.000,   0.010,   20.000,   0.040,  BLK10100
1              30.000,   0.080,   40.000,   0.130,   50.000,   0.170,  BLK10110
2              60.000,   0.210,   70.000,   0.250,   80.000,   0.280,  BLK10120
3              90.000,   0.310/                                        BLK10130
   DATA CDP53/ 0.000,    1.170,    0.100,   0.880,    0.150,   0.670,  BLK10140
1               0.200,   0.520,    0.250,   0.390,    0.300,   0.300,  BLK10150
2               0.350,   0.230,    0.400,   0.180,    0.450,   0.140,  BLK10160
3               0.500,   0.110,    0.550,   0.085,    0.600,   0.060,  BLK10170
4               0.800,   0.012,    1.000,   0.000/                     BLK10180
   DATA CDNOG/ 0.000,    0.000,    0.050,   0.008,    0.100,   0.017,  BLK10190
1               0.150,   0.033,    0.200,   0.053,    0.250,   0.078,  BLK10200
2               0.300,   0.107,    0.350,   0.134,    0.400,   0.166,  BLK10210
3               0.450,   0.201,    0.500,   0.241,    0.550,   0.281,  BLK10220
4               0.600,   0.326,    0.650,   0.375,    0.700,   0.430,  BLK10230
5               0.750,   0.484,    0.800,   0.542,    0.850,   0.640,  BLK10240
6               0.900,   0.665,    0.950,   0.731,    1.000,   0.797,  BLK10250
7               1.050,   0.867,    1.100,   0.940,    1.150,   1.016,  BLK10260
8               1.200,   1.104,    1.600,   1.850,    2.000,   2.700,  BLK10270
9               2.600,   4.450,    4.000,   9.800/                     BLK10280
   DATA CDNCO/ 0.000,    0.000,    0.050,   0.016,    0.100,   0.029,  BLK10290
1               0.150,   0.050,    0.200,   0.071,    0.250,   0.098,  BLK10300
2               0.300,   0.122,    0.350,   0.151,    0.400,   0.180,  BLK10310
3               0.450,   0.212,    0.500,   0.247,    0.550,   0.283,  BLK10320
4               0.600,   0.317,    0.650,   0.360,    0.700,   0.406,  BLK10330
5               0.750,   0.450,    0.800,   0.503,    0.850,   0.554,  BLK10340
6               0.900,   0.606,    0.950,   0.667,    1.000,   0.730,  BLK10350
7               1.050,   0.794,    1.100,   0.864,    1.150,   0.931,  BLK10360
8               1.200,   1.005,    1.600,   1.600,    2.000,   2.350,  BLK10370
9               2.600,   3.750,    4.000,   8.500/                     BLK10380
   DATA CDPN5/ 2.000,                                                  BLK10390
1               4.000,   0.162,    5.000,   0.155,    6.500,   0.148,  BLK10400
2               8.000,   0.143,   10.000,   0.139,                     BLK10410
3               2.500,                                                 BLK10420
4               4.000,   0.113,    5.000,   0.107,    6.500,   0.104,  BLK10430
5               8.000,   0.101,   10.000,   0.100,                     BLK10440
6               3.000,                                                 BLK10450
7               4.000,   0.085,    5.000,   0.079,    6.500,   0.076,  BLK10460
8               8.000,   0.074,   10.000,   0.074,                     BLK10470
9               3.500,                                                 BLK10480
A               4.000,   0.066,    5.000,   0.062,    6.500,   0.058,  BLK10490
B               8.000,   0.056,   10.000,   0.056/                     BLK10500
   DATA CDPM1/ 0.000,    0.100,    0.200,   0.100,    0.400,   0.099,  BLK10510
1               0.700,   0.098,    0.900,   0.096,    1.200,   0.092,  BLK10520
2               1.300,   0.090,    1.500,   0.086,    1.800,   0.078,  BLK10530
3               2.000,   0.070,    2.300,   0.058,    2.600,   0.048,  BLK10540
4               2.900,   0.038,    3.200,   0.030,    3.400,   0.026,  BLK10550
5               3.500,   0.024,    3.700,   0.020,    3.900,   0.018,  BLK10560
6               4.000,   0.016,    4.200,   0.014,    4.400,   0.012,  BLK10570
7               4.600,   0.010,    5.000,   0.008,    5.300,   0.007,  BLK10580
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8              5.800,   0.006,   6.450,   0.006/                          BLK10590
  DATA CDNVK/  0.000,   0.000,   0.050,   0.007,   0.100,   0.016,        BLK10600
1              0.150,   0.029,   0.200,   0.042,   0.250,   0.060,        BLK10610
2              0.300,   0.083,   0.350,   0.106,   0.400,   0.132,        BLK10620
3              0.450,   0.160,   0.500,   0.190,   0.550,   0.223,        BLK10630
4              0.600,   0.260,   0.650,   0.297,   0.700,   0.341,        BLK10640
5              0.750,   0.384,   0.800,   0.433,   0.850,   0.480,        BLK10650
6              0.900,   0.531,   0.950,   0.581,   1.000,   0.637,        BLK10660
7              1.050,   0.701,   1.100,   0.769,   1.150,   0.834,        BLK10670
8              1.200,   0.901,   1.600,   1.450,   2.000,   2.050,        BLK10680
9              2.600,   3.300,   4.000,   7.500/                          BLK10690
 DATA CDABT1/  0.5,                                                       BLK10700
X              0.000,   0.160,   0.050,   0.220,   0.100,   0.240,        BLK10710
1              0.150,   0.240,   0.200,   0.230,   0.250,   0.220,        BLK10720
2              0.300,   0.210,   0.350,   0.190,   0.400,   0.170,        BLK10730
3              0.450,   0.145,   0.500,   0.120,   0.550,   0.100,        BLK10740
4              0.600,   0.075,   0.650,   0.065,   0.700,   0.050,        BLK10750
5              0.750,   0.040,   0.800,   0.033,   0.850,   0.025,        BLK10760
6              0.900,   0.015,   0.950,   0.010,   1.000,   0.000,        BLK10770
X       1.0,                                                             BLK10780
1              0.000,   0.480,   0.025,   0.570,   0.050,   0.600,        BLK10790
2              0.075,   0.620,   0.100,   0.600,   0.150,   0.580,        BLK10800
3              0.200,   0.510,   0.250,   0.480,   0.300,   0.440,        BLK10810
4              0.350,   0.380,   0.400,   0.320,   0.450,   0.250,        BLK10820
5              0.500,   0.210,   0.550,   0.160,   0.600,   0.130,        BLK10830
6   .65, .11, .7, .08, .8, .04,                                          BLK10840
7  .85, .02, .95, .003, 1., 0./                                          BLK10850
 DATA CDABT2/  2.0,                                                       BLK10860
9              0.000,   1.740,   0.025,   1.640,   0.050,   1.540,        BLK10870
A              0.075,   1.440,   0.100,   1.340,   0.150,   1.200,        BLK10880
B              0.200,   1.070,   0.250,   0.940,   0.300,   0.810,        BLK10890
C              0.350,   0.700,   0.400,   0.590,   0.450,   0.500,        BLK10900
D              0.500,   0.420,   0.550,   0.350,   0.600,   0.290,        BLK10910
E              0.650,   0.210,   0.700,   0.170,   0.800,   0.080,        BLK10920
F  .9,  .013,  .95,  .004,  1.0,  0.0,                                   BLK10930
G   3.0,                                                                 BLK10940
1              0.000,   2.460,   0.025,   2.250,   0.050,   2.020,        BLK10950
2              0.075,   1.890,   0.100,   1.760,   0.150,   1.540,        BLK10960
3              0.200,   1.340,   0.250,   1.170,   0.300,   1.010,        BLK10970
4              0.350,   0.870,   0.400,   0.720,   0.450,   0.600,        BLK10980
5              0.500,   0.500,   0.550,   0.410,   0.600,   0.320,        BLK10990
6   .65,  .25,  .7,  .2,  .8,  .08,                                      BLK11000
7   .9,  .018,  .95,  .005,  1.0,  0.0/                                  BLK11010
 DATA CDABT3/  5.000,                                                     BLK11020
1              0.000,   3.320,   0.025,   3.010,   0.050,   2.650,        BLK11030
2              0.075,   2.460,   0.100,   2.270,   0.150,   1.970,        BLK11040
3              0.200,   1.710,   0.250,   1.480,   0.300,   1.260,        BLK11050
4              0.350,   1.080,   0.400,   0.910,   0.450,   0.770,        BLK11060
5              0.500,   0.620,   0.550,   0.510,   0.600,   0.410,        BLK11070
6              0.650,   0.310,   0.700,   0.240,   0.800,   0.110,        BLK11080
7   .9,  .03,  .95,  .01,  1.0,  0.0,                                    BLK11090
8              6.000,                                                    BLK11100
9              0.000,   3.720,   0.050,   2.960,   0.100,   2.470,        BLK11110
A              0.150,   2.110,   0.200,   1.840,   0.250,   1.600,        BLK11120
B              0.300,   1.390,   0.350,   1.170,   0.400,   0.990,        BLK11130
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C                0.450,   0.840,   0.500,   0.700,   0.550,   0.540,  BLK11140
D    .6,  .45,   .65,   .34,   .7,   .25,                             BLK11150
E    .75,  .185,  .8,   .12,   .85,  .075,                            BLK11160
F    .9,  .035,  .95,   .012,  1.0,  0.0/                             BLK11170
 DATA CDABT4/ 8.000,                                                  BLK11180
1                0.000,   4.250,   0.025,   3.750,   0.050,   3.270,  BLK11190
2                0.075,   3.020,   0.100,   2.760,   0.150,   2.380,  BLK11200
3                0.200,   2.040,   0.250,   1.760,   0.300,   1.520,  BLK11210
4                0.350,   1.300,   0.400,   1.090,   0.450,   0.910,  BLK11220
5                0.500,   0.760,   0.550,   0.600,   0.600,   0.480,  BLK11230
6                0.650,   0.370,   0.700,   0.270,   0.800,   0.130,  BLK11240
7    .9,  .04,   .95,   .013,  1.0,  0.0,                             BLK11250
8               10.000,                                              BLK11260
9                0.000,   5.000,   0.025,   4.270,   0.050,   3.560,  BLK11270
A                0.075,   3.280,   0.100,   2.990,   0.150,   2.560,  BLK11280
B                0.200,   2.210,   0.250,   1.910,   0.300,   1.630,  BLK11290
C                0.350,   1.390,   0.400,   1.160,   0.450,   0.970,  BLK11300
D                0.500,   0.820,   0.550,   0.660,   0.600,   0.520,  BLK11310
E                0.650,   0.410,   0.700,   0.270,   0.800,   0.140,  BLK11320
F    .9,  .042,  .95,   .014,  1.0,  0.0/                             BLK11330
 DATA CDABT5/16.000,                                                  BLK11340
1                0.000,   5.600,   0.025,   5.000,   0.050,   4.100,  BLK11350
2                0.075,   3.700,   0.100,   3.340,   0.150,   2.910,  BLK11360
3                0.200,   2.500,   0.250,   2.160,   0.300,   1.860,  BLK11370
4                0.350,   1.630,   0.400,   1.360,   0.450,   1.140,  BLK11380
5                0.500,   0.920,   0.550,   0.750,   0.600,   0.580,  BLK11390
6                0.650,   0.440,   0.700,   0.320,   0.800,   0.140,  BLK11400
7    .9,  .043,  .95,   .015,  1.0,  0.0,                             BLK11410
8               20.000,                                              BLK11420
9                0.025,   4.990,   0.050,   4.500,   0.100,   3.750,  BLK11430
A                0.150,   3.150,   0.200,   2.750,   0.250,   2.380,  BLK11440
B                0.300,   2.040,   0.350,   1.740,   0.400,   1.470,  BLK11450
C                0.450,   1.200,   0.500,   1.000,   0.550,   0.800,  BLK11460
D                0.600,   0.630,   0.650,   0.490,   0.700,   0.360,  BLK11470
E                0.750,   0.250,   0.800,   0.150,   0.850,   0.080,  BLK11480
F    .9,  .044,  .95,   .016,  1.0,  0.0/                             BLK11490
  DATA FLRM7/ 1.200,  18.200,   1.250,  18.400,   1.300,  18.400,     BLK11500
1                1.400,  18.100,   1.600,  16.900,   2.000,  14.900,  BLK11510
2                2.400,  13.200,   2.800,  11.600,   3.200,  10.300,  BLK11520
3                3.600,   9.100,   4.000,   8.100/                    BLK11530
 DATA CDP701/ 1.250,   1.500,   2.000,   3.000,   4.000,              BLK11540
1    2.000,   3.000,   4.000,   5.000,   6.000,   7.000,   8.000,     BLK11550
2                0.000,   0.200,   0.400,   0.600,   0.800,   1.000,  BLK11560
X                0.255,   0.210,   0.190,   0.213,   0.320,   0.520,  BLK11570
X                0.125,   0.110,   0.115,   0.170,   0.300,   0.520,  BLK11580
X                0.078,   0.070,   0.095,   0.160,   0.290,   0.520,  BLK11590
X                0.050,   0.050,   0.080,   0.155,   0.290,   0.520,  BLK11600
X                0.035,   0.040,   0.075,   0.152,   0.290,   0.520,  BLK11610
X                0.030,   0.035,   0.070,   0.151,   0.290,   0.520,  BLK11620
X                0.025,   0.030,   0.068,   0.150,   0.290,   0.520,  BLK11630
3                0.212,   0.202,   0.233,   0.311,   0.456,   0.668,  BLK11640
4                0.111,   0.117,   0.164,   0.263,   0.429,   0.669,  BLK11650
5                0.071,   0.082,   0.135,   0.245,   0.413,   0.669,  BLK11660
6                0.049,   0.060,   0.123,   0.232,   0.408,   0.668,  BLK11670
7                0.036,   0.050,   0.114,   0.230,   0.405,   0.668,  BLK11680
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8               0.028,   0.045,   0.110,   0.227,   0.405,   0.668,  BLK11690
9               0.023,   0.042,   0.106,   0.227,   0.402,   0.669/ BLK11700
 DATA CDP702/   0.180,   0.188,   0.236,   0.348,   0.518,   0.758,  BLK11710
B               0.095,   0.112,   0.181,   0.306,   0.493,   0.758,  BLK11720
C               0.059,   0.080,   0.156,   0.288,   0.800,   0.758,  BLK11730
D               0.041,   0.063,   0.140,   0.280,   0.479,   0.758,  BLK11740
E               0.027,   0.050,   0.133,   0.275,   0.477,   0.758,  BLK11750
F               0.022,   0.045,   0.132,   0.270,   0.476,   0.759,  BLK11760
G               0.016,   0.042,   0.130,   0.268,   0.475,   0.758,  BLK11770
X               0.154,   0.180,   0.258,   0.385,   0.582,   0.843,  BLK11780
1               0.079,   0.112,   0.200,   0.350,   0.568,   0.843,  BLK11790
2               0.049,   0.083,   0.175,   0.333,   0.558,   0.844,  BLK11800
3               0.034,   0.067,   0.163,   0.324,   0.550,   0.843,  BLK11810
4               0.025,   0.058,   0.156,   0.318,   0.549,   0.844,  BLK11820
5               0.019,   0.052,   0.150,   0.315,   0.545,   0.843,  BLK11830
6               0.017,   0.050,   0.150,   0.313,   0.545,   0.843/ BLK11840
 DATA CDP703/   0.142,   0.171,   0.262,   0.408,   0.613,   0.868,  BLK11850
8               0.073,   0.112,   0.210,   0.369,   0.590,   0.868,  BLK11860
9               0.044,   0.083,   0.185,   0.350,   0.582,   0.869,  BLK11870
A               0.031,   0.068,   0.172,   0.340,   0.572,   0.869,  BLK11880
B               0.022,   0.063,   0.164,   0.340,   0.570,   0.869,  BLK11890
C               0.016,   0.055,   0.160,   0.333,   0.568,   0.869,  BLK11900
D               0.013,   0.054,   0.160,   0.332,   0.565,   0.869/ BLK11910
 DATA CDP711/   1.250,   1.500,   2.000,   3.000,   4.000,           BLK11920
1     2.000,   3.000,   4.000,   5.000,   6.000,   7.000,   8.000,  BLK11930
2               0.000,   0.200,   0.400,   0.600,   0.800,   1.000,  BLK11940
Z               0.220,   0.125,   0.090,   0.125,   0.270,   0.520,  BLK11950
Z               0.110,   0.065,   0.070,   0.125,   0.270,   0.520,  BLK11960
Z               0.065,   0.040,   0.045,   0.125,   0.270,   0.520,  BLK11970
Z               0.045,   0.030,   0.045,   0.125,   0.275,   0.520,  BLK11980
Z               0.035,   0.025,   0.045,   0.130,   0.280,   0.520,  BLK11990
Z               0.025,   0.020,   0.045,   0.135,   0.285,   0.520,  BLK12000
Z               0.020,   0.015,   0.050,   0.140,   0.290,   0.520,  BLK12010
3               0.220,   0.140,   0.153,   0.235,   0.395,   0.670,  BLK12020
4               0.105,   0.093,   0.128,   0.220,   0.395,   0.670,  BLK12030
5               0.065,   0.060,   0.110,   0.215,   0.396,   0.670,  BLK12040
6               0.040,   0.048,   0.100,   0.212,   0.400,   0.670,  BLK12050
7               0.030,   0.038,   0.098,   0.210,   0.400,   0.670,  BLK12060
8               0.030,   0.033,   0.095,   0.210,   0.400,   0.670,  BLK12070
9               0.018,   0.030,   0.093,   0.210,   0.400,   0.670/ BLK12080
 DATA CDP712/   0.197,   0.179,   0.205,   0.306,   0.478,   0.754,  BLK12090
B               0.095,   0.100,   0.153,   0.281,   0.473,   0.753,  BLK12100
C               0.055,   0.068,   0.134,   0.269,   0.465,   0.754,  BLK12110
D               0.035,   0.052,   0.125,   0.263,   0.469,   0.753,  BLK12120
E               0.025,   0.042,   0.124,   0.260,   0.479,   0.754,  BLK12130
F               0.018,   0.039,   0.115,   0.257,   0.468,   0.754,  BLK12140
G               0.015,   0.036,   0.115,   0.258,   0.469,   0.754,  BLK12150
X               0.173,   0.178,   0.235,   0.360,   0.564,   0.839,  BLK12160
1               0.088,   0.111,   0.185,   0.331,   0.549,   0.839,  BLK12170
2               0.053,   0.080,   0.169,   0.323,   0.541,   0.840,  BLK12180
3               0.036,   0.068,   0.156,   0.317,   0.538,   0.840,  BLK12190
4               0.026,   0.055,   0.150,   0.313,   0.539,   0.841,  BLK12200
5               0.019,   0.050,   0.145,   0.308,   0.538,   0.842,  BLK12210
6               0.014,   0.049,   0.142,   0.306,   0.537,   0.841/ BLK12220
 DATA CDP713/   0.163,   0.173,   0.240,   0.380,   0.590,   0.868,  BLK12230
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8               0.081,   0.111,   0.200,   0.355,   0.577,   0.867,  BLK12240
9               0.050,   0.082,   0.180,   0.340,   0.568,   0.868,  BLK12250
A               0.032,   0.070,   0.170,   0.335,   0.565,   0.869,  BLK12260
B               0.022,   0.063,   0.162,   0.333,   0.561,   0.869,  BLK12270
C               0.016,   0.058,   0.160,   0.330,   0.560,   0.869,  BLK12280
D               0.011,   0.055,   0.156,   0.325,   0.560,   0.870/  BLK12290
   DATA CDSPHR/0.000,   0.020,   0.250,   0.020,   0.500,   0.020,  BLK12300
1               0.750,   0.060,   1.000,   0.310,   1.250,   0.525,  BLK12310
2               1.500,   0.660,   1.750,   0.730,   2.000,   0.775,  BLK12320
3               2.500,   0.830,   3.000,   0.845,   4.000,   0.860,  BLK12330
4               5.000,   0.870,   6.000,   0.880,  10.000,   0.890/  BLK12340
 END                                                                 BLK12350


 BLOCK DATA                                                          DATA0010
C  DATA FOR RCTM - COST PACKAGE                                      DATA0020
 COMMON /CONLY/ KINOPS,DIAERT,SOMMOR(8)                             DATA0030
 COMMON /GUIDCO/ COSN,NSCRC,WTGUID,SAWTI(3),SAWTJ(3),SAFCI(3),      DATA0040
1  SAFCJ(3),KSASTB,KSAAGT,NSACHN,KSASGT,AWTI(3),AWTJ(3),           DATA0050
2  APPFKI(3),APPFKJ(3),AFCI,AFCJ,KASTB,KAAGT,NACHN,KASGT,          DATA0060
3  GIRWT(3),GIRRSP(3),GIRNDT(3),GIRFC(3),KGTABL,KGTYPE,            DATA0070
4  DUMGX(9)                                                        DATA0080
 COMMON /QACOST/ QMAXQ, VMAXQ, DUMQA(8)                             DATA0090
 REAL NOZWT,MP                                                      DATA0100
 COMMON /COMVLS/ WTANK,VEXIN,VREQ,GGW,HPPUMP,WTFUEL,WCOMM,VCOMI,    DATA0110
1 PS,Y1,WNOZ,KFM,MATTK,A,DCOM,WMC,VBI,DTHRT,RNOZI,NOZWT,MP,CASFM,  DATA0120
2 FNET,WT,WF,FMAX,S,T4,METTJ,ZXNB,D,WM,FC,PPEAK,BSP,NDET,CA,WCS,   DATA0130
3 WWH,WTC,WTP,WGG,WSC,WLV,VGT,WC,WP,DP,WN,METAL,NCONFG             DATA0140
 COMMON /COSTIN/   PRIA1,PRIA2,PRJC,PRIA3,PRIB3,PRIA4,PRIE4,PRIA5, DATA0150
1PRIA6,PRIA7,PRIA8,PRIB8,PRIA9,PRIG9,PRIA10,PRIA11,PRIG11,PRIA12,  DATA0160
2PRIB12,PRIE12,PRIA13,PRIF13,PRIA14,PRIE14,PRIA15,PRIE15,PRIA16,   DATA0170
3PRIF16,PRIA17,PRIF17,PRIA18,PRIB18,PRIE18,PRIA19,PRIE19,PRIA20,   DATA0180
4PRIA21,PRIA22,PRIB22,PRIA23,PRIB23,PRIC23,PRIA24,PRIC24,PRIA25,   DATA0190
5PRIB25,PRIA26,PRIB26,PRIC26,PRNA1,PRNA2,PRNA3,PRNB3,PRNA4,PRNE4,  DATA0200
6PRNA5,PRNA6,PRNA7,PRNA8,PRNB8,PRNA9,PRNG9,PRNA10,PRNA11,PRNG11,   DATA0210
7PRNA12,PRNB12,PRNE12,PRNA13,PRNE13,PRNA14,PRNE14,PRNA15,PRNA16,   DATA0220
8PRNA17,PRNA18,PRNB18,PRNA19,PRNB19,PRNC19,PRNA20,PRNC20,PRNA21,   DATA0230
9PRNB21,PRNA22,PRNB22,PRNC22,PLPC,PLA1,PLA3,PLB3,PLA4,PLA6,PLAR,   DATA0240
APLB8,PLA9,PLA11,PLB11,PLA13,PLB13,PLC13,PLD13,PLA14,PLD14,PLA15,  DATA0250
BPLB15,PLE15,PLF15,PLA16,PLE16,PLA17,PLA18,PLB18,PLC18,PLA19,PLA20,DATA0260
CPLB20,PLA21,PLB21,PLC21,PTA1,PTD1,PTA4,PTB4,PTA5,PTB5,PTE5,PTA6,  DATA0270
DPTE6,PTA7,PTB7,PTC7,PTJC,PTA8,PTD8,PTA9,PTB9,PTA10,PTB10,PTC10,   DATA0280
EPEA3,PEB3,PEA4,PEE4,PEA5,PEE5,PEA6,PEB6,PEE6,PEA7,PEE7,PEA8,PEA9, DATA0290
FPEA10,PEB10,PEC10,PEA11,PEB11,PEE11,PEBC,PSPC,PSA3,PSB3,PSA4,PSE4,DATA0300
GPSA5,PSE5,PSA6,PSF6,PSG6,PSA7,PSF7,PSA8,PSA9,PSA10,PSB10,PSC10,   DATA0310
HPSA11,PSB11,PSE11,CFT,PFT,CFCASE,PFCASE,CFC,PFC,CFM,PFM,IYEAR     DATA0320
 COMMON /COSTIN/   PRIB1,PRIC1,PRIB2,PRIC2,PRIB4,PRIC4,PRID4,PRIB5,DATA0330
1PRIC5,PRIB9,PRIC9,PRID9,PRIE9,PRIF9,PRIB11,PRIC11,PRID11,PRIE11,  DATA0340
2PRIF11,PRIC12,PRID12,PRIB13,PRIC13,PRID13,PRIB14,PRIC14,PRID14,   DATA0350
3PRIB15,PRIC15,PRID15,PRIB16,PRIC16,PRID16,PRIB17,PRIC17,PRIC17,   DATA0360
4PRIF17,PRIC18,PRID18,PRIB19,PRIC19,PRID19,PRIB24,PRNB1,PRNC1,PRNB2DATA0370
5,PRNC2,PRNB4,PRNC4,PRND4,PRNB5,PRNC5,PRNB9,PRNC9,PRND9,PRNE9,PRNF9DATA0380
6,PRNB11,PRNC11,PRND11,PRNE11,PRNF11,PRNC12,PRND12,PRNB13,PRNC13,  DATA0390
7PRND13,PRNB14,PRNC14,PRND14,PRNB15,PRNC15,PRND15,PRNB16,PRNC16,   DATA0400
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8PRND16,PRNB17,PRNC17,PRND17,PRNE17,PRNB20,PLB1,PLC1,PLA2,PLB2,PLB4DATA0410
9,PLC4,PLA5,PLB5,PLB6,PLC6,PLA7,PLB7,PLB9,PLC9,PLA10,PLB10,PLA12,  DATA0420
APLB12,PLB14,PLC14,PLC15,PLD15,PLB16,PLC16,PLD16,PLB19,PLC19,PTB1,  DATA0430
BPTC1,PTA2,PTB2,PTA3,PTB3,PTC5,PTD5,PTB6,PTC6,PTD6,PTB8,PTC8,PEA1,  DATA0440
CPEB1,PEC1,PEA2,PEB2,PEC2,PEB4,PEC4,PED4,PEB5,PEC5,PED5,PEE5,PEC6,  DATA0450
DPED6,PEB7,PEC7,PED7,PEC11,PED11,PSA1,PSB1,PSC1,PSA2,PSB2,PSC2,PSB4DATA0460
E,PSC4,PSD4,PSB5,PSC5,PSD5,PSE5,PSB6,PSC6,PSD6,PSE6,PSB7,PSC7,PSD7,DATA0470
FPSE7,PSC11,PSD11,PRND22,PLD21,PLE21,PTD10,PTE10,PRID26             DATA0480
 COMMON /COSTIN/   PROFIT,QD,R,AFA1,AFB1,AFC1,AFD1,AFI1,AFA2,AFB2,  DATA0490
1AFG2,AFA3,AFB3,AFG3,AFA4,AFB4,AFC4,AFD4,AFJ4,AFA5,AFB5,AFC5,AFH5,  DATA0500
2AFA6,AFB6,AFG6,AFA7,AFC7,AFD7,AFA8,AFB8,AFC8,AFD8,AFI8,AFA9,AFB9,  DATA0510
3AFC9,AFD9,AFJ9,AFA10,AFB10,AFC10,AFH10,AFA11,AFB11,AFG11,AFA12,    DATA0520
4AFC12,AFD12,AFA13,AFB13,AFC13,AFA14,AFB14,AFC14,KFUZE,WA1,WE1,WF1,DATA0530
5WA2,WC2,WF2,KGAIN,CA1,CE1,CF1,CA2,CE2,CF2,CA3,CE3,CF3,GA1,GB1,GF1,DATA0540
6KLE6,KGT6,KSTAB,KAGATE,NCHAN,KSGATE,GA2,GB2,GK2,GA3,GB3,GQ3,GA4,   DATA0550
7GB4,GM4,GA5,GB5,GH5,KG,KC,KW,KA,KP,IGTYPE,ICTYPE,IPRCST            DATA0560
 COMMON /COSTIN/   AFE1,AFF1,AFG1,AFH1,AFC2,AFD2,AFE2,AFF2,AFC3,    DATA0570
1AFD3,AFE3,AFF3,AFE4,AFF4,AFG4,AFH4,AFI4,AFD5,AFE5,AFF5,AFG5,AFC6,  DATA0580
2AFD6,AFE6,AFF6,AFB7,AFE8,AFF8,AFG8,AFH8,AFE9,AFF9,AFG9,AFH9,AFI9,  DATA0590
3AFD10,AFE10,AFF10,AFG10,AFC11,AFD11,AFE11,AFF11,AFB12,WB1,WC1,WD1,DATA0600
4WB2,WC2,CB1,CC1,CD1,CB2,CC2,CD2,CB3,CC3,CD3,GC1,GD1,GE1,GC2,GD2,   DATA0610
5GE2,GF2,GG2,GH2,GI2,GJ2,GC3,GD3,GE3,GF3,GG3,GH3,GI3,GJ3,GK3,GL3,   DATA0620
6GM3,GN3,GP3,GC4,GD4,GE4,GF4,GG4,GH4,GI4,GJ4,GK4,GL4,GC5,GD5,GE5,   DATA0630
7GF5,GG5,CFTTAB(11),PFTTAB(11)                                      DATA0640
 COMMON /CSTPRV/ CBLC,CBMC,CCASE,CCFU,CCL,CCM,CCCMI,CCCML,CCOMM,     DATA0650
1  CCONT,CCRD,CFBFU,CFBRD,CETJ,CEXIN,CGFU,CGRD,                     DATA0660
2  CGT,CGTDT,CIGN,CIRJFU,       CIRJRD,       CLF,CLFL,CLGG,CLI,CLM,  DATA0670
3               CLRFU,CLRRD,CLRT,CLTC,CLTP,CM,CMGG,CMM,CMTC,CMTP,    DATA0680
4  CMV,CNOZ,CNRJFU,       CNRJRD,       CP,CPAFI,CPENG,CPL,CPLC,    DATA0690
5  CPMFGL,CPMFGM,CPQA,CPR,CPRC,CPS,CPSMGG,CPSN2,CPSRAM,CPSSGG,       DATA0700
6  CPTOOL,CRAFI,CRDEV,CREG,CRENG,CRFTO,CRJC,CRMFGL,CRMFGM,CRQA,      DATA0710
7  CRTOOL,CSA,CSRFU,CSRRD,CSRT,CT,CTAFI,CTC,CTEB,CTIRJ,CTJFU,        DATA0720
8  CTJLF,CTJLFL,CTJRD,CTJT,       CTL,CTM,CTNRJ,CTP,CWH,CWHFU,CWHR,   DATA0730
9  CPODC,CRPS,CPFU,PROFPR,PRFUAF,PRRAF,CCLB,CCMB,CTCB,CLIB,CNCZB,     DATA0740
A  CPRB,CPLB,CIGNB,CSAB,PROFEX                                       DATA0750
 DATA KINDPS,DIAERT,SOMMOR/41,1.,8*0./                              DATA0760
 DATA CFT,PFT,CFCASE,PFCASE,CFC,PFC,CFM,PFM/8*0.0/                  DATA0770
 DATA CFTTAB/.6,1.,1.,.6,.2,2.5,1.,1.,.6,3.241,1./                  DATA0780
 DATA PFTTAB/.229,.274,1.,.929,.257,.723,2.571,1.386,22.857,1.281,  DATA0790
1 1./                                                               DATA0800
 DATA KG,KC,KW,KA,KP,IGTYPE,ICTYPE,     IPRCST/8*0/                DATA0810
 DATA WWH/0./,QA/0./,WCS/0./,FC/0./,BSP/0./,NDET/0/,PPEAK/0./       DATA0820
 DATA ENET/0./,T4/0./,METTJ/0/,WTC/0./,WTP/0./,WGG/0./,WSC/0./      DATA0830
 DATA WLV/0./,VGT/0./,WT/0./,WC/0./,WF/0./,WP/0./,A/0./,S/0./       DATA0840
 DATA EMAX/0./,METAL/0/,D/0./,WM/0./,WMC/0./,DP/0./                 DATA0850
 DATA CTERT/0./,RNOZI/0./,WN/0./                                    DATA0860
 DATA NCONEG/0/,ZXNB/0./,R5/0./,Y1/0./,WNOZ/0./,KFM/0/,MATTK/0/     DATA0870
 DATA CCOM/0./,VBI/0./,NOZWT/0./,MP/0./,CASEM/0./,WTANK/0./         DATA0880
 DATA VEXIN/0./,VREQ/0./,GGW/0./,HPPUMP/0./,WTFUEL/0./,WCOMM/0./    DATA0890
 DATA VCCMI/0./                                                     DATA0900
C      WARHEAD COST PRE-STORED VALUES                               DATA0910
 DATA WA1/1.0/,WB1/103.43/,WC1/23.096/,WD1/1352.0/,WE1/1.0/         DATA0920
 DATA WF1/0.0/,WA2/1.0/,WB2/64.911/,WC2/43.295/,WD2/1.0/            DATA0930
 DATA WE2/0.0/,KFUZE/0/                                             DATA0940
C      CONTROLS COST PRE-STORED VALUES                              DATA0950
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      DATA KGAIN/0/,CA1/1.0/,CB1/4798./,CC1/222.7/,CD1/5796.3/,CE1/1.0/ DATA0960
      DATA CF1/0./,CA2/1.0/,CB2/48./,CC2/881./,CD2/5116./,CE2/1.0/     DATA0970
      DATA CF2/0./,CA3/1./,CB3/62./,CC3/213./,CD3/1880./,CE3/1./,CF3/0./DATA0980
C          PROPULSION (SOLID SUSTAINER) COST PRE-STORED VALUES          DATA0990
      DATA PSA1/.C08166/,PSB1/140./,PSC1/.333/,PSA2/.02022/            DATA1000
      DATA PSB2/140./,PSC2/.333/,PSA3/1./,PSB3/0./,PSA4/1./            DATA1010
      DATA PSB4/.001039/,PSC4/198./,PSD4/.333/,PSE4/0./,PSA5/1./       DATA1020
      DATA PSB5/.CC1755/,PSC5/4.6788/,PSD5/1.4045/,PSE5/1.5487/        DATA1030
      DATA PSF5/0./,PSA6/1./,PSB6/1C0000./,PSC6/32.006/,PSD6/.069/     DATA1040
      DATA PSE6/1CCC./,PSF6/1./,PSG6/0./,PSA7/1./,PSB7/.00343/         DATA1050
      DATA PSC7/1C0000./,PSD7/32.0C6/,PSE7/.387/,PSF7/0./              DATA1060
      DATA PSA8/.19305/,PSA9/.3861/                                    DATA1070
      DATA PSA10/1./,PSB1C/1./,PSC1C/0./,PSA11/1./,PSB11/1./           DATA1080
      DATA PSC11/16.551/,PSD11/.4263/,PSE11/0./                        DATA1090
      DATA PSPC/.1/                                                    DATA1100
C          AIRFRAME AND INTEGRATION COST PRE-STORED VALUES              DATA1110
      DATA PROFIT/.1/,QD/20./,R/1./                                    DATA1120
      DATA AFA1/26./,AFB1/1./,AFC1/1./,AFD1/1./                        DATA1130
      DATA AFE1/.C396/,AFF1/.791/,AFG1/1.526/,AFH1/.183/,AFI1/0./      DATA1140
      DATA AFA2/1./,AFB2/1./,AFC2/.008325/,AFD2/.873/,AFE2/1.89/       DATA1150
      DATA AFF2/.346/,AFG2/C./,AFA3/1./,AFB3/1./,AFC3/.001244/         DATA1160
      DATA AFD3/1.16/,AFE3/1.371/,AFF3/1.281/,AFG3/0./,AFA4/19./       DATA1170
      DATA AFB4/1./,AFC4/1./,AFD4/1./,AFE4/4.0127/,AFF4/.764/,AFG4/.899/DATA1180
      DATA AFH4/.178/,AFI4/.066/,AFJ4/0./,AFA5/12./,AFB5/1./,AFC5/1./  DATA1190
      DATA AFD5/28.984/,AFE5/.74/,AFF5/.543/,AFG5/.524/,AFH5/0./       DATA1200
      DATA AFA6/1./,AFB6/1./,AFC6/37.632/,AFD6/.689/,AFE6/.624/        DATA1210
      DATA AFF6/.792/,AFG6/C./,AFA7/1./,AFB7/.13/,AFC7/1./,AFD7/0./    DATA1220
      DATA AFA8/26./,AFB8/1./,AFC8/1./,AFD8/1./,AFE8/.0396/,AFF8/.791/ DATA1230
      DATA AFG8/1.526/,AFH8/.183/,AFI8/0./                             DATA1240
      DATA AFA9/19./,AFB9/1./,AFC9/1./,AFD9/1./                        DATA1250
      DATA AFE9/4.0127/,AFF9/.764/,AFG9/.899/,AFH9/.178/,AFI9/.066/    DATA1260
      DATA AFJ9/0./                                                    DATA1270
      DATA AFA10/12./,AFB1C/1./,AFC10/1./,AFD10/28.984/,AFE10/.74/     DATA1280
      DATA AFF10/.543/,AFG10/.524/,AFH10/0./                           DATA1290
      DATA AFA11/1./,AFB11/1./,AFC11/37.632/,AFD11/.689/,AFE11/.624/   DATA1300
      DATA AFF11/.792/,AFG11/0./                                       DATA1310
      DATA AFA12/1./,AFB12/.13/,AFC12/1./,AFD12/0./                    DATA1320
      DATA AFA13/1./,AFB13/1./,AFC13/0./                               DATA1330
      DATA AFA14/1./,AFB14/1./,AFC14/0./                               DATA1340
C          GUIDANCE SYSTEM COST PRE-STORED VALUES                       DATA1350
      DATA GA1/1./,GB1/1./,GC1/8.37/,GD1/.0157/,GE1/.35/,GF1/0./       DATA1360
      DATA GA2/1./,GB2/1./,GC2/7129./,GD2/-.056/,GE2/62./,GF2/2.35/    DATA1370
      DATA GG2/10500./,GH2/2400./,GI2/143./,GJ2/2885./,GK2/0./         DATA1380
      DATA GA3/1./,GB3/1./,GC3/7129./,GD3/-.056/,GE3/62./,GF3/2.35/    DATA1390
      DATA          GK3/1500./,GL3/1620./,GM3/.33/,GN3/.041/,GP3/2.5/  DATA1400
      DATA GQ3/0./                                                     DATA1410
      DATA GG3/10500./,GH3/2400./,GI3/143./,GJ3/2885./                 DATA1420
      DATA GA4/1./,GB4/1./,GC4/7129./,GD4/-.056/,GE4/62./,GF4/2.35/    DATA1430
      DATA GG4/10500./,GH4/2400./,GI4/143./,GJ4/2885./                 DATA1440
      DATA GK4/1520./,GL4/7100./,GM4/0./,GA5/1./,GB5/1./,GC5/9018./    DATA1450
      DATA GD5/.177/,GE5/-1.147/,GF5/175./,GG5/3700./,GH5/0./          DATA1460
      DATA KSTAR/0/,KAGATE/0/,NCHAN/0/,KSGATE/0/                       DATA1470
C          PROPULSION (TURBOJET) COST PRE-STORED VALUES                 DATA1480
C          PTB1 AND PTC1 ARE SET BY TURBOJET RTNE. IF NOT SUPPLIED      DATA1490
      DATA PTA1/1./,PTB1/0./,PTC1/C./,PTD1/0./,PTA2/5.148/,PTB2/.2608/ DATA1500
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      DATA PTA3/4.415/,PTB3/.2608/,PTA4/1./,PTB4/0./                    DATA1510
      DATA PTA5/1./,PTB5/0.1/,PTC5/3125./,PTD5/.069/                    DATA1520
      DATA PTE5/0./,PTA6/1./,PTB6/.C001/,PTC6/3125./,PTD6/.029/,PTE6/0./DATA1530
      DATA PTA7/1./,PTB7/1./,PTC7/0./,PTJC/.1/,PTA8/1./,PTB8/16.22/     DATA1540
      DATA PTC8/.7436/,PTD8/0./,PTA9/1./,PTB9/0./,PTA10/1./             DATA1550
      DATA PTB10/1./,PTC10/0./,PTD10/16.22/,PTE10/.7436/                DATA1560
C          PROPULSION (LIQUID ROCKET) COST PRE-STORED VALUES            DATA1570
      DATA PLA1/10./,PLB1/639.1/,PLC1/.5/,PLA2/201./,PLB2/.75/,PLA3/1./ DATA1580
      DATA PLB3/0./,PLA4/10./,PLB4/234.9/,PLC4/.63/,PLA5/340.7/         DATA1590
      DATA PLB5/.81/,PLA6/10./,PLB6/361.9/,PLC6/.5/,PLA7/174.8/         DATA1600
      DATA PLB7/.86/,PLA8/1./,PLB8/0./,PLA9/10./,PLB9/125.9/,PLC9/.7/   DATA1610
      DATA PLA10/1355./,PLB10/.63/,PLA11/1./,PLB11/0./,PLA12/122.83/    DATA1620
      DATA PLB12/.4949/,PLA13/1./,PLB13/.275/,PLC13/.275/,PLD13/0./     DATA1630
C          PLB14 AND PLC14 ARE SET BY LIQUID ROCKET RTNE. IF NOT SUPPLIEDDATA1640
      DATA PLA14/1./,PLB14/0./,PLC14/0./,PLD14/0./,PLA15/1./            DATA1650
      DATA PLB15/.11/,PLC15/3125./,PLD15/.069/,PLE15/1.18/,PLF15/0./    DATA1660
      DATA PLA16/1./,PLB16/.C0C1/,PLC16/3125./,PLD16/.029/,PLE16/0./    DATA1670
      DATA PLA17/.1925/,PLA18/1./,PLB18/1./,PLC18/0./,PLA19/1./         DATA1680
      DATA PLB19/.231/,PLC19/3000./,PLA20/1./,PLB20/0./                 DATA1690
      DATA PLA21/1./,PLB21/1./,PLC21/0./,PLD21/.231/,PLE21/3000./       DATA1700
      DATA PLPC/.1/                                                     DATA1710
C          PROPULSION (EXTERNAL BOOSTER) COST PRE-STORED VALUES         DATA1720
      DATA PEA1/.008166/,PEB1/140./,PEC1/.333/                          DATA1730
      DATA PEA2/.02022/,PEB2/140./,PEC2/.333/                           DATA1740
      DATA PEA3/1./,PEB3/0./,PEA4/1./,PEB4/.001039/,PEC4/198./          DATA1750
      DATA PED4/.333/,PEE4/0./                                          DATA1760
      DATA PEA5/1./,PEB5/.001755/,PEC5/4.6788/,PED5/1.4045/,PEE5/1.5487/DATA1770
      DATA PEF5/0./                                                     DATA1780
      DATA PEA6/1./,PEB6/1./,PEC6/3125./,PED6/.069/,PEE6/0./            DATA1790
      DATA PEA7/1./,PEB7/.00343/,PEC7/3125./,PED7/.387/,PEE7/0./        DATA1800
      DATA PEA8/.2861/,PEA9/.19305/                                     DATA1810
      DATA PEA10/1./,PEB10/1./,PEC10/0./                                DATA1820
      DATA PEA11/1./,PEB11/1./,PEC11/14.392/,PED11/.4263/               DATA1830
      DATA PEE11/0./,PEBC/.1/                                           DATA1840
C          PROPULSION (INTEGRAL RAMJET) COST PRE-STORED VALUES          DATA1850
      DATA PRIA1/1./,PRIB1/5.148/,PRIC1/.2608/                          DATA1860
      DATA PRIA2/1./,PRIB2/4.415/,PRIC2/.2608/                          DATA1870
      DATA PRIA3/1./,PRIB3/0./                                          DATA1880
      DATA PRIA4/1./,PRIB4/.001039/,PRIC4/198./,PRID4/.333/,PRIE4/0./   DATA1890
      DATA PRIA5/1./,PRIB5/122.83/,PRIC5/.4949/                         DATA1900
      DATA PRIA6/.275/,PRIA7/.275/,PRIA8/1./,PRIB8/0./                  DATA1910
      DATA PRIA9/1./,PRIB9/3.086/,PRIC9/.0577/,PRID9/4./,PRIE9/.36/     DATA1920
      DATA PRIF9/.075/,PRIG9/0./                                        DATA1930
      DATA PRIA10/5.1975/,PRIA11/1./,PRIB11/1.08/,PRIC11/2.543/         DATA1940
      DATA PRID11/.014/,PRIE11/.00002/,PRIF11/2./,PRIG11/0./            DATA1950
      DATA PRIA12/1./,PRIB12/1./,PRIC12/3125./,PRID12/.069/,PRIE12/0./  DATA1960
      DATA PRIA13/1./,PRIB13/.0001/,PRIC13/3125./,PRID13/.029/          DATA1970
      DATA PRIE13/0./                                                   DATA1980
      DATA PRIA14/1./,PRIB14/.C096/,PRIC14/140./,PRID14/.333/           DATA1990
      DATA PRIE14/0./                                                   DATA2000
      DATA PRIA15/1./,PRIB15/.C2378/,PRIC15/140./,PRID15/.333/          DATA2010
      DATA PRIE15/0./                                                   DATA2020
      DATA PRIA16/1./,PRIB16/.001195/,PRIC16/198./,PRID16/.333/         DATA2030
      DATA PRIE16/0./                                                   DATA2040
      DATA PRIA17/1./,PRIB17/.0026234/,PRIC17/4.6788/,PRID17/1.4045/    DATA2050
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      DATA PRIE17/1.5487/,PRIF17/0./                                    DATA2060
      DATA PRIA18/1./,PRIB18/1./,PRIC18/3125./,PRID18/.069/,PRIE18/0./  DATA2070
      DATA PRIA19/1./,PRIB19/.00343/,PRIC19/3125./,PRID19/.387/,        DATA2080
     1 PRIE19/0./                                                       DATA2090
      DATA PRIA20/.3861/,PRIA21/.19305/                                 DATA2100
      DATA PRIA22/1./,PRIB22/0./,PRIA23/1./,PRIB23/1./,PRIC23/0./       DATA2110
      DATA PRIA24/1./,PRIB24/2422./,PRIC24/0./,PRIA25/1./,PRIB25/0./    DATA2120
      DATA PRIA26/1./,PRIB26/1./,PRIC26/0./,PRID26/2422./,PRJC/.1/      DATA2130
C          PROPULSION (NON-INTEGRAL RAMJET) COST PRE-STORED VALUES      DATA2140
C          PRJC IS INITIALIZED IN INTEGRAL RAMJET DATA                  DATA2150
      DATA PRNA1/1./,PRNB1/5.148/,PRNC1/.2608/                          DATA2160
      DATA PRNA2/1./,PRNB2/4.415/,PRNC2/.2608/                          DATA2170
      DATA PRNA3/1./,PRNB3/0./                                          DATA2180
      DATA PRNA4/1./,PRNB4/.001039/,PRNC4/198./,PRND4/.333/,PRNE4/0./   DATA2190
      DATA PRNA5/1./,PRNB5/122.83/,PRNC5/.4949/                         DATA2200
      DATA PRNA6/.275/,PRNA7/.275/,PRNA8/1./,PRNB8/0./                  DATA2210
      DATA PRNA9/1./,PRNB9/3.086/,PRNC9/.0577/,PRND9/4./,PRNE9/.36/     DATA2220
      DATA PRNF9/.075/,PRNG9/0./                                        DATA2230
      DATA PRNA10/5.1975/,PRNA11/1./,PRNB11/1.08/,PRNC11/2.543/         DATA2240
      DATA PRND11/.014/,PRNE11/.00002/,PRNF11/2./,PRNG11/0./            DATA2250
      DATA PRNA12/1./,PRNB12/1./,PRNC12/3125./,PRND12/.069/,PRNE12/0./  DATA2260
      DATA PRNA13/1./,PRNB13/.0001/,PRNC13/3125./,PRND13/.029/          DATA2270
      DATA PRNE13/0./                                                   DATA2280
      DATA PRNA14/1./,PRNB14/.008166/,PRNC14/140./,PRND14/.333/         DATA2290
      DATA PRNE14/0./                                                   DATA2300
      DATA PRNA15/1./,PRNB15/.02022/,PRNC15/140./,PRND15/.333/          DATA2310
      DATA PRNA16/1./,PRNB16/.001039/,PRNC16/198./,PRND16/.333/         DATA2320
      DATA PRNA17/1./,PRNB17/.001755/,PRNC17/4.6788/,PRND17/2.809/,     DATA2330
     1 PRNE17/1.5487/                                                   DATA2340
      DATA PRNA18/1./,PRNB18/0./,PRNA19/1./,PRNB19/1./,PRNC19/0./       DATA2350
      DATA PRNA20/1./,PRNB20/2040./,PRNC20/0./,PRNA21/1./,PRNB21/0./    DATA2360
      DATA PRNA22/1./,PRNB22/1./,PRNC22/0./,PRND22/2040.0/              DATA2370
      DATA PTR1,PTC1,PLC14/1.52,0.6,0.2608/                             DATA2380
      DATA IPRCST,IGTYPE,ICTYPE/0,1,1/                                  DATA2390
      DATA NSCRC/0/                                                     DATA2400
      DATA WTGUID,A/50.,1000./                                          DATA2410
      DATA WTGUID,KGTABL,KGTYPE,DUMGX/0.,1,11,9*0./                     DATA2420
      DATA S,QD,QA,R,IYEAR/1000.,20.,1.,   1.,1974/                     DATA2430
      DATA SAWTI/50.,100.,150./                                         DATA2440
      DATA SAWTJ/50.,100.,150./                                         DATA2450
      DATA SAFCI/10.,9.,8./                                             DATA2460
      DATA SAFCJ/20.,15.,10./                                           DATA2470
      DATA AWTI/150.,250.,350./                                         DATA2480
      DATA AWTJ/150.,250.,350./                                         DATA2490
      DATA APPEKI/40.,150.,250./                                        DATA2500
      DATA APPEKJ/40.,150.,250./                                        DATA2510
      DATA AFCI,AFCJ/9.,15./                                            DATA2520
      DATA KASTB,KAAGT,NACHN,KASGT/4*0/                                 DATA2530
      DATA KSASTB,KSAAGT,NSACHN,KSASGT/4*0/                             DATA2540
      DATA GIRWT/25.,50.,100./                                          DATA2550
      DATA GIRBSP/2.,2.,6./                                             DATA2560
      DATA GIRNDT/3*1./                                                 DATA2570
      DATA GIREC/2.,4.,11./                                             DATA2580
      DATA QMAXQ,VMAXQ,DUMQA/10*0.0/                                    DATA2590
      DATA PTR1/0.0/                                                    DATA2591
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      END                                                              DATA2600


      SUBROUTINE DATA 2 ( I, JB,NB,NL,A,C,D,E,F,G)                     DRDS0010
C   MODIFIED FEBRUARY 1972 GMCC                                        DRDS0020
      DIMENSION A(15),C(15,15),D(15,15),NB(15),E(15,15),F(15,15),      DRDS0030
     XG(15,15)                                                         DRDS0040
      COMMON /DEVICE/ NDEV(12)                                         DRDS0050
      EQUIVALENCE ( NDEV(5), N5 )                                      DRDS0060
   50 CONTINUE                                                         DRDS0070
      READ (N5,10) AA,JB,NL,CC,GG,FF,EE,DD                            DRDS0080
   10 FORMAT(2X,A4,2I2,5A4 )                                          DRDS0090
      READ(N5,30) ( A(N), N=1,NL )                                     DRDS0100
   30 FORMAT ( 10X, 6F10.0  )                                         DRDS0110
      READ(N5,15) ( NB(N), N=1,NL  )                                   DRDS0120
   15 FORMAT ( 2012 )                                                 DRDS0130
   55 DO 170 N =1,NL                                                  DRDS0140
   60 KL=NB(N)                                                        DRDS0150
      READ(N5,30) ( C(N,K), K=1,KL )                                   DRDS0160
      GO TO ( 81, 75, 70, 65 ) , JB                                    DRDS0170
   65 READ(N5,30) (G(N,K),K=1,KL)                                     DRDS0180
   70 READ(N5,30) (F(N,K),K=1,KL)                                     DRDS0190
   75 READ(N5,30) (E(N,K),K=1,KL)                                     DRDS0200
   81 READ(N5,30) (D(N,K),K=1,KL)                                     DRDS0210
  170 CONTINUE                                                        DRDS0220
      RETURN                                                           DRDS0230
      END                                                              DRDS0240


      SUBROUTINE PAGE                                                  PAGE0010
C** PGM=NXX          L.D.GREGORY. VER.1  11-15-72. FORTRAN IV.  EBCD   PAGE0020
      COMMON/INOUT/NLINE,NPAGE,PCODE(20),IDUM(108)                     PAGE0030
      COMMON/SECIO/CLAS(20)                                            PAGE0040
 1000 FORMAT(//26X,19A4,A3/1H1,25X,19A4,A3/)                           PAGE0050
 2000 FORMAT(6X,19A4,A3,6X, 4HPAGE,I4/)                               PAGE0060
      WRITE( 6,1000) CLAS, CLAS                                        PAGE0070
      WRITE( 6,2000) PCODE,NPAGE                                       PAGE0080
      NPAGE = NPAGE + 1                                                PAGE0090
      NLINE = 8                                                        PAGE0100
      RETURN                                                           PAGE0110
      END                                                              PAGE0120


      SUBROUTINE RJINPT ( IZ4, NRAMPX, IPRIN,ITABL )                   RJIN0010
C     OPTIONAL TABULAR READ OR NAMELIST READ                           RJIN0020
C     NAMELIST READS AS STORED...WITH INDICES REVERSED FROM            RJIN0030
C     SYSTEM  NORMAL STORAGE.....K,J,I,   NOT IMJ,K                    RJIN0040
C     REFORMATTED OUTPUT ..... NOT AS READ IN                          RJIN0050
      COMMON /ALTDD/                                                   RJIN0060
     1K1,ALT(24),SDTEMP(24),PRESS(24),ID(8)                            RJIN0070
      COMMON/CODEXX/ II(16)                                            RJIN0080
      EQUIVALENCE ( II(2), ITYPE )                                     RJIN0090
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      EQUIVALENCE ( II(8), NDUCT ), ( II(9), NFRNG )                          RJIN0100
      COMMON /EXTERN/ EXTR14 (14), ASPECT, EXTX, DSMACH, DSHT, EXTR2(2)       RJIN0110
      COMMON /FUELXX/  K2, KK(15), TT2(15),FAR1(15,15),TRHI(15,15),           RJIN0120
     1                 TRMED(15,15),TRLO(15,15),                            RJIN0130
     2                 K3, KL(15), JGAMM, TT4A(15),FAR2(15,15),             RJIN0140
     3                 GAMLO(15,15),GAMMED(15,15), GAMHI(15,15),            RJIN0150
     4                 K4, KN(15), JR, TT4B(15), FAR3(15,15),               RJIN0160
     5                 GASLO(15,15), GASMED(15,15), GASHI(15,15),           RJIN0170
     6                 NB1, BSP(24), COMEFF(24), RLEAN(24)                  RJIN0180
      COMMON /INDATX/ THXX(23)                                                RJIN0190
      EQUIVALENCE (THXX(21),TSTART),(THXX(22),TFRNG)                          RJIN0200
      COMMON /INDES/ XINDD(16)                                                RJIN0210
      EQUIVALENCE ( XINDD(1), XR1),  ( XINDD(2), XR2 ), ( XINDD(3),XR3),RJIN0220
     1            ( XINDD(4), XR4), ( XINDD(5), XC ),                         RJIN0230
     2           ( XINDD(6), YR1 ), ( XINDD(7), YR2 ),                        RJIN0240
     4           ( XINDD(8), YR3 ), ( XINDD(9), YR4 ),                        RJIN0250
     5           ( XINDD(10), YC ), ( XINDD(11), XT ),                        RJIN0260
     6           ( XINDD(12), ZMACHT ), ( XINDD(13), YRANG1 ),                RJIN0270
     7           ( XINDD(14), YRANG2 ), ( XINDD(15), YRANG3 )                 RJIN0280
      COMMON/INLETX/                                                          RJIN0290
     6K8,KPTC(15),ALPHV(15),AAMACH(15,15),ADACC(15,15),PT3PTC(15,15),         RJIN0300
     1ADDD(15,15)                                                             RJIN0310
      COMMON /NFILES/ N5, N6, N7, N11, N12, N1                                RJIN0320
      COMMON /RJBLOK/ RJ(50)                                                  RJIN0330
      EQUIVALENCE                                                             RJIN0340
     1(RJ( 1),CNM    ),(RJ( 2),ANC    ),(RJ( 3),ANN    ),(RJ( 4),AL     ),  RJIN0350
     2(RJ( 5),PT2PD  ),(RJ( 6),CDB    ),(RJ( 7), C1    ),(RJ( 8),PT4X   ),  RJIN0360
     3(RJ( 9),PT4Y   ),(RJ(10),GAM    ),(RJ(11),A6MAX  ),(RJ(12),ACMAX  ),  RJIN0370
     4(RJ(13),A6MIN  ),(RJ(14),XMOMR  ),(RJ(15),ADAC   ),(RJ(16),CDA    ),  RJIN0380
     5(RJ(17),DELT4  ),(RJ(18),PCMGN  ),(RJ(19),AMACH  ),(RJ(20),ALFCLD),  RJIN0390
     6(RJ(21),A2A3   ),(RJ(22),FARLB  ),(RJ(23),IFTYPE),(RJ(24),BPAR   ),  RJIN0400
     7(RJ(25),ALF1   ),(RJ(26),TT4    ),(RJ(27),FAR    ),(RJ(28),PM     ),  RJIN0410
     8(RJ(29),WF     ),(RJ(30),ANC4   ),(RJ(31),PT2PCC),(RJ(32),PTO    ),  RJIN0420
     9(RJ(33),TO     ),(RJ(34),PO     ),(RJ(35),KDIA   ),(RJ(36),PT4I   ),  RJIN0430
     X (RJ(37),PT41   ),(RJ(38),PT42   ),(RJ(39),PT43   )                    RJIN0440
      COMMON /RJTITL/  TITLE(20)                                              RJIN0450
      COMMON/TRAJX/ CFNET,CFNRQ,AMAXX,ALXX,MODES,IND,FARMAX,TT4MAX,FSLRCRJIN0460
     1,ICODE                                                                  RJIN0470
C     TABLE 2 TEMP RISE                                                       RJIN0480
C     TABLE 3 GAMMA                                                           RJIN0490
C     TABLE 4 GAS CONSTANT                                                    RJIN0500
C     TABLE 5  BURNER SEVERITY TABLE,ANC AND LEAN BLOW OUT                    RJIN0510
C     TABLE 6 INLET MAP                                                       RJIN0520
C     IFTYPE = 0 FOR JP5 FUEL                                                 RJIN0530
C     IFTYPE = 1 FOR HD4C OR BORON SLURRY                                     RJIN0540
C     READ AND WRITE TITLE,FUEL,TABLES,+INPUT DATA                            RJIN0550
      NAMELIST /NAMTRS/ KK,K2, TT2, FAR1, TRLO, TRMED, TRHI                   RJIN0560
      NAMELIST /NAMSPH/ KL,K3, TT4A, FAR2, GAMLO, GAMMED, GAMHI               RJIN0570
      NAMELIST /NAMGSC/ KN,K4, TT4B,  FAR3,                                   RJIN0580
     1                                GASLO,GASMED, GASHI                      RJIN0590
      NAMELIST /NAMBSP/ NB1, BSP, COMEFF, RLEAN                               RJIN0600
      NAMELIST /NAMINM/ KPTC,K8,ALPHV,AAMACH,ADDD,ADACC,PT3PTC,               RJIN0610
     1   ASPECT,  DSHT,  DSMACH,  NDUCT,  NFRNG,  NRAMP,                      RJIN0620
     2       TFRNG, TSTART, XC, XR1, XR2, XR3, XR4, XT, YC,                   RJIN0630
     3   YR1, YR2, YR3, YR4, YRANG1, YRANG2, YRANG3, ZMACHT                   RJIN0640
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      JPTC=3                                                            RJIN0650
      IFF = 1                                                           RJIN0660
      IF ( IFTYPE .GT. 0 ) IFF = 3                                      RJIN0670
      IF ( (IZ4.LT.56) .OR. (IZ4.GT.65) ) GO TO 66                      RJIN0680
   57 IF ( IZ4 .NE. 57 )  GO TO 58                                      RJIN0690
      IF(ITABL.EQ.0) READ(N5,NAMTRS)                                    RJIN0700
      IF(ITABL.NE.0) CALL DATA2(1,3,                                    RJIN0710
     1              KK,K2,TT2,FAR1,TRHI,TRMED,TRLO,G)                   RJIN0720
      IF ( IPRIN  .LE.  0 ) GO TO 58                                    RJIN0730
C     WRITE TEMPERATURE RISE LIST                                       RJIN0740
      NONE=1                                                            RJIN0750
      NTWO=2                                                            RJIN0760
      NTHR=3                                                            RJIN0770
      NFOR=4                                                            RJIN0780
      DO 2999 MI = 1, K2, 4                                             RJIN0790
      WRITE ( N6, 2300 )                                                RJIN0800
 2300 FORMAT( // 50X,28HTEMPERATURE RISE DATA TABLES  // )               RJIN0810
      WRITE(N6,2310) NONE, TT2(NONE), NTWO, TT2(NTWO)                   RJIN0820
 2310 FORMAT(10X8HSUBTABLE , I4, 5X,6HTT2  =, F7.2,                     RJIN0830
     1       35X8HSUBTABLE , I4, 5X,6HTT2  =, F7.2  )                   RJIN0840
      WRITE(N6,2315)                                                    RJIN0850
 2315 FORMAT( 9X4HFAR1,8X4HTRLO, 11X5HTRMED, 11X4HTRHI,                 RJIN0860
     1       18X4HFAR1,8X4HTRLO, 11X5HTRMED, 11X4HTRHI  )               RJIN0870
      IKK = MAXO ( KK(NONE), KK(NTWO)  )                                RJIN0880
      WRITE(N6,2320) ((FAR1(NONE,I), TRLO(NONE,I), TRMED(NONE,I),       RJIN0890
     1 TRHI(NONE,I),   FAR1(NTWO,I), TRLO(NTWO,I), TRMED(NTWO,I),      RJIN0900
     2 TRHI(NTWO,I) ), I=1, IKK )                                       RJIN0910
 2320 FORMAT(5XF10.4, 3F15.4, 10XF10.4, 3F15.4  )                       RJIN0920
      IF ( K2 .LT. NTHR ) CALL PAGE                                     RJIN0930
      IF ( K2  .LT. NTHR ) GO TO 2999                                   RJIN0940
      WRITE(N6,6325)                                                    RJIN0950
      WRITE(N6,2310) NTHR, TT2(NTHR), NFOR, TT2(NFOR)                   RJIN0960
      WRITE(N6,2315)                                                    RJIN0970
      IKK = MAXO ( KK(NTHR), KK(NFOR)  )                                RJIN0980
      WRITE(N6,2320) ((FAR1(NTHR,I), TRLO(NTHR,I), TRMED(NTHR,I),       RJIN0990
     1 TRHI(NTHR,I),   FAR1(NFOR,I), TRLO(NFOR,I), TRMED(NFOR,I),      RJIN1000
     2 TRHI(NFOR,I) ), I=1, IKK )                                       RJIN1010
      NONE=NONE+4                                                       RJIN1020
      NTWO=NTWO+4                                                       RJIN1030
      NTHR=NTHR+4                                                       RJIN1040
      NFOR=NFOR+4                                                       RJIN1050
      CALL PAGE                                                         RJIN1060
 2999 CONTINUE                                                          RJIN1070
   58 IF ( IZ4 .NE. 58 )  GO TO 59                                      RJIN1080
      IF(ITABL.EQ.0) READ(N5,NAMSPH)                                    RJIN1090
      IF( (ITABL.NE.0) .AND. (IFF.EQ.3) ) CALL DATA2(1,IFF,             RJIN1100
     1              KL,K3,TT4A,FAR2,GAMHI,GAMMED,GAMLO,G)               RJIN1110
      IF( (ITABL.NE.0) .AND. (IFF.EQ.1) ) CALL DATA2(1,IFF,             RJIN1120
     1     KL,K3,TT4A,FAR2,GAMLO,GG1,GG2,G)                            RJIN1130
      IF ( IPRIN .LE. 0 ) GO TO 59                                      RJIN1140
C     WRITE SPECIFIC HEAT LIST                                          RJIN1150
      NONE=1                                                            RJIN1160
      NTWO=2                                                            RJIN1170
      NTHR=3                                                            RJIN1180
      NFOR=4                                                            RJIN1190
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```
      DO 3999 MI = 1, K3, 4                                                  RJIN1200
      WRITE(N6,3300)                                                         RJIN1210
 3300 FORMAT( // 50X, 25HSPECIFIC HEAT DATA TABLES   // )                    RJIN1220
      WRITE(N6,3310) NONE, TT4A(NONE), NTWO, TT4A(NTWO)                      RJIN1230
 3310 FORMAT( 9X8HSUBTABLE, I4, 5X6HTT4A =, F7.2,                            RJIN1240
     1        35X8HSUBTABLE, I4, 5X6HTT4A =, F7.2    )                     RJIN1250
      WRITE(N6,3315)                                                         RJIN1260
 3315 FORMAT( 9X4HFAR2,9X5HGAMLO, 10X6HGAMMED,  9X5HGAMHI,                   RJIN1270
     1        17X4HFAR2,9X5HGAMLO, 10X6HGAMMED, 10X5HGAMHI   )              RJIN1280
      IKL = MAXO ( KL(NONE) , KL(NTWO)  )                                    RJIN1290
      WRITE(N6,3320) (( FAR2(NONE,I), GAMLO(NONE,I), GAMMED(NONE,I),         RJIN1300
     1 GAMHI(NONE,I),  FAR2(NTWO,I), GAMLO(NTWO,I), GAMMED(NTWO,I),          RJIN1310
     2 GAMHI(NTWO,I) ), I= 1, IKL )                                          RJIN1320
 3320 FORMAT(5XF10.4, 3F15.6, 10XF10.4, 3F15.6  )                            RJIN1330
      IF ( K3 .LT. NTHR ) CALL PAGE                                          RJIN1340
      IF ( K3  .LT. NTHR ) GO TO 3999                                        RJIN1350
      WRITE(N6,6325)                                                         RJIN1360
      WRITE(N6,3310) NTHR, TT4A(NTHR), NFOR, TT4A(NFOR)                      RJIN1370
      WRITE(N6,3315)                                                         RJIN1380
      IKL = MAXO ( KL(NTHR) , KL(NFOR)  )                                    RJIN1390
      WRITE(N6,3320) (( FAR2(NTHR,I), GAMLO(NTHR,I), GAMMED(NTHR,I),         RJIN1400
     1 GAMHI(NTHR,I),  FAR2(NFOR,I), GAMLO(NFOR,I), GAMMED(NFOR,I),          RJIN1410
     2 GAMHI(NFOR,I) ), I= 1, IKL )                                          RJIN1420
      NONE=NONE+4                                                            RJIN1430
      NTWO=NTWO+4                                                            RJIN1440
      NTHR=NTHR+4                                                            RJIN1450
      NFOR=NFOR+4                                                            RJIN1460
      CALL PAGE                                                              RJIN1470
 3999 CONTINUE                                                               RJIN1480
   59 IF ( IZ4 .NE. 59 )  GO TO 60                                           RJIN1490
      IF(ITABL.EQ.0) READ(N5,NAMGSC)                                         RJIN1500
      IF( (ITABL.NE.0) .AND. (IFF.EQ.3) ) CALL DATA2(1,IFF,                  RJIN1510
     1              KN,K4,TT4B,FAR3,GASHI,GASMED,GASLO,G)                    RJIN1520
      IF( (ITABL.NE.0) .AND. (IFF.EQ.1) ) CALL DATA2(1,IFF,                  RJIN1530
     1     KN,K4,TT4B,FAR3,GASLO,GG1,GG2,G)                                  RJIN1540
      IF ( IPRIN .LE. 0 ) GO TO 60                                           RJIN1550
C     WRITE GAS CONSTANT LIST                                                RJIN1560
      NONE=1                                                                 RJIN1570
      NTWO=2                                                                 RJIN1580
      NTHR=3                                                                 RJIN1590
      NFOR=4                                                                 RJIN1600
      DO 4999 MI=1,K4,4                                                      RJIN1610
      WRITE(N6,4300)                                                         RJIN1620
 4300 FORMAT( // 50X, 24HGAS CONSTANT DATA TABLES   // )                     RJIN1630
      WRITE(N6,4310) NONE, TT4B(NONE),NTWO, TT4B(NTWO)                       RJIN1640
 4310 FORMAT( 9X8HSUBTABLE, I4, 5X6HTT4B =, F7.2,                            RJIN1650
     1        35X8HSUBTABLE, I4, 5X6HTT4B =, F7.2  )                        RJIN1660
      WRITE(N6,4315)                                                         RJIN1670
 4315 FORMAT( 9X4HFAR3,10X5HGASLO, 10X6HGASMED, 10X5HGASHI,                  RJIN1680
     1        17X4HFAR3,10X5HGASLO, 10X6HGASMED, 10X5HGASHI   )             RJIN1690
      IKL = MAXO (  KN(NONE) ,  KN(NTWO) )                                   RJIN1700
      WRITE (N6,4320) (( FAR3(NONE,I), GASLO(NONE,I), GASMED(NONE,I),        RJIN1710
     1 GASHI(NONE,I),  FAR3(NTWO,I), GASLO(NTWO,I), GASMED(NTWO,I),          RJIN1720
     2 GASHI(NTWO,I)  ) , I=1,IKL )                                          RJIN1730
 4320 FORMAT( 5XF10.4, 3F15.4, 10XF10.4, 3F15.4   )                          RJIN1740
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      IF ( K4 .LT. NTHR ) CALL PAGE                                          RJIN1750
      IF ( K4  .LT.  NTHR  )  GO TO 4999                                     RJIN1760
      WRITE(N6,6325)                                                         RJIN1770
      WRITE(N6,4310) NTHR, TT4B(NTHR),NFOR, TT4B(NFOR)                       RJIN1780
      WRITE(N6,4315)                                                         RJIN1790
      IKL = MAXO (  KN(NTHR) ,  KN(NFOR) )                                   RJIN1800
      WRITE (N6,4320) (( FAR3(NTHR,I), GASLO(NTHR,I), GASMED(NTHR,I),        RJIN1810
     1 GASHI(NTHR,I),  FAR3(NFOR,I), GASLO(NFOR,I), GASMED(NFOR,I),          RJIN1920
     2 GASHI(NFOR,I)  ) , I=1,IKL )                                          RJIN1830
      NONE=NONE+4                                                            RJIN1840
      NTWO=NTWO+4                                                            RJIN1850
      NTHR=NTHR+4                                                            RJIN1860
      NFOR=NFOR+4                                                            RJIN1870
      CALL PAGE                                                              RJIN1880
 4999 CONTINUE                                                               RJIN1890
   60 IF ( IZ4 .NE. 60 )  GO TO 61                                           RJIN1900
      READ (N5, NAMBSP )                                                     RJIN1910
      IF ( IPRIN  .LE.  0  )  GO TO 61                                       RJIN1920
C     WRITE BURNER SEVERITY LIST                                             RJIN1930
      WRITE ( N6, 5100 )                                                     RJIN1940
 5100 FORMAT( /// 15X26HBURNER SEVERITY DATA TABLE   //                      RJIN1950
     1      /   17X3HBSP,9X6HCOMEFF,10X5HRLEAN  / )                         RJIN1960
      WRITE ( N6, 5200) ( ( BSP(NI),COMEFF(NI),RLEAN(NI) ), NI=1,NBL )       RJIN1970
 5200 FORMAT ( 5X, F15.2, F15.4, F15.5 )                                     RJIN1980
      CALL PAGE                                                              RJIN1990
   61 CONTINUE                                                               RJIN2000
      IF ((IZ4.NE.61).AND.(IZ4.NE.62)) GO TO 62                              RJIN2010
      NRAMP = NRAMPX                                                         RJIN2020
      READ (N5, NAMINM )                                                     RJIN2030
      XINDD(16) = DSMACH                                                     RJIN2040
      NRAMPX = NRAMP                                                         RJIN2050
      IF ( IPRIN  .LE.  0  )  GO TO 1111                                     RJIN2060
      IF ( ITYPE  .EQ.  1  )  WRITE(N6, 545 )                                RJIN2070
      IF ( ITYPE  .EQ.  2  )  WRITE(N6, 546 )                                RJIN2080
  545 FORMAT(///10X,28HBELLY INLET DESIGN REQUESTED          )               RJIN2090
  546 FORMAT(///10X,31HDUAL AFT INLET DESIGN REQUESTED         )             RJIN2100
      WRITE(N6, 550 ) NRAMP, DSMACH, DSHT                                    RJIN2110
  550 FORMAT(20X,8HRAMPS - , I10/ 20X,8HMACH  - , F10.3/                     RJIN2120
     1  20X,8HALT   - ,F10.0   /// )                                         RJIN2130
C     WRITE INLET SIZING TERMS                                               RJIN2140
      WRITE(N6,570) ASPECT,ZMACHT,NDUCT,NFRNG,TFRNG,TSTART,                  RJIN2150
     1      XR1,YR1,XR2,YR2,XR3,YR3,XR4,YR4,XC,YC,XT                         RJIN2160
      WRITE(N6,571) YRANG1, YRANG2,YRANG3                                    RJIN2170
  570 FORMAT(/// 40X6HASPECT,F10.4/  40X6HZMACHT,F10.4/                      RJIN2180
     1  40X6HNDUCT ,I10/  40X6HNFRNG ,I10/  40X6HTFRNG ,F10.4/               RJIN2190
     2   40X6HTSTART,F10.4///  40X3HXR1,F13.4, 5X3HYR1,F10.4/                RJIN2200
     3   40X3HXR2,F13.4, 5X3HYR2,F10.4/   40X3HXR3,F13.4, 5X3HYR3,F10.4/     RJIN2210
     4   40X3HXR4,F13.4, 5X3HYR4,F10.4/                                      RJIN2220
     5   40X2HXC,F14.4, 5X2HYC,F11.4/ 40X2HXT,F14.4///)                      RJIN2230
  571 FORMAT(40X6HYRANG1,F10.4/ 40X6HYRANG2,F10.4/ 40X6HYRANG3,F10.4)        RJIN2240
 1111 CONTINUE                                                               RJIN2250
      IF (  IZ4  .NE.  62  )  GO TO 660                                      RJIN2260
      KTEL=1                                                                 RJIN2270
      CALL DATA2(KTEL,JPTC,KPTC,K8,ALPHV,AAMACH,ADDO,AOACC,PT3PTC,G)         RJIN2280
  660 CONTINUE                                                               RJIN2290
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      IF ( IPRIN .LE. C ) GO TO 62                                      RJIN2300
C     WRITE INLET MAP - CRITICAL                                        RJIN2310
      NONE=1                                                            RJIN2320
      NTWO=2                                                            RJIN2330
      NTHR=3                                                            RJIN2340
      NFOR=4                                                            RJIN2350
      CALL PAGE                                                         RJIN2360
      DO 6999 MI=1,K8,4                                                 RJIN2370
      WRITE(N6,6300)                                                    RJIN2380
 6300 FORMAT( // 45X, 20HINLET MAP - CRITICAL    // )                   RJIN2390
      WRITE(N6,6310) NONE,ALPHV(NONE),  NTWO,ALPHV(NTWO)                RJIN2400
 6310 FORMAT( 9X,8HSUBTABLE, I4,5X6HALPHV= ,F7.2,                       RJIN2410
     1        35X,8HSUBTABLE, I4,5X6HALPHV= ,F7.2   /  )                RJIN2420
      WRITE(N6,6315)                                                    RJIN2430
 6315 FORMAT(9X6HAAMACH,8X4HADDD,12X5HAOACC,9X6HPT3PTO,                  RJIN2440
     1       15X6HAAMACH,8X4HADDD,12X5HAOACC,9X6HPT3PTO   )             RJIN2450
      IKPT = MAXO ( KPTC(NONE), KPTC(NTWO)  )                           RJIN2460
      WRITE(N6,6320) ( ( AAMACH(NONE,I),ADDD(NONE,I),AOACC(NONE,I),     RJIN2470
     1 PT3PTO(NONE,I), AAMACH(NTWO,I), ADDD(NTWO,I), AOACC(NTWO,I),     RJIN2480
     2 PT3PTO(NTWO,I) ), I=1, IKPT )                                    RJIN2490
 6320 FORMAT(5XF10.4,F15.5,F15.5,F15.5, 10XF10.4,F15.5,2F15.5 )         RJIN2500
      IF ( K8 .LT. NTHR ) CALL PAGE                                     RJIN2510
      IF ( K8  .LT.  NTHR ) GO TO 6999                                  RJIN2520
      WRITE (N6,6325)                                                   RJIN2530
 6325 FORMAT(  ///// )                                                  RJIN2540
      WRITE(N6,6310) NTHR,ALPHV(NTHR),  NFOR,ALPHV(NFOR)                RJIN2550
      WRITE(N6,6315)                                                    RJIN2560
      IKPT = MAXO ( KPTC(NTHR), KPTC(NFOR)  )                           RJIN2570
      WRITE(N6,6320) ( ( AAMACH(NTHR,I),ADDD(NTHR,I),AOACC(NTHR,I),     RJIN2580
     1 PT3PTO(NTHR,I), AAMACH(NFOR,I), ADDD(NFOR,I), AOACC(NFOR,I),     RJIN2590
     2 PT3PTO(NFOR,I) ), I=1, IKPT )                                    RJIN2600
      NONE = NONE + 4                                                   RJIN2610
      NTWO = NTWO + 4                                                   RJIN2620
      NTHR = NTHR + 4                                                   RJIN2630
      NFOR = NFOR + 4                                                   RJIN2640
      CALL PAGE                                                         RJIN2650
 6999 CONTINUE                                                          RJIN2660
   62 IF (IZ4.NE.63) GO TO 63                                           RJIN2670
   63 IF (IZ4.NE.64) GO TO 64                                           RJIN2680
   64 IF ( IZ4 .NE.65 ) GO TO 66                                        RJIN2690
   66 CONTINUE                                                          RJIN2700
      RETURN                                                            RJIN2710
       END                                                              RJIN2720


      SUBROUTINE SETUP1(IX,IZ5,KASE,IXX, Z3  )                          SETU0010
C  PGM=NU6(CGSM) L.D.GREGORY, 3-53300. VER.2, 06-09-71.FORTRAN IV.EBCD  SETU0020
C     TO READ COMPATIBILITY MATRICES                                    SETU0030
      COMMON /NFILES/ N5,N6,N7,N11,N12,N1                               SETU0040
      INTEGER*4   Z3                                                    SETU0050
       COMMON/CON1/INX(16),NCNCPT,NSSTYP,IL(30),NICOMA                  SETU0060
       COMMON/S11/TITLE6(15),TITLE7(15),TITLE8(14)                      SETU0070
       INTEGER*2  ICM                                                   SETU0080
       COMMON/CSET3/KAS ,LBVIX,LABVIX,MBVIX,MABVIX,NBV,NAUXV,IMBVIX(24) SETU0090
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     1,    BAUXV(16,10),BTC(4,30)                                          SETU0100
     2,    BVIX(24,16),NT(30),LABT,MABT,NABT,NBT,BT(10,10,30)              SETU0110
     3,    ICM(16,16,10)                                                   SETU0120
       COMMON/S13/MINX(70),IR(70),IC(70),IS1(70),IS2(70)                   SETU0130
       COMMON/TEMP/JX1(70),JX2(70),JX3(70),JX4(70),RX1(70),RX2(70),        SETU0140
     1   RX3(70),  RX4(70), JX(24)                                         SETU0150
       DATA COMPAT/4HCOMP/                                                 SETU0160
CZAZA                                                                      SETU0170
       COMMON/CZAZA/NCBA,IDA1,IDA2,IDA3,JZARL,LZA,MZA,ICA(16),CA(16)       SETU0180
     1, TITLA(15),HEADA(37),IFMT                                           SETU0190
     2, LA1,LAA1,MA1,MAA1,KA1(  31,5),VA1(  31,12)          ,PADZA(77 )  SETU0200
       DIMENSION  BZA( 700)                                                SETU0210
       EQUIVALENCE  (NCBA,BZA(1))                                          SETU0220
       COMMON/BASTAB/KZARL,KZARS                                           SETU0230
 2005  FORMAT(1HO,22HERROR IN SETUP1 AT E1=F8.2,(6X,5G12.5))                SETU0240
C**                                                                        SETU0250
C** READ BASIC VARIABLES TABLE AND RECORD NSSTYP=NVAR & IL(I)=NO.OF EA.     SETU0260
 1     IY  = 3                                                             SETU0270
       IDA1 = 2010000                                                      SETU0280
      KASE = IDA2                                                          SETU0290
       CALL  RCBD11(BZA,LZA,MZA,NCBA,KZARL,IDA1,IDA2,IY,IXX)               SETU0300
       NSSTYP = LA1                                                        SETU0310
       IF (IXX.EQ.0)  GO TO 104                                            SETU0320
       E1  = 1.06                                                          SETU0330
  103 WRITE (N6,2005) E1,IDA1,IDA2                                         SETU0340
       RETURN                                                              SETU0350
 104   DO 105 I=1,NSSTYP                                                  SETU0360
 105   IL(I) = KA1(I,5)                                                    SETU0370
C**                                                                        SETU0380
C                                                                          SETU0390
      IF ( Z3   .GT.  0   )  GO TO 1111                                    SETU0400
C                                                                          SETU0410
C**    GO READ COMPATIBILITY MATRIX INDEX                                  SETU0420
   11 CONTINUE                                                             SETU0430
      READ(N5,9000) NUMT, NUMC                                             SETU0440
 9000 FORMAT(12X, I7, 10X, I5 )                                            SETU0450
      READ(N5,1000) TITLE6, NICOMA                                         SETU0460
 1000  FORMAT(15A4,I10)                                                    SETU0470
      READ (N5,1000) TITLE7,NCNCPT                                         SETU0480
   12 READ (N5,1002) (JX1(I),JX2(I),JX3(I),I=1,8)                          SETU0490
 1002  FORMAT(8(I3,1X,I2,1X,I2,1X))                                        SETU0500
C                                                                          SETU0510
C      REINTERPRET, FIND DIMENSIONS, STORE IN MINX, IR, IC                 SETU0520
       DO 14 I=1,8                                                         SETU0530
       J= JX1(I)                                                           SETU0540
       K= JX2(I)                                                           SETU0550
       L= JX3(I)                                                           SETU0560
       IF((J.GT.NICOMA).OR.(J.LE.0)) GO TO 16                              SETU0570
       M= IL(K)                                                            SETU0580
       N= IL(L)                                                            SETU0590
       IF((M.NE.0).AND.(N.NE.0)) GO TO 13                                  SETU0600
       M=0                                                                 SETU0610
       N=0                                                                 SETU0620
   13  MINX(J)=          K*10**6+L*10**4+M*100+N                           SETU0630
       IS1(J)=K                                                            SETU0640
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      IS2(J)=L                                                          SETU0650
      IR(J)=M                                                           SETU0660
   14 IC(J)=N                                                           SETU0670
      IF((J.NE.0).AND.(J.LT.NICOMA)) GO TO 12                           SETU0680
C**                                                                     SETU0690
   16 READ (N5,1010) (TITLE8(I),I=1,7),MX,(TITLE8(I),I=8,14),N         SETU0700
 1010 FORMAT(6A4,A1,I5,10X,6A4,A1,I5)                                   SETU0710
      IF(TITLE8(1).EQ.COMPAT)  GO TO 18                                 SETU0720
      STEP=16.02                                                        SETU0730
      WRITE (N6,2000) STEP                                              SETU0740
 2000 FORMAT(1H0,5X,22HERROR IN SET1 AT STEP=,F10.2)                    SETU0750
   18 IF(N.EQ.NCNCPT)  GO TO  20                                        SETU0760
      STEP=18.01                                                        SETU0770
      WRITE (N6,2000) STEP                                              SETU0780
   20 L1=IR(MX)                                                         SETU0790
      L2=IC(MX)                                                         SETU0800
      DO 22 J=1,L1                                                      SETU0810
   22 READ  (N5,1012) (ICM(J,K,MX),K=1,L2)                              SETU0820
 1012 FORMAT(10X,14I5)                                                  SETU0830
      IF(MX.LT.NICOMA) GO TO 16                                         SETU0840
      RETURN                                                            SETU0850
 1111 CONTINUE                                                          SETU0860
      NICOMA = -1                                                       SETU0870
      NCNCPT = 0                                                        SETU0880
      RETURN                                                            SETU0890
      END                                                               SETU0900
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      SUBROUTINE  SETUP3(IX,IZ5,KASS,IPR,NLINE,NPAGE,PCODE,IXX)         SETU0870
C  PGM=NU6(CCSM) L.D.GREGORY, 3-53300. VER.2, 05-25-71.FORTRAN IV.EBCD  SETU0880
C  SUBROUTINE PURPOSE. RETRIEVE TYPE 2 TABLES FROM BASIC TABLE FILE,    SETU0890
C    (DISK 11) AND STORE IN CORE FOR USE.                               SETU0900
C  PGM=NU6(CCSM)   R.K.MCDONOUGH  35240C  2/29/72  F-IV/EBCD           SETU0910
C  IX  =  Z4 = 1,  INITIAL SETUP.  PRINT IF IPR=IPR(5)= 1.              SETU0920
C             = 2,  PRINT ONLY, SEE IPR                                SETU0930
C  IPR = IPR(5) = 1, PRINT BORDERED TABLE ONLY                         SETU0940
C  IPR = IPR(5) = 2, PRINT BORDERED TABLE ONLY + AUX                   SETU0950
C  IPR = IPR(5) = 3, PRINT BORDERED TABLE ONLY + AUX + IMBVIX          SETU0960
C IZ5      = UNUSED                                                    SETU0970
C  KASS    = KASE =  CASE NUMBER, USED TO RETRIEVE SPECIFIC TABLES     SETU0980
C  IXX     = 0,       TABLES SET UP WITH NO ERROR                      SETU0990
C          =.GT.0     TABLES NOT SET UP, OR A TABLE NOT FOUND          SETU1000
C  IN COMMON/CSET3/                                                    SETU1010
C  KASE    = KASS                                                      SETU1020
C  BVIX( , ) = BASIC VARIABLES INDEX.                                  SETU1030
C  LBVIX,MBVIX ARE ABSOLUTE DIMENSIONS OF BVIX. LBVIX,MBVIX SPECIFIC.  SETU1040
C  NBV  = LBVIX - NAUXV = NO. BASIC VARIABLES.                         SETU1050
C  NAUXV= LBVIX - NBV   = NO. AUXILIARY VARIABLES                      SETU1060
C  IMBVIX(I) = LENGTH OF ROW 'I' IN BVIX(I,J).                         SETU1070
C  BAUXV( , )= AUXILIARY TABLE, TRANSPOSE OF LAST ROWS OF BVIX( , )    SETU1080
C              WITH COL LENGTHS INSERTED IN FIRST ROW.                 SETU1090
C  BT( , ,K) = BORDERED TABLE 'K', I.E. LAYER  K .                     SETU1100
C  NT(J)  = K  = LAYER IN WHICH 'JTH' TABLE IS FOUND (J=1,NBT).        SETU1110
C  NBT    = NO. OF BORDERED TABLES STORED IN BT( , , ).                SETU1120
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C  LABT, MABT, NABT = ABSOLUTE DIMENSIONS OF BT.                                  SETU1130
      COMMON /NFILES/ N5,N6,N7,N11,N12,N1                                        SETU1140
       COMMON/BASTAB/KZARL,KZARS                                                 SETU1150
CZAZA                                                                           SETU1160
       COMMON/CZAZA/NCBA,IDA1,IDA2,IDA3,JZARL,LZA,MZA,ICA(16),CA(16)             SETU1170
     1, TITLA(15),HEADA(37),IFMT                                                SETU1180
     2, LA1,LAA1,MA1,MAA1,KA1(  31,5),VA1(  31,12)          ,PADZA(77 )         SETU1190
       DIMENSION  BZA( 700)                                                     SETU1200
       EQUIVALENCE  (NCBA,BZA(1))                                               SETU1210
       COMMON/CSET3/KASE,LBVIX,LABVIX,MBVIX,MABVIX,NBV,NAUXV,IMBVIX(24)         SETU1220
     1,    BAUXV(16,10),BTC(4,30)                                               SETU1230
     2,    BVIX(24,16),NT(30),LABT,MABT,NABT,NBT,BT(10,10,30)                   SETU1240
     3,    XXXX(1280)                                                           SETU1250
       DIMENSION  NID(30),PCODE(20),IDUM(1,1)                                   SETU1260
      DATA NID/30*0/                                                            SETU1270
 2005  FORMAT(1H0,22HERROR IN SETUP3 AT E1=F8.2,(6X,5G12.5))                     SETU1280
 2006  FORMAT(6X,27HIN SETUP3, TABLE NOT FOUND= (6X,5G12.5))                     SETU1290
 2007  FORMAT(/6X, 7HIMBVIX= /(6X,10G12.5) )                                     SETU1300
C**                                                                             SETU1310
C**    INITIALIZE                                                               SETU1320
 1      IXX = C                                                                 SETU1330
        GO TO ( 2,40) ,IX                                                       SETU1340
 2      KASE = KASS                                                             SETU1350
       KASE = IDA2                                                              SETU1360
        LABVIX = 24                                                             SETU1370
        MABVIX = 16                                                             SETU1380
        LABT   = 10                                                             SETU1390
        MABT   = 10                                                             SETU1400
        NABT   = 30                                                             SETU1410
        NBT    =  0                                                             SETU1420
        NBV    =  0                                                             SETU1430
        DO  8 I=1,NABT                                                          SETU1440
 8      NT(I) = 0                                                               SETU1450
C**    READ BASIC VARIABLES INDEX AND STORE                                     SETU1460
        ID1  = 2010000                                                          SETU1470
        ITRANS = 1                                                              SETU1480
 10     IY   = 3                                                                SETU1490
        IXY  = 0                                                                SETU1500
        CALL  RCBD11(BZA,LZA,MZA,NCBA,KZARL,ID1, KASE,IY,IXY)                   SETU1510
        IF (IXY.EQ.0)  GO TO 12                                                 SETU1520
       IF ( NLINE .LT.  60  )  GO TO 1000                                       SETU1530
       CALL PAGE                                                                SETU1540
       NPAGE = NPAGE + 1                                                        SETU1550
       NLINE = 9                                                                SETU1560
 1000  CONTINUE                                                                 SETU1570
       IF ( IPP  .LE.  C  )  GO TO 1234                                         SETU1580
       WRITE (N6,2006) ID1,KASE                                                 SETU1590
        NLINE = NLINE + 1                                                       SETU1600
 1234  CONTINUE                                                                 SETU1610
        IF (ITRANS.EQ.1)  RETURN                                                SETU1620
        IXX = IXX + 1                                                           SETU1630
        GO TO 24                                                                SETU1640
 12     GO TO (14,26)     , ITRANS                                              SETU1650
 14     LBVIX = LA1                                                             SETU1660
        MBVIX = MA1                                                             SETU1670
```

```
      DO 16 I=1,LBVIX                                                    SETU1680
      IMBVIX(I) = KA1(I,5)                                               SETU1690
      DO 16 J=1,MBVIX                                                    SETU1700
 16   BVIX(I,J) = VA1(I,J)                                               SETU1710
C**   TRANSFER AUXILIARY VARIABLES                                       SETU1720
      DO 18 I=1,LBVIX                                                    SETU1730
      IL = I                                                             SETU1740
      IF (KA1(I,5).LT.0)  GO TO 19                                       SETU1750
 18   CONTINUE                                                           SETU1760
      IL = LBVIX                                                         SETU1770
   19 CONTINUE                                                           SETU1780
      I = IL - 1                                                         SETU1790
      NBV = MAX0(0,I)                                                    SETU1800
      NAUXV = LBVIX - NBV                                                SETU1810
      IF ( NAUXV .LE. 0 ) GO TO 5678                                     SETU1820
      DO 21 J=1,NAUXV                                                    SETU1830
      BAUXV(1,J) = -IMBVIX(J + NBV) + 1                                  SETU1840
      K    = BAUXV(1,J) + .001                                           SETU1850
      DO 21 I=2,K                                                        SETU1860
 21   BAUXV(I,J) = VA1(J+NBV,I-1)                                        SETU1870
C**   FILL 3-DIM BORDERED TABLES  BT( , , )                              SETU1880
 5678 CONTINUE                                                          SETU1890
      ITRANS  = 2                                                        SETU1900
      K  = 0                                                             SETU1910
 24   K  = K + 1                                                         SETU1920
      IF (K.GT.NABT)  GO TO 32                                           SETU1930
      ID1  = NID(K)                                                      SETU1940
      IF (ID1.LE.0)   GO TO 24                                           SETU1950
      GO TO 10                                                           SETU1960
 26   NBT = K                                                            SETU1970
      NT(K) = K                                                          SETU1980
      L  = VA1(1,1) + .01                                                SETU1990
      M  = MOD(L,100)                                                    SETU2000
      L  = L / 100                                                       SETU2010
      DO 28 I=1,L                                                        SETU2020
      DO 28 J=1,M                                                        SETU2030
 28   BT(I,J,K) = VA1(I,J)                                               SETU2040
      DO 29 I=1,4                                                        SETU2050
 29   BTC(I,K) = CA(4*I)                                                 SETU2060
      GO TO 24                                                           SETU2070
 32   IF (IPR.EQ.0)  RETURN                                              SETU2080
C**                                                                     SETU2090
C**   WRITE BORDERED TABLES                                              SETU2100
 40   K  = 0                                                             SETU2110
 42   K  = K + 1                                                         SETU2120
      IF (K.GT.NABT)  GO TO 44                                           SETU2130
      KT = NT(K)                                                         SETU2140
      IF (KT.LE.0)    GO TO 42                                           SETU2150
      L  = BT(1,1,KT) + .01                                              SETU2160
      M  = MOD(L,100)                                                    SETU2170
      L  = L / 100                                                       SETU2180
      CALL WMAT3(2,IDUM,BT,LABT,MABT,NABT,L,M,KT,NLINE,NPAGE,PCODE,      SETU2190
     1 6OHBORDERED TABLE FROM SETUP3 - PGM=CGSM                          ) SETU2200
      GO TO 42                                                           SETU2210
C**   WRITE AUXILIARY VARIABLES                                          SETU2220
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 44     IF (IPR.LE.1)  RETURN                                                  SETU2230
        VAR = 0.0                                                             SETU2240
       CALL WRITRX(BAUXV,MABVIX,    10,MABVIX,NAUXV,VAR,IXY,NLINE,NPAGE,      SETU2250
      1PCODE,                                                                 SETU2260
      2 60HAUXILIARY VARIABLES AND RANGES FROM SETUP3 - PGM=CGSM        )     SETU2270
        IF (IPR.LE.2)  RETURN                                                 SETU2280
       WRITE (N6,2007) IMBVIX                                                 SETU2290
        RETURN                                                                SETU2300
        END                                                                   SETU2310


        SUBROUTINE SORTCM                                                     SORT0010
C     NUK.CM-CGSM  R.K.MCDONOUGH  FIV/EBCD   10/18/73                         SORT0020
C                                                                             SORT0030
        COMMON/CON1/INX(16),NCNCPT,NSSTYP,IL(30),NICOMA                       SORT0040
        COMMON/CSET3/KASE,LBVIX,LABVIX,MBVIX,MABVIX,NBV,NAUXV,IMBVIX(24)      SORT0050
      1,    BAUXV(16,10),BTC(4,30)                                            SORT0060
      2,    BVIX(24,16),NT(30),LABT,MABT,NABT,NBT,BT(10,10,30)                SORT0070
      3,    XXXX(1280)                                                        SORT0080
        DIMENSION ID1(2000),ID2(2000)                                         SORT0090
        EQUIVALENCE (BT(1),ID1(1)),(ID1(2001),ID2(1))                         SORT0100
       COMMON/FILING/ KONPL,KSAVPL,KONBS                                      SORT0110
        COMMON/INOU12/JD12,ND12,NB12                                          SORT0120
        INTEGER  ZIP,ZCODE,Z1,Z2,Z3,Z4,Z5,Z6,Z7,Z8,Z9                         SORT0130
        COMMON/INOUT/NLINE,NPAGE,PCODE(20),MISC(7),XMISC(7),ZIP,ZCODE(19)SORT0140
      1, JRASH(20),TRASH(20),IP(8),IC(8),DUM(8),IDUM(8),NFLAG,NFLAG2          SORT0150
        EQUIVALENCE  (ZCODE(1),Z1),(ZCODE(2),Z2),(ZCODE(3),Z3)                SORT0160
      1             ,(ZCODE(4),Z4),(ZCODE(5),Z5),(ZCODE(6),Z6)                SORT0170
      2             ,(ZCODE(7),Z7),(ZCODE(8),Z8),(ZCODE(9),Z9)                SORT0180
        COMMON/LEVEL1/NSYST,EFF(2000),COST(2000),NSYS(2000),NLEVT,            SORT0190
      1              NSTOP(99),EFFL(2000),COSTL(2000),NSYSL(2000)             SORT0200
       COMMON /NFILES/ N5,N6,N7,N11,N12,N1                                    SORT0210
       COMMON /SCREEN/ NLEVEL,LTM1,LTM2,LEVLOP,NCONOP, NUT74(4)               SORT0220
        COMMON/SY1/MCODE(6),NCODES,NCONFG                                     SORT0230
       EQUIVALENCE (KASE,KAS), (NCONFG,JCONFG)                                SORT0240
C                                                                             SORT0250
       DIMENSION TAPE(100)                                                    SORT0260
       EQUIVALENCE (TAPE(  1), NCONXX ), (TAPE(  2), WTTOT  ),                SORT0270
      1            (TAPE(  3), WWING  ), (TAPE(  4), RCR    ),                SORT0280
      3            (TAPE(  5), ACR    ), (TAPE(  6), VCR    ),                SORT0290
      4            (TAPE(  7), WORTH  ), (TAPE(  8), WTAIL  ),                SORT0300
      4            (TAPE(  9), RLL    ), (TAPE( 10), ALL    ),                SORT0310
      5            (TAPE( 11), VLL    ), (TAPE( 12), CEP    ),                SORT0320
      6            (TAPE( 13), PLMASS ), (TAPE( 14), PLLT   ),                SORT0330
      7            (TAPE( 15), RANGE  ), (TAPE( 16), FORCE  ),                SORT0340
      8            (TAPE( 17), SUSW   ), (TAPE( 18), SUSL   ),                SORT0350
      9            (TAPE( 19), RELIB  ), (TAPE( 20), WPROPS )                 SORT0360
       EQUIVALENCE (TAPE( 21), BOOW   ), (TAPE( 22), BOOL   ),                SORT0370
      A            (TAPE( 23), WPROPB ), (TAPE( 24), XLTOT  ),                SORT0380
      C            (TAPE( 25), WTH1   ), (TAPE( 26), WTH2   ),                SORT0390
      D            (TAPE( 27), WM     ), (TAPE( 28), XLM    ),                SORT0400
      E            (TAPE( 29), WP     ), (TAPE( 30), DEXIT  ),                SORT0410
      F            (TAPE( 31), WINERT ), (TAPE( 32), PMF    ),                SORT0420
      G            (TAPE( 33), WN     ), (TAPE( 34), WPOVWC ),                SORT0430
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     H              (TAPE( 35), XLPS   ), (TAPE( 36), WPROPI ),          SORT0440
     I              (TAPE( 37), XLTF   ), (TAPE( 38), WF     ),          SORT0450
     J              (TAPE( 39), XLTOX  ), (TAPE( 40), WOX    ),          SORT0460
     K              (TAPE( 41), WFTANK ), (TAPE( 42), WOXTNK ),          SORT0470
     L              (TAPE( 43), XLTP   ), (TAPE( 44), WTP    ),          SORT0480
     M              (TAPE( 45), ACA3   ), (TAPE( 46), HC     )           SORT0490
      EQUIVALENCE   (TAPE( 47), WTSP   ), (TAPE( 48), A5A3   ),          SORT0500
     1              (TAPE( 49), WC     ), (TAPE( 50), WFMB   ),          SORT0510
     2              (TAPE( 51), A6A3   ), (TAPE( 52), WTINLT ),          SORT0520
     3              (TAPE( 53), WTNOZ  ), (TAPE( 54), AC     ),          SORT0530
     4              (TAPE( 55), XLE    ), (TAPE( 56), CDC    ),          SORT0540
     5              (TAPE( 57), CLA    )                                SORT0550
      EQUIVALENCE ( TAPE(81), AWING), ( TAPE(82), ATAIL ),              SORT0560
     1              (TAPE(85), WWH  ), ( TAPE(86), WGC  ),              SORT0570
     2              (TAPE(87), DIAM )                                   SORT0580
C                                                                        SORT0590
      KDL = KSAVPL                                                       SORT0600
      NCON = MINO ( KDL, NCONFG )                                        SORT0610
       IF (NCON.GT.0)  GO TO 10                                          SORT0620
      WRITE (N6,3008) KASE                                               SORT0630
 3008  FORMAT(6X,12HCASE NUMBER=,I12,26H,  NO CONFIGURATIONS FOUND )     SORT0640
       RETURN                                                            SORT0650
   10 CONTINUE                                                           SORT0660
      WTM1=FLOAT(LTM1)                                                   SORT0670
      WTM2=FLOAT(LTM2)                                                   SORT0680
      IF ( NLEVEL  .LT.  1  )  NLEVEL = 1                                SORT0690
      NLDEL = 1                                                          SORT0700
      CALL PAGE                                                          SORT0710
      WRITE ( N6, 5517 )                                                 SORT0720
 5517 FORMAT(/// 5X,34HCONCEPT WORTH    COST LENGTH RANGE        ,      SORT0730
     1     3X34HRCR   RRI DIAM  WW/H  WEIGHT   VCR    )                 SORT0740
      DO 100 ICON = 1, NCON                                              SORT0750
       JD12 = ICON                                                       SORT0760
      READ (N12'JD12)  TAPE                                              SORT0770
       NSYS(ICON) = ICON                                                 SORT0780
      COST(ICON)=TAPE(100)                                               SORT0790
      XCOST=TAPE(100)                                                    SORT0800
      EFF(ICON) = ( WTH1*WTM1  +  WTH2*WTM2  ) / ( WTM1 + WTM2 )         SORT0810
      WORTH = EFF(ICON)                                                  SORT0820
      NLINE = NLINE + NLDEL                                              SORT0830
      IF ( NLINE .LT. 50 ) GO TO 3017                                    SORT0840
      CALL PAGE                                                          SORT0850
      NLINE = NLINE + NLDEL                                              SORT0860
      WRITE ( N6, 5517 )                                                 SORT0870
 3017 CONTINUE                                                           SORT0880
      NCONFG = ICON                                                      SORT0890
      WRITE(N6,5518) NCONFG,WORTH,XCOST,XLTOT,RANGE,RCR,                 SORT0900
     1     RLL,DIAM,WWH,WTTOT,VCR                                        SORT0910
 5518 FORMAT(5X,I5,F8.2,F8.0,F7.1,3F6.1,F5.1,F6.0,F8.0,F6.2  )           SORT0920
 100   CONTINUE                                                          SORT0930
       NSYST = NCON                                                      SORT0940
       NLEVT = NLEVEL                                                    SORT0950
      CALL LEVCM                                                         SORT0960
C                                                                        SORT0970
C     OUTPUT FOR TOP LEVEL CONFIGURATIONS                                SORT0980
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      IF( (LEVLOP.LE.0)  .OR.  (NCONOP.LE.0)  )  GO TO 2200                SORT0990
C     TOP LEVLOP LEVELS OR TOP NCONOP CONFIGURATIONS                       SORT1000
      ICOUNT = 1                                                           SORT1010
      K1 = 1                                                               SORT1020
      LQ  = LEVLOP                                                         SORT1030
      IF ( LEVLOP .GT.  NLEVT  )  LQ = NLEVT                               SORT1040
      DO 2100 I = 1, LQ                                                    SORT1050
      K2 = NSTOP(I)                                                        SORT1060
      DO 2080 K = K1, K2                                                   SORT1070
      CALL PAGE                                                            SORT1080
      KZ = NSYSL(K)                                                        SORT1090
      JD12 = KZ                                                            SORT1100
      WRITE ( N6, 5519 ) I                                                 SORT1110
 5519 FORMAT ( ///  11X,8H******** / 2X5HLEVEL, 4X1H*, I5, 1X1H*  )        SORT1120
      IXXY = 1                                                             SORT1121
      CALL PACKCM ( IXXY, KCONFG, KZ )                                     SORT1130
C                                                                          SORT1140
      IF ( ICOUNT  .GE.  NCONOP  )  GO TO 2200                             SORT1150
      ICOUNT = ICOUNT + 1                                                  SORT1160
 2080 CONTINUE                                                             SORT1170
      K1 = K2 + 1                                                          SORT1180
 2100 CONTINUE                                                             SORT1190
 2200 CONTINUE                                                             SORT1200
C     OUTPUT SUMMARY DATA BY LEVEL                                         SORT1201
      ICOUNT = 1                                                           SORT1202
      K1 = 1                                                               SORT1203
      LQ = NLEVT                                                           SORT1204
      DO 4100 I = 1, LQ                                                    SORT1205
      K2 = NSTOP(I)                                                        SORT1206
      CALL PAGE                                                            SORT1207
      WRITE(N6,4911) I                                                     SORT1208
 4911 FORMAT(/// 10X17HSUMMARY FOR LEVEL    ,  I5  )                      SORT1209
      WRITE(N6,5517)                                                       SORT1210
      DO 4080 K = K1, K2                                                   SORT1211
      KZ = NSYSL(K)                                                        SORT1212
      JD12 = KZ                                                            SORT1213
      READ(N12'JD12 ) TAPE                                                 SORT1214
      WORTH = ( WTH1*WTM1  +  WTH2*WTM2 ) / ( WTM1 + WTM2 )                SORT1215
      XCOST=TAPE(100)                                                      SORT1216
      NCONXX=TAPE(1)                                                       SORT1217
      WRITE(N6,5518)NCONXX,WORTH,XCOST,XLTOT,RANGE,RCR,RLL,CIAM,WWH,       SORT1218
     1  WTTOT,VCR                                                          SORT1219
 4080 CONTINUE                                                             SORT1220
      K1=K2+1                                                              SORT1221
 4100 CONTINUE                                                             SORT1222
       RETURN                                                              SORT1230
      END                                                                  SORT1240


      SUBROUTINE CMGSM ( NIT, KRET )                                       CMGS0010
C    NUK.CM-CGSM  P.K.MCDONOUGH  FIV/EBCD   10/18/73                       CMGS0020
C     KIND = 10  SOLID ROCKET                                              CMGS0030
C     KIND = 20  LIQUID ROCKET                                             CMGS0040
C     KIND = 41  INTEGRAL ROCKET RAMJET                                    CMGS0050
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C      KIND = 43  EXTERNAL BOOSTED RAMJET                                    CMGS0060
C      KIND = 44  UNBOOSTED RAMJET                                           CMGS0070
C      ISIZE = 1  LENGTH IS INPUT                                            CMGS0080
C      ISIZE = 2  WEIGHT IS INPUT                                            CMGS0090
C      NCOP IS NUMBER OF TRAJECTORY POINTS                                   CMGS0100
C      KSUS TYPE SUSTAINER                                                   CMGS0110
C      KFM TYPE OF FUEL MANAGEMENT SYSTEM                                    CMGS0120
C      ITYPE 1  BELLY INLET                                                  CMGS0130
C      ITYPE 2  DUAL AFT INLET                                               CMGS0140
C      NDUCT IS INLET MATERIAL CODE                                          CMGS0150
C      NFRNG IS FAIRING MATERIAL CODE                                        CMGS0160
C      PCINT(X,1) ALTITUDE                                                   CMGS0170
C      PCINT(X,2) MACH NUMBER                                                CMGS0180
C      PCINT(X,3) ACCN   NORMAL  ACCEL                                       CMGS0190
C      PCINT(X,4) ACCT   TANGTL  ACCEL                                       CMGS0200
C      PCINT(X,5) GAMMA  FLIGHT PATH ANGLE                                   CMGS0210
C      PCINT(X,6) FRACTN FRACTION FUEL CONSUMED                              CMGS0220
COMMON GENERAL                                                               CMGS0230
       COMMON/BASTAB/KZARL,KZARS                                             CMGS0240
       COMMON /CONSTA/ RE,TWOPI,GM  , PI, RAD,FPNM,RENM,WE                   CMGS0250
       COMMON /CMOPT/ KBYORG,KBYPAK,KBYPSM,KBYVP                             CMGS0260
      1 ,KBYMOI, INWORL , KFIL12                                             CMGS0270
       COMMON /FILING/ KONPL, KSAVPL, KEND                                   CMGS0280
       COMMON /GUIDCO/ GUVAR(60)                                             CMGS0290
       EQUIVALENCE ( GUVAR(2), NSCRC )                                       CMGS0300
       DIMENSION IPRP(4)                                                     CMGS0310
        COMMON/INOU1/IPR(16),JPAR(16),PAR(16)                                CMGS0320
       EQUIVALENCE ( IPR  , IPRP )                                           CMGS0330
       EQUIVALENCE ( IPR(10), IAIR ), ( IPR(11), IPACK ),                    CMGS0340
      1            ( IPP(12), IPSM ), ( IPR(13), IVP )                      CMGS0350
        COMMON/INOU11/JD11,ND11,NB11,INDX11( 100,7)                          CMGS0360
       COMMON / INOU12 / JD12,ND12, NB12                                     CMGS0370
        INTEGER  ZIP,ZCODE,Z1,Z2,Z3,Z4,Z5,Z6,Z7,Z8,Z9                        CMGS0380
        COMMON/INOUT/NLINE,NPAGE,PCODE(20),MISC(7),XMISC(7),ZIP,ZCODE(19)CMGS0390
      1, JPASH(20),TRASH(20),IR(8),IC(8),DUM(8),IDUM(8),NFLAG,NFLAG2         CMGS0400
        EQUIVALENCE  (ZCODE(1),Z1),(ZCODE(2),Z2),(ZCODE(3),Z3)               CMGS0410
      1             ,(ZCODE(4),Z4),(ZCODE(5),Z5),(ZCODE(6),Z6)             CMGS0420
      2             ,(ZCODE(7),Z7),(ZCODE(8),Z8),(ZCODE(9),Z9)             CMGS0430
       COMMON /INOUU/ LABEL                                                  CMGS0440
       COMMON /NFILES/ N5,N6,N7,N11,N12,N1                                   CMGS0450
       COMMON /SCREEN/NLEVEL,NWF1,NWF2,LDES,NDES,LPERF,NPERF,LSAV,NSAV       CMGS0460
       EQUIVALENCE ( NLEVEL, LEVELS ), ( LDES, NLOUT )                       CMGS0470
      1          ,   ( NDES, NCOUT )                                        CMGS0480
       DIMENSION PVCEP(7),DWCEP(7), PVRMAX(7), DWRMAX(7),                    CMGS0490
      1   PVNC(7), DWNC(7), PVREL(7), DWREL(7), DWWTWH(7), PVWTWH(7),        CMGS0500
      2   PVRCR(7), DWRCR(7), PVRLL(7), DWRLL(7), PVHCR(7), DWHCR(7),        CMGS0510
      3   PVHLL(7),DWHLL(7), PVVCR(7),DWVCR(7), PVVLL(7),DWVLL(7)            CMGS0520
       COMMON /SCRNNL/ NPTS(20),PARVNL(7,20),DWNL(7,20),DUMMY(50)            CMGS0530
      1  ,NSCOST, IDU4M4(4)                                                  CMGS0540
       EQUIVALENCE ( IDU4M4(1), KBYCST )                                     CMGS0550
       EQUIVALENCE ( IDU4M4(3), ICOST )                                      CMGS0560
       EQUIVALENCE                                                           CMGS0570
      1 (NPTS( 1),NCEP  ),                                                   CMGS0580
      2 (NPTS( 2),NRMAX ),                                                   CMGS0590
      3 (NPTS( 3),NNO   ),                                                   CMGS0600
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     4 (NPTS( 4),NREL   ),                                                  CMGS0610
     5 (NPTS( 5),NWTWH  ),                                                  CMGS0620
     6 (NPTS( 6),NRCR   ),                                                  CMGS0630
     7   ( NPTS(7), NRLL   ),                                               CMGS0640
     8 (NPTS( 8),NHCR),                                                     CMGS0650
     9 (NPTS( 9),NHLL),                                                     CMGS0660
     A (NPTS(10),NVCR),                                                     CMGS0670
     B (NPTS(11),NVLL)                                                      CMGS0680
      EQUIVALENCE                                                           CMGS0690
     A (PVCEP(1), PARVNL(1,1)),                                             CMGS0700
     1 (PVRMAX(1), PARVNL(1,2)),                                            CMGS0710
     2 (PVND(1), PARVNL(1,3)),                                              CMGS0720
     3 (PVREL(1), PARVNL(1,4)),                                             CMGS0730
     4 (PVWTWH(1),PARVNL(1,5)),                                             CMGS0740
     5 (PVRCR(1), PARVNL(1,6)),                                             CMGS0750
     6 (PVRLL(1), PARVNL(1,7)),                                             CMGS0760
     7  (PVHCR(1), PARVNL(1,8)),                                            CMGS0770
     8 (PVHLL(1), PARVNL(1,9)),                                             CMGS0780
     9 (PVVCR(1), PARVNL(1,10)),                                            CMGS0790
     A (PVVLL(1), PARVNL(1,11))                                             CMGS0800
      EQUIVALENCE                                                           CMGS0810
     1 (DWCEP(1), DWNL(1,1)),                                               CMGS0820
     2 (DWRMAX(1), DWNL(1,2)),                                              CMGS0830
     3 (DWND(1), DWNL(1,3)),                                                CMGS0840
     J(DWREL(1), DWNL(1,4)),                                                CMGS0850
     5 (DWWTWH(1), DWNL(1,5)),                                              CMGS0860
     6 (DWRCR(1), DWNL(1,6)),                                               CMGS0870
     7 (DWRLL(1), DWNL(1,7)),                                               CMGS0880
     8 (DWHCR(1), DWNL(1,8)),                                               CMGS0890
     9 (DWHLL(1), DWNL(1,9)),                                               CMGS0900
     A (DWVCR(1), DWNL(1,10)),                                              CMGS0910
     B (DWVLL(1), DWNL(1,11))                                               CMGS0920
      COMMON /SECIO/ SECUR(20)                                              CMGS0930
      COMMON /SUPERB/ KSYSTM,  KLNCH, KFUEL                                 CMGS0940
      COMMON /SYI  / NCODE(6), NCODES, NCONFG                               CMGS0950
       COMMON/SWORTH/KBASE,WORTH1,WORTH2,NPAR,KPAR(20),PARV(20)             CMGS0960
     1,      DERV1(20),DERV2(20)                                            CMGS0970
      COMMON /TUB/       BCLR,CLRA,CLRF,DELVX,FCLR,GCLR,KMAIR,             CMGS0980
     1      PAKSUB,RATCLP, REHTUB,THEAD, THERST, TUBTHK,                   CMGS0990
     2      KMTAIL, WINGCL, WTMAX, XLTMAX, DTUBMX, XLTBMX, ZPYLON          CMGS1000
      COMMON /ZWORTH/ ZCEP(10), ZFORCE, ZGWT (10), ZREL, ZWCTH(10)          CMGS1010
      EQUIVALENCE ( ZWOTH(1), NZLLRI )                                      CMGS1020
COMMON PAYLOAD                                                              CMGS1030
      COMMON /SEVEN/ ITNX,APHI,CLR, IRADAR,IPAY,DANT,XLVCID,WFQ,WMISC,      CMGS1040
     1  RHOWH,PHOEO,EQCLR,WHCLR,XLMISC,XLEQ,XLWH,                           CMGS1050
     2  IARTX,NWX,IARWX,PIVOT,INTYPE,XLPAYI,WPAYI,WWH,XLEHT,                CMGS1060
     3   XLFW,XLEVT,XLET,EXTRSV(25)                                         CMGS1070
      DIMENSION XX1(20)                                                     CMGS1080
      COMMON /XINERT/ XX5(5),WARRAY(20),XX1,PANWW,XX4(4),PANWHT,            CMGS1090
     1   XXX4(4),PANWVT,XX29(29),PARRAY(20),XX12(12),PANWT,XXX1,BRAT,       CMGS1100
     2   THETAC,XX11(11)                                                    CMGS1110
COMMON ADM                                                                  CMGS1120
      COMMON /AERO/ X91(93),SLET, X10(10), BRAZ, XXZZ                       CMGS1130
      EQUIVALENCE ( XDIT, X91(58) )                                         CMGS1140
      COMMON /AERPRO/ ZDODES(10), ZLADES(10)                                CMGS1150
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      COMMON /AER7/ AER79(9),FRBTX,FRB,NAERX(30)                        CMGS1160
      COMMON /AFTAR/ ARVT,TRVT,BVT,RCVT,TCVT,TANSVT                     CMGS1170
     1   , STEVT, GGMIS(7)                                              CMGS1180
      COMMON /BYAIR/ SREF,SMACH1(20),SMACH2(20),SMACH3(20),SMACH4(20),  CMGS1190
     1      SMACH5(20), CLALF1(20),CLALF2(20),CLALF3(20),CLALF4(20),    CMGS1200
     2      CLALF5(20), DMACH1(20),DMACH2(20),DMACH3(20),DMACH4(20),    CMGS1210
     3      DMACH5(20), CDO1(20,5),CDO2(20,5),CDO3(20,5),CDO4(20,5),    CMGS1220
     4      CDO5(20,5)                                                  CMGS1230
      COMMON /DRG/ XAZ2(2),FINE,XAZ7(7),ITN,AM5(5),IBTL,AZM23(3),       CMGS1240
     1   ITSECT,IWSECT,RXINT,RXINW,ARV9(9),DE,UMPT(2),NW,DZ4(4),        CMGS1250
     2   ART,ARW,TRT,TRW,ZSXC2(2)                                       CMGS1260
      COMMON /FIXUP/ FIX2(2), RMLO,RMHI,FIX6(6)                         CMGS1270
      COMMON /FORNOW/ NRM,NALT,RMV(20),ALTV(10),FRBT,FACTOR             CMGS1280
      COMMON /HINC/ RHLTX, RHLW                                         CMGS1290
      COMMON /LET/ SET3(3),SET,SET2(2),RL4,RL5,SFF2(2),IART,            CMGS1300
     1   ICNTRL,XZ2X(2)                                                 CMGS1310
      COMMON /NAERC/ TNAZZL                                             CMGS1320
     P   ,STF,STET,TRAT,SWE,TRAW,DCASE,DEOD,ARL6,AL5X,XMSX,             CMGS1330
     Q   STEW,       XSTA,FSOVCW,FSOVCT,WMISS,SMRL,SMRH,WWING,IARW,     CMGS1340
     R     IPLOT,NCCVAR                                                CMGS1350
     S      ,PHLT,TNZZL,TLTHEO                                         CMGS1360
      COMMON /ROLL/ RNW,RNT,IARWQ,BWH,BTH                               CMGS1370
      COMMON /SUREX/ RMDES,WDG,GULT,IWTS,WWINGI,WTI,WOVAW,WOVAHT,       CMGS1380
     1      WOVAVT,WOVAT,WXW3(3), VTALOC, WXW5(5)                       CMGS1390
     2   ,SLEW,SLEVT,ISURFW,IPLANW,ISURFT,IPLANT                        CMGS1400
COMMON PSM                                                              CMGS1410
      COMMON /ADDON/ SPPWF,FF(19)                                       CMGS1420
      COMMON /ALL/ ALL12(12),IMCD, ALL16(16)                            CMGS1430
      COMMON /BESYET/ ZXNB, BES14(14)                                   CMGS1440
      COMMON  /CODEBT/ IFIRST,JRJ,J                                     CMGS1450
      COMMON /CODEXX/ KPROP,KINLET,ISIZE,NODP,KSUS,KEM,IRSTIN,          CMGS1460
     1      NDUCT,NERNG,II3(3),IEX,NPASS,NOUT,IXXN                     CMGS1470
      EQUIVALENCE ( II3(1), NZTEMP )                                    CMGS1480
      COMMON /DAM/ DIAFR,DAMISC(19)                                     CMGS1490
      COMMON /DESIGN/ DES9(9), PCNFDS, PRFDS, ETAFDS, DES12(12), T4DS,  CMGS1500
     1      DES2(2), ETARDS, DEX12(12), TFLPDS, CNLPDS, ETLPDS, DES37(37)CMGS1510
      COMMON /DESOPT/ KENG,KTANK,KIZQ,METTJ,ISTR,IDIFF, DES19(19)       CMGS1520
      COMMON /EXTERN/ EXT6(6),VL,VECB,EXT3(3),A3,EXIT,                  CMGS1530
     1    TANLT,AX,EXTX,XMRJTO,HEIGHT,EXT2(2)                          CMGS1540
      COMMON/EXXRJ/ EX(48)                                              CMGS1550
      EQUIVALENCE                                                       CMGS1560
     1                                (EX( 3),TEXIT ),(EX( 4),TTHROT),  CMGS1570
     2(EX( 5),TENT  ),(EX( 6),RHOEXT),(EX( 7),RHOTHT),(EX( 8),RHOENT),  CMGS1580
     3(EX( 9),TEXTER),(EX(10),RHOX  ),(EX(11),TMINC ),(EX(12),TMIND ),  CMGS1590
     4(EX(13),FL    ),(EX(14),FSULT ),(EX(15),FSYLD ),(EX(16),TINS  ),  CMGS1600
     5(EX(17),RHOIN ),(EX(18),XSTAR ),(EX(19),CLEAR ),(EX(20),C1    ),  CMGS1610
     6(EX(21),C2    ),(EX(22),C3    ),(EX(23),C4    ),(EX(24),C5    ),  CMGS1620
     7(EX(25),C6    ),(EX(26),TINAFT),(EX(27),WRJ   ),(EX(28),XRJ   ),  CMGS1630
     8(EX(29),TEMPC ),(EX(30),MTLRAM)                                   CMGS1640
      COMMON /EMPT/ HP,AMACH,ALF1,FARD                                  CMGS1650
      COMMON /FRONT/ FR63(63), HPEXT, FR16(16)                          CMGS1660
      COMMON /FSB/ HPEXX, FSB8(8)                                       CMGS1670
      COMMON /GOBOL/ WARD (78)                                          CMGS1680
      EQUIVALENCE   (WARD( 1),      D), (WARD( 2),     PC ),            CMGS1690
     1              (WARD( 3),     FJ), (WARD( 4),     PA ),            CMGS1700
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2                (WARD( 5),     F1), (WARD( 6),   PBELL ),                    CMGS1710
3                                   (WARD( 8),     GAM ),                    CMGS1720
4                (WARD( 9),   RHOP), (WARD(10),    AFAT ),                   CMGS1730
5                (WARD(11),  CSTAR), (WARD(12),     PCM ),                   CMGS1740
6                (WARD(13),  FSYLX), (WARD(14),   FSULX ),                   CMGS1750
7                (WARD(15),   TMIN), (WARD(16),  TCASEF ),                   CMGS1760
8                (WARD(17),   BETA), (WARD(18),   CASFM ),                   CMGS1770
9                (WARD(19),     DM), (WARD(20),    ETAX ),                   CMGS1780
A                (WARD(21),   DLFS), (WARD(22),     TTH ),                   CMGS1790
B                (WARD(23),   FCWM), (WARD(24),     FER ),                   CMGS1800
C                (WARD(25),  RBOSS) , (WARD(26),    DENI) ,                  CMGS1810
D                (WARD(27),    FIT) , (WARD(28),     FBM) ,                  CMGS1820
E                (WARD(29),   RMIW) , (WARD(30),     SAW)                    CMGS1830
 EQUIVALENCE     (WARD(31),   RMFW) , (WARD(32),    VREH) ,                  CMGS1840
G                (WARD(33),  RMFSW) , (WARD(34),     FSL) ,                  CMGS1850
H                (WARD(35),   FSWM) , (WARD(36),     SEM) ,                  CMGS1860
I                (WARD(37),  RMASW) , (WARD(38),     ASL) ,                  CMGS1870
J                (WARD(39),   ASWM) , (WARD(40),    GMAX) ,                  CMGS1880
K                (WARD(41),    ASM) , (WARD(42),     AER) ,                  CMGS1890
L                (WARD(43),    EAR) , (WARD(44),    RMAW) ,                  CMGS1900
M                (WARD(45),    AIT) , (WARD(46),      TL) ,                  CMGS1910
N                (WARD(47),  EMPAH) , (WARD(48),     ABM) ,                  CMGS1920
P                (WARD(49),   RMCW) , (WARD(50),   RNBWM) ,                  CMGS1930
Q                (WARD(51),   RNTM) , (WARD(52),    RNECC),                  CMGS1940
R                (WARD(53),   RNRM) , (WARD(54),   RNTWM) ,                  CMGS1950
S                (WARD(55),   RNEC) , (WARD(56),   RNEC1) ,                  CMGS1960
T                (WARD(57),  RNEC2) , (WARD(58),   RNEC3) ,                  CMGS1970
U                (WARD(59),   RNMW) , (WARD(61),     EPI) ,                  CMGS1980
V               ( WARD(62), PSUB), ( WARD(63), RHORH )                       CMGS1990
 COMMON /INDATX/ THX20(20),TSTART,TERNG,TXHX                                 CMGS2000
 COMMON /INPTTJ/ ENOND, ALFTX, AMOMD, T404D, INP20(20)                       CMGS2010
 EQUIVALENCE  ( INP20(1), SKSTR), ( INP20(5),RHOTJ),                         CMGS2020
X     ( INP20(6), REHTJ ),                                                  CMGS2030
1            ( INP20(9), TJLMIS), ( INP20(10), WSTRI ),                     CMGS2040
2            ( INP20(11), WOVATJ ), ( INP20(12), XLDIFI )                   CMGS2050
3         ,   (  INP20(13), WMISTJ  )                                       CMGS2060
 COMMON /ITERT/ DVTOL,DELDEL,NUMIT,MAXNIT,DVMULT                             CMGS2070
 COMMON/MODL/ OD(30)                                                         CMGS2080
 EQUIVALENCE  (TSKINI,OD(1)), (TCWI, OD(2)), (TFRAC,OD(3)),                  CMGS2090
1 (SAFAC, OD(4)), (IWTANK,OD(5)), (WSKNPL, OD(6)),                           CMGS2100
2 (WPAYL, OD(7)), (IWTPL,OD(8)), (WSINPU, OD(9)), (WOVAST, OD(10)),CMGS2110
3 (DRT, OD(11))                                                              CMGS2120
 EQUIVALENCE ( OD(12), ITANK )                                               CMGS2130
 COMMON /NAMSOL/ DX7,XISPHI,DXZ3(3), WMSOL,DX33(3),                          CMGS2140
1   TOWDES, TRATIO, ITHR, FDES                                              CMGS2150
 COMMON /PAKER/ PK(48)                                                       CMGS2160
 EQUIVALENCE                                                                 CMGS2170
1 (PK(13),PKD    ),                                                         CMGS2180
1(PK( 1),CLX    ),(PK( 2),NB     ),(PK( 3),X2     ),(PK( 4),X1     )       CMGS2190
 EQUIVALENCE ( PK(14), VPP )                                                 CMGS2200
 COMMON /PINT/ EFX3(3),PCHI,ETACF,EXPBR,PHINOR,PBELS,RHOMTL,                 CMGS2210
1  RHOINL,SIGMTL,REFH,APAT,RHOS,XISPLC,                                      CMGS2220
2    RHOISS,AIAT,TIC, REAH,PS, ZUMW10(10)                                    CMGS2230
 COMMON /RJBLOK/ RJ(50)                                                      CMGS2240
 EQUIVALENCE ( RJ(10), GAMRJX)                                               CMGS2250
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      EQUIVALENCE ( RJ(26), TT4 )                                          CMGS2260
      EQUIVALENCE ( RJ(1),CNM),(RJ(3),ANN),(RJ(4),AL),(RJ(6),CDB),         CMGS2270
     1            ( RJ(11),A6MAX),(RJ(12),ACMAX),(RJ(13),A6MIN),         CMGS2280
     2            ( RJ(14),XMOMR),(RJ(17),DELT4),(RJ(18),FCMGN),         CMGS2290
     3            ( RJ(23),IFTYPE),(RJ(37),PT41),(RJ(38),PT42),          CMGS2300
     4            ( RJ(39),PT43)                                         CMGS2310
      COMMON /ROCKET/ XISPTH,XMRT,ETAISP, PCHAMB, FENG, ETACL, PBELLL,     CMGS2320
     1  P1,P2,P3,P4,P5,P6,P7,P8,PSTAR, PT, WOVAC2, EXS1, WCVAC1, DULU,     CMGS2330
     2  WOVAN1, WOVAN2, RHOOX, PVOX, REH, METAL, ROC5(5),                  CMGS2340
     3  WMISCL, RHOF, ITHL, TOWDEL, TRATIL, FDEL, XOLMIS                   CMGS2350
      COMMON/SEPOWR/ SP(48)                                                CMGS2360
      EQUIVALENCE                                                          CMGS2370
     1(SP( 1),WTSP  ),(SP( 2),VOLSP )                                      CMGS2380
      COMMON /SOLMIS/ CSTAR1, CSTAR2, ETSISP, DUM7(7)                      CMGS2390
      COMMON /SUSDAT/ TX(44)                                               CMGS2400
      EQUIVALENCE                                                          CMGS2410
     1(TX( 1), EXIN  ),(TX( 2),DROF  ),(TX( 3),EDR   ),(TX( 4),FEXP  ),   CMGS2420
     2(TX( 5), GMF   ),(TX( 6),PDF   ),(TX( 7),PN2   ),(TX( 8),RGD   ),   CMGS2430
     3(TX( 9), ROB   ),(TX(10),RHORJF),(TX(11),TFUEL ),(TX(12),BU    ),   CMGS2440
     4(TX(13), SULTN ),(TX(14),TBLAD ),(TX(15),THGG  ),(TX(16),TSUS  ),   CMGS2450
     5(TX(17), ULLG  ),(TX(18),TCASEC),(TX(19),TMAX  ),(TX(20),PCC   ),   CMGS2460
     6(TX(21), WDEMAX),(TX(22),XEMB  ),(TX(23),WFC   ),(TX(24),WFMR  ),   CMGS2470
     7(TX(25), SUSMLT),(TX(26),SUSMWT),(TX(27),EMIN  ),(TX(28),DELWT ),   CMGS2480
     8(TX(29), DELLT ),(TX(30),DELF  ),(TX(31),SWTOLD),(TX(32),SLTOLD),   CMGS2490
     9(TX(33), SUSLT ),(TX(34),SUSWT ),(TX(35),ETUS  ),(TX(36),ETYS  ),   CMGS2500
     1(TX(37), SMLT  ),(TX(38),SMWT  ),(TX(39),EMINT ),(TX(40),FUSABL),   CMGS2510
     2(TX(41), RHO   ),(TX(42),RHOINS),(TX(43),MATTK),(TX(44),MATPB)      CMGS2520
      COMMON /TRAJX/ CFN6(6), FARMAX, TT4MAX, CFN2(2)                      CMGS2530
      EQUIVALENCE ( CFN2(1), FSLBO )                                       CMGS2540
      COMMON /TRJDTA/ ZPALT(10), ZPMACH(10), ZPNACC(10), ZPTACC(10),       CMGS2550
     1    ZPGAM(10), ZPFREU(10), ZPTTEA(10)                                CMGS2560
      COMMON /TURBI/ TV(30)                                                CMGS2570
      EQUIVALENCE ( TV(1), WAFCDS ), (ALETJ, TV(2) )                       CMGS2580
      COMMON /UPINLT/ PRAMBL(129), XCGD1                                   CMGS2590
      COMMON /WATIN/ WAT5(5), TJMMAX,NEXEX,OPR,WAT3(3), YEAR,ZSCALE        CMGS2600
COMMON VPM                                                                 CMGS2610
      DIMENSION ZPRINT(20)                                                 CMGS2620
      EQUIVALENCE ( FUSY(1), ZPRINT(1)  )                                  CMGS2630
      COMMON /PERF/ KBY2(2),VELI,XMACHI,GAMMAI,ALTI,MOPT,ALPHAZ,           CMGS2640
     1     NCPHAZ,NDPHAZ,XMACHF(20),ALTF(20),GAMMAF(20),FVALUE(20),        CMGS2650
     A    CONI1 (10), CONI2 (10), CONI3 (10), CONI4 (10), CONI5 (10),     CMGS2660
     B    CONI6 (10), CONI7 (10), CONI8 (10), CONI9 (10), CONI10(10),     CMGS2670
     C    CONI11(10), CONI12(10), CONI13(10), CONI14(10), CONI15(10),     CMGS2680
     D    CONI16(10), CONI17(10), CONI18(10), CONI19(10), CONI20(10),     CMGS2690
     E    COND1 (10), COND2 (10), COND3 (10), COND4 (10), COND5 (10),     CMGS2700
     E    COND6 (10), COND7 (10), COND8 (10), COND9 (10), COND10(10),     CMGS2710
     G    COND11(10), COND12(10), COND13(10), COND14(10), COND15(10),     CMGS2720
     H    COND16(10), COND17(10), COND18(10), COND19(10), COND20(10),     CMGS2730
     2     ITERM(20), NAERO(20),                                          CMGS2740
     3     IPTYPE(20),MODES(20),MHGEN(20),ICONT(20)                       CMGS2750
     4   ,  ALPMAX(20),ANZMAX(20),FUSY(20)                                CMGS2760
      DIMENSION COND2(400)                                                 CMGS2770
      EQUIVALENCE ( COND2(1), CONI1(1)   )                                 CMGS2780
      COMMON /MULTRJ/ NTRAJ,TRCON(670,5), XLBDY,  XNDZ                     CMGS2790
     1   , TRMOR(102,5), KEMTY                                            CMGS2800
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      DIMENSION TREIX(102)                                                  CMGS2810
      EQUIVALENCE ( TREIX(1), DALPH )                                       CMGS2820
      DIMENSION TRYSOM(670)                                                 CMGS2830
      EQUIVALENCE ( TRYSOM(1), KBY2(1) )                                    CMGS2840
      EQUIVALENCE ( TSKINI, ZSKINI )                                        CMGS2850
      COMMON /NEWVPM/ DALPH,DALT,DCFN,DELMAX, DHCL,DMACH,DMIN,DSTART,       CMGS2860
     C   DVCL,EREF,ERREAC,IPROP1, JPRINT,MXSTEP,NTRYS,RANGEI,RTOL,         CMGS2870
     D   TIMEI,GKG,GKV,GKVCRU,GTOPT,SLOPE(20),TPHASE(20),TTOTAL(20),        CMGS2880
     E   PMORE(20)                                                          CMGS2890
      EQUIVALENCE ( PMORE(1), TPCMGN )                                      CMGS2900
      COMMON /TDVPER/ BOOWP,BISPV,BTHVAC,BEXIT,SUSWP,SEXIT,BCANTA,          CMGS2910
     1    WTINIT,DROPST,DROPEB,KIND,A5A3,A6A3,ACA3,D3,                      CMGS2920
     2     TVACMX,TVACMN,YISP(20),XTHRTL(20) ,EXTRA(15)                     CMGS2930
      COMMON/VERT/ SVTSPF,   BARVT,   TANOVT,   TAN2VT,   TAN4VT,           CMGS2940
     1     ACVT,   ATN2VT,   ATCVT,   AMACVT,   TMACVT,   BTANVT,          CMGS2950
     2    BDCVT,   TRTPV1,  BAPPVT,    BAPVT,   FLVTST,    XLENVT,         CMGS2960
     3   CEVT, TRAVT, RXINVT, FSOVVT                                        CMGS2970
C                                                                           CMGS2980
C NL FCP GENERAL                                                            CMGS2990
      NAMELIST /NAM1/ IAIR, INPRIN, IPACK, IPRP, IPSM, IVP,                 CMGS3000
     1                  KFIL12,                  NPAGE                     CMGS3010
     2  , ICOST                                                            CMGS3020
       NAMELIST/NAM2/NPARV,KPARM,KASE,PARM,KASEA,PARMA,KASEB,PARMB,         CMGS3030
     1    NPARTS,PLVL1,PLVL2,RLVL1,RLVL2                                    CMGS3040
       DATA RLVL1,RLVL2,RLVL1,RLVL2/16.667,50.,10.,30./                     CMGS3050
      NAMELIST /NAM3/ WORTH1, NRMAX, PVRMAX,DWRMAX,NWTWH,PVWTWH,            CMGS3060
     1  DWWTWH, NRCR,PVRCR,DWRCR, NRLL,PVRLL,DWRLL,                        CMGS3070
     2  NHCR,PVHCR,DWHCR, NHLL,PVHLL,DWHLL, NVCR,PVVCR,DWVCR,              CMGS3080
     3   NVLL,PVVLL,DWVLL, NCEP,PVCEP,DWCEP, NREL,PVREL,DWREL,             CMGS3090
     4   NNO,PVNO,DWNO                                                    CMGS3100
     5   , ZCEP, ZFORCE, ZGWT, ZREL                                       CMGS3110
       NAMELIST/NAM4/KBASE,KPARM,PARM,WORTH1,WORTH2,RDER1,RDER2             CMGS3120
      NAMELIST /NAMPAK/ BCLR,CLRA,CLRF,DELVX,FCLR,GCLR,KMAIR,              CMGS3130
     1     PAKSUB,RATCLR, REHTUB,THEAD, THEBST, TUBTHK,                    CMGS3140
     2     KMTAIL, WINGCL, WTMAX, XLTMAX, DTUBMX, XLTBMX, ZPYLON           CMGS3150
     3   , KLNCH                                                          CMGS3160
      NAMELIST /NAMBYP/ KBYORG, KBYPAK, KBYPSM, KBYVP,                      CMGS3170
     A                  ACA3,A5A3,A6A3, BEXIT,BISPV,BOOWP,BTHVAC,         CMGS3180
     1     DROPEB,DROPST, SEXIT,SUSWP, TVACMN,TVACMX, XTHRTL,YISP,         CMGS3190
     2           SMACH1, SMACH2, SMACH3, SMACH4, SMACH5,                   CMGS3200
     3           CLALF1, CLALF2, CLALF3, CLALF4, CLALF5,                   CMGS3210
     4           DMACH1, DMACH2, DMACH3, DMACH4, DMACH5,                   CMGS3220
     5           CD01,CD02,CD03,CD04,CD05, CDODES, CLADES,                 CMGS3230
     6  XLBDY, XNOZ     ,    XCGD1                                         CMGS3240
     7   , KBYCST                                                         CMGS3250
      NAMELIST /NAMSCR/ LEVELS, NCOUT, NLOUT                                CMGS3260
      NAMELIST /NAMCNF/ ALTV,ARVT,          FACTOR,FSOVCT,FSOVCW,FSOVVT,    CMGS3270
     1     GULT,ILUG,IPLANT,IPLANW,IWTS,NALT,NRM,                          CMGS3280
     X     PANWHT,PANWT,PANWVT,RL5,RMDES,RMV,                              CMGS3290
     2  RXINT,RXINVT,RXINW,SLET,SLEW,SLEVT,STET,STEVT, STEW,THETAC,        CMGS3300
     A     TRAT, TRAVT, TRAW,                                              CMGS3310
     3 TRT,TRVT,TRW, VTALOC,WOVAHT,    WOVAST,WOVAT,WOVAVT,WOVAW,          CMGS3320
     4     WTI, WWINGI                                                     CMGS3330
     5     ,  ZPOPT, ZWSKIN                                                CMGS3340
     6   ,RMLO,RMHI,SMRL,SMRH                                              CMGS3350
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     7   , ZSKINI                                                          CMGS3360
C NL FOR PSM                                                              CMGS3370
      NAMELIST /NAMBOD/ ABM,AER,AFAT,AIT, ASL,ASM,ASWM,                   CMGS3380
     1      CASEM,CSTAR, DENI,DLFS, EAR,EPI,ETAX,     FBM,FCWM,          CMGS3390
     2      FER,FIT,FJ, FMPAH,FSL, FSULX,FSWM,FSYLX, GAM,GMAX,          CMGS3400
     3      PA,PBELL,PC,PCM, PHI,PSUB, RBOSS,RHOP,        RMASW,        CMGS3410
     4      RMAW,RMCW,RMFSW,RMFW, RMIW, RNBWM,RNEC, RNECC,RNEC1,        CMGS3420
     5   RNEC2,RNEC3,RNMW,RNRM,RNTM,RNTWM,SAW,SEM,TCASEF,               CMGS3430
     6    TL,TMIN,TTH,VREH                                              CMGS3440
      NAMELIST /NAMEXB/ C1,C2,C3,C4,C5,C6,CLEAR, EL,                     CMGS3450
     1      MTLRAM,          RHOENT,RHOEXT,          RHOIN,RHOTHT,RHOX,  CMGS3460
     2                  TEMPC,TENT,TEXIT, TEXTER,THETA, TINAFT,         CMGS3470
     3      TINS,TMINC, TMIND, TTHROT,   WHARNS, XSTAR                    CMGS3480
      NAMELIST /NAMSR/ AIAT,APAT, ETACF,EXPBR,                           CMGS3490
     1      PBELS,     PHINOZ,    REAH,REFH, RHOISS,RHOMTL,RHOS,         CMGS3500
     2      SIGMTL,TIC,         TRATIO, WMSOL                           CMGS3510
     4   , ETSISP, CSTAR1, CSTAR2                                       CMGS3520
      NAMELIST /NAMLR/ DBT, ETACL, ETAISP, EXS1,  ITANK, IWTANK,         CMGS3530
     1      METAL,P1,P2,P3,P4,P5,P6,P7,P8,PBELLL,       PSTAR,PT,PVCX,   CMGS3540
     2   REH,RHOF,RHOOX,SAFAC,TCWI,TFRAC,TRATIL,WMISCL,                 CMGS3550
     3      WOVAC1,WOVAC2,WOVAN1,WOVAN2,                      XCLMIS     CMGS3560
      NAMELIST /NAMRJS/ A6MAX,A6MIN,ACMAX, AL,ANN, CDB,CLX,CNM,          CMGS3570
     1      DELT4,DROF, EDR,FEXP,EXIN,   FSLBO,FTUS,FTYS,               CMGS3580
     2   GMF, IFTYPE, MATPB, MATTK, NB,                                 CMGS3590
     3      PDF,PKD,PN2,PT41,PT42,PT43,                                 CMGS3600
     4      RGD,RHOINS, RHORJF, ROB,  RU,  SPPWF,  TANLT,TRLAD,         CMGS3610
     5      TCASEC,          TFUEL,   THGG,TMAX,        TSUS,           CMGS3620
     6   ULLG, VPP, X1, X2, XMOMR                                       CMGS3630
      NAMELIST /NAMTJ/ ALFTJ, CNLPDS,   ETABDS,   ETAFDS,  ETLPDS,      CMGS3640
     1       HPEXT,  IDIFF, IMCD,   ISTR,   KENG,  SKSTR,  KTANK,      CMGS3650
     2       METTJ,  TJMMAX, OPR,   PCNFDS, PRFDS,   REHTJ,             CMGS3660
     3       RHOTJ,  TFLPDS,  TJLMIS,  WMISTJ,          WOVATJ, WSTRI,  CMGS3670
     4       XLDIFI,  YEAR                                              CMGS3680
C NL FOR VPM                                                            CMGS3690
      NAMELIST /NAMVPM/ ALPMAX,ALTF,ANZMAX,FVALUE,GAMMAF,               CMGS3700
     1   ICONT, IPTYPE, ITERM, MHGEN, MODES, NAERO, XMACHF,             CMGS3710
     2      CONI1, CONI2, CONI3, CONI4, CONI5, CONI6, CONI7,            CMGS3720
     3      CONI8, CONI9, CONI10, CONI11, CONI12, CONI13, CONI14,       CMGS3730
     4      CONI15, CONI16, CONI17, CONI18, CONI19, CONI20,             CMGS3740
     5      COND1, COND2, COND3, COND4, COND5, COND6, COND7, COND8,     CMGS3750
     6      COND9, COND10, COND11, COND12, COND13, COND14, COND15,      CMGS3760
     7      COND16, COND17, COND18, COND19, COND20                      CMGS3770
     8   ,  ZPRINT                                                      CMGS3780
     9  ,ALTI, EARMAX, GAMMAI, MOPT, NCPHAZ,NDPHAZ, NLPHAZ, NZLLRI,    CMGS3790
     A  TT4MAX, VELI, XMACHI , TPCMGN                                   CMGS3800
     B                , DALPH,DALT,DCFN,DELMAX, DHCL,DMACH,DMIN,DSTART, CMGS3810
     C   DVCL,ERREF,ERREAC,IPROP1, JPRINT,MXSTEP,NTRYS,RANGEI,RTOL,    CMGS3820
     D   TIMEI,GKG,GKV,GKVCRU,GTOPT,SLOPE,TPHASE,TTOTAL                 CMGS3830
      NAMELIST /SUPER/ ALTI,   ART,            BCANTA,   BRAT,          CMGS3840
     1   DIAER,                                                         CMGS3850
     2      DVMULT,DVTOL, EARMAX,FINE,  ERBT,GAMMAI,                    CMGS3860
     3      IART,IARW,IBTL, ICNTRL,    INWORL,     ISURFT,ISURFW,       CMGS3870
     A   ITHR,                                                          CMGS3880
     4      ITN,      ITSECT,      IWSECT,                             CMGS3890
     5      KFUEL,  KINLET,KLNCH,  KPROP,                              CMGS3900
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     6    MAXNIT, MOPT, NCPHAZ, NDPHAZ, NLPHAZ, NW,                          CMGS3910
     7      NZLLRI, NZTEMP, TT4MAX,                                          CMGS3920
     8      VELI,  VEOB, VL, WMISC,  XMACHI                                  CMGS3930
     X    , ZXNB, TPCMGN                                                     CMGS3940
     R      , XLBDY                                                          CMGS3950
      NAMELIST /NAMAA/ KBYDRG,KBYPAK,KBYPSM,KBYVP,ACA3,A5A3,A6A3,BEXIT,     CMGS3960
     1      BISPV,BOOWP,BTHVAC,DROPEB,DROPST,SEXIT,SUSWP,CDCDES,             CMGS3970
     2    CLADES, XLBDY, XNOZ                                                CMGS3980
      NAMELIST /NAMAB/ TVACMN, TVACMX, XTHRTL, YISP                         CMGS3990
      NAMELIST /NAMAC/ SMACH1, SMACH2, SMACH3, SMACH4, SMACH5,              CMGS4000
     1      CLALF1, CLALF2, CLALF3, CLALF4, CLALF5                           CMGS4010
      NAMELIST /NAMAD/ DMACH1, DMACH2, DMACH3, DMACH4, DMACH5,              CMGS4020
     1      CD01, CD02, CD03, CD04, CD05                                     CMGS4030
C FORMATS                                                                   CMGS4040
 1000  FORMAT(1X,19A4,A3)                                                   CMGS4050
 1002  FORMAT(A4,3I2,I10,4I5,10A4)                                          CMGS4060
 2002  FORMAT(/6X,A4,3I2,I10,4I5,10A4)                                      CMGS4070
 2005  FORMAT(1H0,20HERROR IN MAIN AT EL=,F8.2,3X,A4,3I2,I10,4I5,10A4)      CMGS4080
C                                                                           CMGS4090
      NLIX = NLINE                                                          CMGS4100
C                                                                           CMGS4110
C                                                                           CMGS4120
      IF ( NIT  .GT.  0  )  GO TO 6001                                      CMGS4130
C                                                                           CMGS4140
      NIT = 1                                                               CMGS4150
      CALL  INVRT                                                           CMGS4160
      NPAGE = 3                                                             CMGS4170
       NTABL = 0                                                            CMGS4180
      KRJE=0                                                                CMGS4190
       NPAR = 0                                                             CMGS4200
      KPASVA  = 1                                                           CMGS4210
      KBYDRG = 0                                                            CMGS4220
      ICOST = -1                                                            CMGS4230
      INPRIN = 1                                                            CMGS4240
      KBYPAK = 1                                                            CMGS4250
      KBYPSM = 0                                                            CMGS4260
      KBYVP = 0                                                             CMGS4270
      KBYMOI = 1                                                            CMGS4280
      KSYSTM = 1                                                            CMGS4290
      KLNCH = 1                                                             CMGS4300
      KFUEL = 1                                                             CMGS4310
      INWORL = 0                                                            CMGS4320
      KFIL12 = 0                                                            CMGS4330
      IAIR=-1                                                               CMGS4340
      IPACK=0                                                               CMGS4350
      IPSM=-1                                                               CMGS4360
      IVP=-1                                                                CMGS4370
      CDCDES=0.0                                                            CMGS4380
      CLADES=0.0                                                            CMGS4390
      XLDIFI=0.                                                             CMGS4400
      WMISC=0.0                                                             CMGS4410
      MAXNIT=3                                                              CMGS4420
      MOPT=1                                                                CMGS4430
      CROF=0.000001                                                         CMGS4440
      NALT=3                                                                CMGS4450
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      NRM=6                                                          CMGS4460
      ALTV(1)=0.                                                     CMGS4470
      ALTV(2)=40000.                                                 CMGS4480
      ALTV(3)=100000.                                                CMGS4490
      RMV(1)=.4                                                      CMGS4500
      RMV(2)=.9                                                      CMGS4510
      RMV(3)=1.                                                      CMGS4520
      RMV(4)=1.5                                                     CMGS4530
      RMV(5)=2.                                                      CMGS4540
      RMV(6)=4.                                                      CMGS4550
      XLBDY = 0.                                                     CMGS4560
      XNOZ = 0.                                                      CMGS4570
      SMRL=-.5                                                       CMGS4580
      SMRH=-.5                                                       CMGS4590
      RMLO=.8                                                        CMGS4600
      RMHI=2.                                                        CMGS4610
      XCGD1=5.                                                       CMGS4620
      RL4=0.                                                         CMGS4630
      XSTA=0.                                                        CMGS4640
      RHLW=0.                                                        CMGS4650
      RHLT=0.                                                        CMGS4660
      TCASEF=900.                                                    CMGS4670
      ZSKINI = .4                                                    CMGS4680
      TPCMGN=3.                                                      CMGS4690
      GAMRJX = 1.4                                                   CMGS4700
      DO 5297 IZ = 1, 10                                             CMGS4710
      IZIZ = IZ + 10                                                 CMGS4720
      ZPRINT(IZ   ) = 0.                                             CMGS4730
      ZPRINT(IZIZ) = 0.                                              CMGS4740
      ZCEP(IZ) = .01                                                 CMGS4750
      ZGWT(IZ) = 1000.                                               CMGS4760
5297  CONTINUE                                                       CMGS4770
      ALFTJ = 0.                                                     CMGS4780
      ZGWT(1) = 0.                                                   CMGS4790
      ZREL = .95                                                     CMGS4800
      ZFORCE = 100.                                                  CMGS4810
      NZLLRI=0                                                       CMGS4820
      NZTEMP=0                                                       CMGS4830
      NSELAF=1                                                       CMGS4840
      NSELPS=1                                                       CMGS4850
      NSELTA=1                                                       CMGS4860
      NSELTR=1                                                       CMGS4870
      NSELWI=1                                                       CMGS4880
      CPREFU=0.0                                                     CMGS4890
      CPNACC = 0.                                                    CMGS4900
      CPTACC = 0.                                                    CMGS4910
      KPY2(1) = 0                                                    CMGS4920
      KPY2(2) = 0                                                    CMGS4930
      WHARNS  =  0.                                                  CMGS4940
      PHINOZ=15.                                                     CMGS4950
      TRAVT = .05                                                    CMGS4960
      FSOVVT = 0.                                                    CMGS4970
      STEVT = 0.                                                     CMGS4980
      RXINVT = .5                                                    CMGS4990
      ARVT=.99                                                       CMGS5000
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      TRVT=.4                                                          CMGS5010
      RAD = 57.29578                                                   CMGS5020
      IPTL = NAERX(2)                                                  CMGS5030
      ILUG = NAERX(3)                                                  CMGS5040
      DIAFR = 1.                                                       CMGS5050
      VPP = 10.                                                        CMGS5060
      DVTOL = 20.                                                      CMGS5070
      MAXNIT = 5                                                       CMGS5080
      DVMULT = 1.1                                                     CMGS5090
      NRAMP = 3                                                        CMGS5100
      WARD(61) = 10.                                                   CMGS5110
      PHI=WARD(7)                                                      CMGS5120
      THETA = EX(2)                                                    CMGS5130
      ZXNB = 2.                                                        CMGS5140
      ZPOPT = 0.                                                       CMGS5150
      ZWSKIN = 1.                                                      CMGS5160
      EPEXT = 0.                                                       CMGS5170
C     SER TRAJ PARAM INTO STORAGE - PRESTORED VALUES                   CMGS5180
      NTRAJ = 1                                                        CMGS5190
      DO 1969 ITR = 1, 670                                             CMGS5200
 1969 TRCON(ITR,1) = TRYSOM(ITR)                                       CMGS5210
      DO 1968 ITR = 1, 102                                             CMGS5220
 1968 TRMOR(ITR,1) = TREIX(ITR)                                        CMGS5230
 6001 CONTINUE                                                         CMGS5240
C                                                                      CMGS5250
C                                                                      CMGS5260
      IF ( INPRIN .LE. 0 ) NLIX = 0                                    CMGS5270
 9022  GO TO (3,3,3,4,5,6,7,8,9,10,11,10) ,Z2                          CMGS5280
   10 CONTINUE                                                         CMGS5290
 9021  NFLAG = NFLAG + 1                                              CMGS5300
      E1 = 902.                                                        CMGS5310
      WRITE (N6,2005) E1,ZCODE                                         CMGS5320
       GO TO 902                                                       CMGS5330
C**READ INOUT PARAMETERS                                               CMGS5340
 3     GO TO 902                                                       CMGS5350
 4      IF (Z3.GT.1)  GO TO 42                                         CMGS5360
      NLIX = NLIX +  4                                                 CMGS5370
      IF ( NLIX .GT. 50 ) CALL PAGE                                    CMGS5380
      NLINE = NLINE + 4                                                CMGS5390
      READ (N5,NAM1)                                                   CMGS5400
      IF ( INPRIN .LE. 0 ) GO TO 8113                                  CMGS5410
      WRITE(N6,8117)                                                   CMGS5420
 8117 FORMAT( // 3X,9HNAM1 LIST   //  5X,11HI/O CONTROL   )            CMGS5430
      WRITE(N6,8118) IAIR,INPRIN, (IPRP(I),I=1,3) , IPSM,IVP,          CMGS5440
     1  ICOST, IPACK, KFIL12, NPAGE                                    CMGS5450
 8118 FORMAT(5X8HIAIR    =,I5/ 5X8HINPRIN =, I5/                       CMGS5460
     1   5X8HIPRP    =,3I5/ 5X8HIPSM    =,I5/ 5X8HIVP    =,I5/       CMGS5470
     W   5X8HICOST  =  , I5/  5X8HIPACK  =  ,I5/  5X8HKFIL12 = ,I5/   CMGS5480
     2     5X8HNPAGE  = , I5 // )                                      CMGS5490
      CALL PAGE                                                        CMGS5500
 8113 CONTINUE                                                         CMGS5510
 1919 CONTINUE                                                         CMGS5520
      GO TO 902                                                        CMGS5530
 42    IF (Z3.GT.2)  GO TO 43                                          CMGS5540
       CALL PAGE                                                       CMGS5550
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      READ (N5,NAM2)                                                    CMGS5560
      IF ( INPRIN .GT. 0 ) WRITE (N6, NAM2   )                          CMGS5570
       GO TO 900                                                        CMGS5580
   43 IF( 73 .GT.  5  )  GO TO 44                                       CMGS5590
      READ ( N5, NAMBYP )                                               CMGS5600
      IF ( INPRIN .EQ. 0 ) GO TO 3944                                   CMGS5610
      WRITE(N6,8142)                                                    CMGS5620
 8142 FORMAT(//5X,11HNAMBYP LIST//5X,28HINCLUDES NAMAB THROUGH NAMAG  ) CMGS5630
      WRITE(N6,8021)                                                    CMGS5640
 8021 FORMAT(/5X,29HNAMAB PRINTED IF YISP(1) NE 0   //                  CMGS5650
     1 5X,41HNAMAC AND NAMAD PRINTED IF SMACH1(2) NE 0       /// )      CMGS5660
      WRITE(N6,8022) ACA3,KBYDRG,CDODES,A5A3,KBYPAK,CLADES              CMGS5670
 8022 FORMAT(10X4HACA3,F11.4, 5X6HKBYDRG,I9, 5X6HCDODES,F9.3 //         CMGS5680
     1   10X4HA5A3,F11.4, 5X6HKBYPAK,I9, 5X6HCLADES,F9.3  /  )          CMGS5690
      WRITE(N6,8023) A6A3,KBYPSM,BEXIT,KBYVP                            CMGS5700
 8023 FORMAT( 10X4HA6A3,F11.4,  5X6HKBYPSM,I9   //                      CMGS5710
     1      10X5HBEXIT,F10.2, 5X5HKBYVP,I10 / )                        CMGS5720
      WRITE(N6,8024) BISPV,BOOWP,BTHVAC,DROPEB,DROPST,SEXIT,SUSWP       CMGS5730
     1   , XCGD1                                                        CMGS5740
 8024 FORMAT(10X5HBISPV,F10.2// 10X5HBOOWP,F10.2 //10X6HBTHVAC,F9.0//   CMGS5750
     1      10X6HDROPEB,F9.2 // 10X6HDROPST,F9.2 // 10X5HSEXIT,F10.2    CMGS5760
     2  // 10X5HSUSWP,F10.2  //  10X5HXCGD1,F10.2   /   )               CMGS5770
      WRITE(N6,8025) XLBDY, XNOZ                                        CMGS5780
 8025 FORMAT(10X5HXLBDY,F10.2  //  10X4HXNOZ,F11.2   /  )               CMGS5790
      WRITE(N6,7948)   KBYCST                                           CMGS5800
 7948 FORMAT(  30X, 6HKBYCST, I9 / )                                    CMGS5810
      IF ( YISP(1)  .NE.  0.0  )  WRITE(N6,NAMAB)                       CMGS5820
      IF(SMACH1(2) .NE. 0.0 ) WRITE(N6,NAMAC)                           CMGS5830
      IF(SMACH1(2) .NE. 0.0 ) WRITE(N6,NAMAD)                           CMGS5840
 3944 CONTINUE                                                          CMGS5850
      KBY2(1)=KBYPSM                                                    CMGS5860
      KBY2(2)=KBYDRG                                                    CMGS5870
       GO TO 900                                                        CMGS5880
   44 IF( 73 .GT.  7  )  GO TO 45                                       CMGS5890
       GO TO 902                                                        CMGS5900
   45 IF( 73 .GT.  8  )  GO TO 46                                       CMGS5910
C     INPUT FOR AERODYNAMICS                                            CMGS5920
      NLIX = NLIX + 8                                                   CMGS5930
      IF ( NLIX .GT. 50 ) CALL PAGE                                     CMGS5940
      NLINE = NLINE  + 8                                                CMGS5950
      READ ( N5, NAMCNF )                                               CMGS5960
      IF(INPRIN.LE.0) GO TO 8593                                        CMGS5970
      WRITE(N6,8531)                                                    CMGS5980
 8531 FORMAT( ///   20X,31HCONFIGURATION OPTIONS DATA LIST //          CMGS5990
     1    29X,15HNAMCNF NAMELIST //// 14X8HAIRFRAME, 15X4HWING,        CMGS6000
     2    16X4HTAIL,10X13HVERTICAL TAIL  // )                         CMGS6010
      WRITE(N6,8532) FACTOR,FSOVCW,FSOVCT,ARVT,ILUG,GULT,GULT,FSOVVT    CMGS6020
 8532 FORMAT(10X6HFACTOR,F9.2, 5X6HFSOVCW,F9.2, 5X6HFSOVCT,F9.2,        CMGS6030
     1    5X4HARVT,F11.4 // 10X4HILUG,I11, 5X4HGULT,F11.2,              CMGS6040
     2    5X4HGULT,F11.2, 5X6HFSOVVT,F9.2 / )                          CMGS6050
      WRITE(N6,8533) THETAC,IPLANW,IPLANT,PANWVT,WOVAST,IWTS,IWTS,RXINVTCMGS6060
 8533 FORMAT(10X6HTHETAC,F9.4, 5X6HIPLANW,I9, 5X6HIPLANT,I9,            CMGS6070
     1    5X6HPANWVT,F9.2 // 10X6HWOVAST,F9.2, 5X4HIWTS,I11,           CMGS6080
     2    5X4HIWTS,I11, 5X6HRXINVT,F9.2 / )                            CMGS6090
      WRITE(N6,8534) ZPOPT,RL5,PANWHT,SLEVT,ZSKINI,RMDES,PANWT,STEVT    CMGS6100
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 8534 FORMAT(10X5HZPOPT,F10.0, 5X3HRLS,F12.2, 5X6HPANWHT,F9.2,                CMGS6110
     1     5X5HSLEVT,F10.2 // 10X6HZSKINI,F9.2, 5X5HRMDES,F10.2,            CMGS6120
     2     5X5HPANWT,F10.2, 5X5HSTEVT,F10.2 / )                             CMGS6130
       WRITE(N6,8535) ZWSKIN,                                               CMGS6140
     1               RXINW,RXINT,TRAVT,SLEW,SLET,TRVT                       CMGS6150
 8535 FORMAT( 10X6HZWSKIN,F9.2,  5X,                                        CMGS6160
     A          5HRXINW,F10.2, 5X5HRXINT,F10.2, 5X5HTRAVT,F10.4  //        CMGS6170
     1       30X4HSLEW,F11.2,  5X4HSLET,F11.2,  5X4HTRVT,F11.4  /  )       CMGS6180
       WRITE(N6,8536) STEW,STET,VTALOC,TRAW,TRAT,WOVAVT                     CMGS6190
 8536 FORMAT(30X4HSTEW,F11.2, 5X4HSTET,F11.2, 5X6HVTALOC,F9.2  //           CMGS6200
     1       30X4HTRAW,F11.4, 5X4HTRAT,F11.4, 5X6HWOVAVT,F9.2  /  )       CMGS6210
       WRITE(N6,8537) TRW,TRT,WOVAW,WOVAHT,WWINGI,WOVAT,WTI                 CMGS6220
 8537 FORMAT( 30X3HTRW,F12.4, 5X3HTRT,F12.4 // 30X5HWOVAW,F10.2,            CMGS6230
     1     5X6HWOVAHT,F9.2 // 30X6HWWINGI,F9.2, 5X5HWOVAT,F10.2 //          CMGS6240
     2     50X3HWTI,F12.2  //   )                                           CMGS6250
       WRITE(N6,8548)                                                       CMGS6260
 8548 FORMAT(7X,52HALTITUDES AND MACH NO. USED IN COMPUTING AERO TABLES     CMGS6270
     1      )                                                               CMGS6280
       WRITE(N6,8538) NALT,(ALTV(I),I=1,NALT)                               CMGS6290
 8538 FORMAT(10X4HNALT,I5/ 10X4HALTV,5X,5F10.0/ 19X5F10.0 )                 CMGS6300
       WRITE(N6,8539) NRM,(RMV(I),I=1,NRM)                                  CMGS6310
 8539 FORMAT(     10X3HNRM,I6/  10X3HRMV6X,10F6.2/   19X10F6.2  )           CMGS6320
       CALL PAGE                                                            CMGS6330
 8593 CONTINUE                                                              CMGS6340
       GO TO 902                                                            CMGS6350
   46  IF ( Z3  .GT.  9  )  GO TO 902                                       CMGS6360
       NLIX = NLIX + 8                                                      CMGS6370
       IF ( NLIX  .GT.  50  )  CALL PAGE                                    CMGS6380
       NLINE = NLINE + 8                                                    CMGS6390
       READ ( N5, NAMPAK )                                                  CMGS6400
       IF ( INPRIN  .GT.  0  )  WRITE ( N6, NAMPAK )                        CMGS6410
       GO TO 900                                                            CMGS6420
    5  IF ( Z3.GT.7 ) GO TO 58                                              CMGS6430
C      CALL PROTC                                                           CMGS6440
       GO TO 900                                                            CMGS6450
   58  IF ( Z3 .GT. 8 ) GO TO 59                                            CMGS6460
       NLIX = NLIX + 10                                                     CMGS6470
       IF ( NLIX  .GT.  50  )  CALL PAGE                                    CMGS6480
       NLINE = NLINE + 10                                                   CMGS6490
       IF  (  Z4  .GT.  0  )  GO TO 581                                     CMGS6500
       READ ( N5, NAMBOO )                                                  CMGS6510
       IF ( INPRIN .LE. 0 ) GO TO 8693                                      CMGS6520
       WRITE(N6,8621)                                                       CMGS6530
 8621 FORMAT( ///// 35X,40HBOOSTER DATA LIST (INTEGRAL OR EXTERNAL)         CMGS6540
     1     // 46X,15HNAMBOO NAMELIST ////  )                               CMGS6550
       WRITE(N6,8622) ABM,EPI,GAM,RMCW,RNTM,AER,ETAX,GMAX,RMFSW,RNTWM       CMGS6560
 8622 FORMAT(10X3HABM,F12.4, 5X3HEPI,F12.4, 5X3HGAM,F12.4,                  CMGS6570
     1     5X4HRMCW,F11.2, 5X4HRNTM,F11.4  // 10X3HAER,F12.4,               CMGS6580
     2     5X4HETAX,F11.4, 5X4HGMAX,F11.2,     5X5HRMFSW,F10.2,            CMGS6590
     3     5X5HRNTWM,F10.4  /  )                                            CMGS6600
       WRITE(N6,8623) AFAT,FBM,PA,RMFW,SAW, AIT,FCWM,PBELL,RMIW,SEM         CMGS6610
 8623 FORMAT(10X4HAFAT,F11.4, 5X3HFBM,F12.4, 5X2HPA,F13.2,                  CMGS6620
     1     5X4HRMFW,F11.2, 5X3HSAW,F12.4 // 10X3HAIT,F12.4,                 CMGS6630
     2     5X4HFCWM,F11.4, 5X5HPBELL,F10.2,  5X4HRMIW,F11.4,                CMGS6640
     3     5X3HSEM,E12.2 /  )                                               CMGS6650
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      WRITE(N6,8624) ASL,FER,PC,RNBWM,TCASEF,ASM,FIT,PCM,RNEC,TL          CMGS6660
 8624 FORMAT(10X3HASL,F12.4, 5X3HFER,F12.4, 5X2HPC,F13.0,                 CMGS6670
     1     5X5HRNBWM,E10.3, 5X6HTCASEF,F9.4  // 10X3HASM,F12.4,          CMGS6680
     2     5X3HFIT,F12.4, 5X3HPCM,F12.0, 5X4HRNEC,E11.3,                 CMGS6690
     3     5X2HTL,F13.4  /  )                                            CMGS6700
      WRITE(N6,8625) ASWM,FJ,PHI,RNECC,TMIN,CASEM,FMPAH,PSUB,RNEC1,TTH   CMGS6710
 8625 FORMAT(10X4HASWM,F11.4, 5X2HFJ,F13.4, 5X3HPHI,F12.2,                CMGS6720
     1     5X5HRNECC,E10.4, 5X4HTMIN,F11.4 // 10X5HCASEM,F10.4,          CMGS6730
     2     5X5HFMPAH,F10.4, 5X4HPSUB,F11.2, 5X5HRNEC1,F10.2,             CMGS6740
     3     5X3HTTH,F12.4  /  )                                           CMGS6750
      WRITE(N6,8626) CSTAR,FSL,RBOSS,RNEC2,VRFH, DENI,FSULX,RHOP,RNEC3   CMGS6760
 8626 FORMAT(10X5HCSTAR,F10.2, 5X3HFSL,F12.4, 5X5HRBOSS,F10.4,            CMGS6770
     1     5X5HRNEC2,F10.2, 5X4HVRFH,F11.4 // 10X4HDENI,F11.4,           CMGS6780
     2     5X5HFSULX,F10.4, 5X4HRHOP,F11.4, 5X5HRNEC3,F10.2 / )          CMGS6790
      WRITE(N6,8627) DLFS,FSWM, RMASW, RNMW,EAR, FSYLX,RMAW, RNRM        CMGS6800
 8627 FORMAT(10X4HDLFS,F11.4, 5X4HFSWM,F11.4, 5X5HRMASW,F10.4,            CMGS6810
     1     5X4HRNMW,F11.2 // 10X3HEAR,F12.4, 5X5HFSYLX,F10.4,            CMGS6820
     2     5X4HRMAW,F11.4, 5X4HRNRM,F11.2 / )                            CMGS6830
      CALL PAGE                                                          CMGS6840
 8693 CONTINUE                                                           CMGS6850
      GO TO 902                                                          CMGS6860
  581 CONTINUE                                                           CMGS6870
      READ ( N5, NAMEXB )                                                CMGS6880
      IF(INPRIN.LE.0) GO TO 8293                                         CMGS6890
      WRITE(N6,8221)                                                     CMGS6900
 8221 FORMAT(/// 20X,26HEXTERNAL BOOSTER DATA LIST  //                   CMGS6910
     1           25X,15HNAMEXB NAMELIST /// )                           CMGS6920
      WRITE(N6,8222) C1,CLEAR,RHOTHT,TINAFT, C2,EL,RHOX,TINS             CMGS6930
 8222 FORMAT( 10X2HC1,F13.2, 5X5HCLEAR,F10.2, 5X6HRHOTHT,F9.4,           CMGS6940
     1     5X6HTINAFT,F9.2 // 10X2HC2,F13.2, 5X2HEL,F13.2,               CMGS6950
     2     5X4HRHOX,F11.4, 5X4HTINS,F11.2 /  )                           CMGS6960
      WRITE(N6,8223) C3,MTLRAM,TEMPC,TMINC, C4,RHOENT,TENT,TMIND         CMGS6970
 8223 FORMAT(10X2HC3,F13.2, 5X6HMTLRAM,I9, 5X5HTEMPC,F10.0,               CMGS6980
     1     5X5HTMINC,F10.2 // 10X2HC4,F13.2, 5X6HRHOENT,F9.4,            CMGS6990
     2     5X4HTENT,F11.2, 5X5HTMIND,F10.2 / )                           CMGS7000
      WRITE(N6,8224) C5,RHOEXT,TEXIT,TTHROT,C6,RHOIN,TEXTER,             CMGS7010
     1               WHARNS,THETA,XSTAR                                  CMGS7020
 8224 FORMAT(10X2HC5,F13.2, 5X6HRHOEXT,F9.4, 5X5HTEXIT,F10.2,            CMGS7030
     1     5X6HTTHROT,F9.2 // 10X2HC6,F13.2, 5X5HRHOIN,F10.4,            CMGS7040
     2     5X6HTEXTER,F9.2, 5X6HWHARNS,F9.2 //                           CMGS7050
     3     50X5HTHETA,F10.2, 5X5HXSTAR,F10.2 / )                         CMGS7060
      CALL PAGE                                                          CMGS7070
 8293 CONTINUE                                                           CMGS7080
      GO TO 902                                                          CMGS7090
   59 IF ( Z3  .GT.  11  )  GO TO 159                                    CMGS7100
      NLIX = NLIX + 6                                                    CMGS7110
      IF ( NLIX  .GT. 50 )  CALL PAGE                                    CMGS7120
      READ ( N5, NAMSR  )                                                CMGS7130
      IF(INPRIN.LE.0) GO TO 8393                                         CMGS7140
      WRITE(N6,8321)                                                     CMGS7150
 8321 FORMAT(//// 20X,32HSOLID ROCKET SUSTAINER DATA LIST   //           CMGS7160
     1     29X,14HNAMSR NAMELIST  /// )                                  CMGS7170
      WRITE(N6,8322) AIAT, PHINOZ, RHOS, APAT, REAH, SIGMTL              CMGS7180
 8322 FORMAT(10X4HAIAT,F11.4, 5X6HPHINOZ,F9.2, 5X4HRHOS,F11.4 //          CMGS7190
     1     10X4HAPAT,F11.4, 5X4HREAH,F11.2, 5X6HSIGMTL,F9.0 / )          CMGS7200
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      WRITE(N6,8323) ETACE,REEH,TIC,EXPBR,RHOISS,TRATIC,                CMGS7210
     1               PBELS,RHOMTL,WMSOL                                 CMGS7220
 8323 FORMAT(10X5HETACE,F10.4, 5X4HREEH,F11.2, 5X3HTIC,F12.2 //         CMGS7230
     1   10X5HEXPBR,F10.4, 5X6HRHOISS,F9.4, 5X6HTRATIO,F9.2 //          CMGS7240
     2   10X5HPBELS,F10.2, 5X6HRHOMTL,F9.4, 5X5HWMSOL,F10.2 / )         CMGS7250
      WRITE(N6,7927) ETSISP,CSTAR1,CSTAR2                               CMGS7260
 7927 FORMAT(10X6HETSISP,F9.4 // 10X6HCSTAR1, F9.2  //                  CMGS7270
     1   10X6HCSTAR2, F9.2  /  )                                        CMGS7280
      CALL PAGE                                                         CMGS7290
 8393 CONTINUE                                                          CMGS7300
      NLINE = NLINE + 6                                                 CMGS7310
      PHINOR = PHINOZ / RAD                                             CMGS7320
      GO TO 902                                                         CMGS7330
  159 IF ( 73  .GT.  12  )  GO TO 1159                                  CMGS7340
      NLIX = NLIX + 6                                                   CMGS7350
      IF ( NLIX  .GT.  50  )  CALL PAGE                                 CMGS7360
      NLINE = NLINE + 6                                                 CMGS7370
      READ(N5,NAMLR)                                                    CMGS7380
      IF(INPRIN.LE.0) GO TO 8493                                        CMGS7390
      WRITE(N6,8421)                                                    CMGS7400
 8421 FORMAT( /// 30X,33HLIQUID ROCKET SUSTAINER DATA LIST //           CMGS7410
     1     39X,14HNAMLR NAMELIST   ////   )                            CMGS7420
      WRITE(N6,8422) DBT,P1,PBELLL,TERAC, ETACL,P2,PSTAR,TRATIL         CMGS7430
 8422 FORMAT(10X3HDBT,F12.4, 5X2HP1,F13.2, 5X6HPBELLL,F9.2,             CMGS7440
     1     5X5HTERAC,F10.4 // 10X5HETACL,F10.4, 5X2HP2,F13.4,           CMGS7450
     2     5X5HPSTAR,F10.2, 5X6HTRATIL,F9.4  / )                       CMGS7460
      WRITE(N6,8423) ETAISP,P3,PT,         EXS1,P4,PVOX,WMISCL          CMGS7470
 8423 FORMAT(10X6HETAISP,F9.4, 5X2HP3,F13.4, 5X2HPT,F13.2,              CMGS7480
     1                    // 10X4HEXS1,F11.4, 5X2HP4,F13.6,            CMGS7490
     2     5X4HPVOX,F11.2, 5X6HWMISCL,F9.2 / )                         CMGS7500
      WRITE(N6,8424) ITANK,P5,REH,WOVAC1,IWTANK,P6,RHOF,WOVAC2          CMGS7510
 8424 FORMAT(10X5HITANK,I10, 5X2HP5,F13.6, 5X3HREH,F12.2,               CMGS7520
     1     5X6HWOVAC1,F9.4  // 10X6HIWTANK,I9, 5X2HP6,F13.6,           CMGS7530
     2     5X4HRHOF,F11.2, 5X6HWOVAC2,F9.4  /  )                       CMGS7540
      WRITE(N6,8425) METAL,P7,RHOOX,WOVAN1, P8,SAFAC,WOVAN2,TCWI,XOLMIS CMGS7550
 8425 FORMAT(10X5HMETAL,I10, 5X2HP7,F13.6, 5X5HRHOOX,F10.2,             CMGS7560
     1     5X6HWOVAN1,F9.4 // 30X2HP8,F13.6, 5X5HSAFAC,F10.2,          CMGS7570
     2     5X6HWOVAN2,F9.4 // 50X4HTCWI,F11.4, 5X6HXOLMIS,F9.2 / )     CMGS7580
      CALL PAGE                                                         CMGS7590
 8493 CONTINUE                                                          CMGS7600
 1159 GO TO 902                                                         CMGS7610
    6 CONTINUE                                                          CMGS7620
      IF ( 73  .GT.  10  )  GO TO 160                                   CMGS7630
C     INPUT FOR PROPULSION SIZING                                       CMGS7640
      IF (73 .GT. 1 ) GO TO 62                                          CMGS7650
      NLIX = NLIX + 15                                                  CMGS7660
      IF ( NLIX  .GT.  50  )  CALL PAGE                                 CMGS7670
      NLINE = NLINE + 15                                                CMGS7680
      READ ( N5, NAMRJS )                                               CMGS7690
      IF (  INPRIN .LE. 0 ) GO TO 8793                                  CMGS7700
      WRITE (N6,8721)                                                   CMGS7710
 8721 FORMAT( ///// 28X,26HRAMJET SUSTAINER DATA LIST  //               CMGS7720
     1               34X,15HNAMRJS NAMELIST   ///  )                   CMGS7730
      WRITE(N6,8722) A6MAX,EXIN,PKD,TBLAD,A6MIN,FSLBO,PN2,TCASEC        CMGS7740
 8722 FORMAT(10X5HA6MAX,F10.4, 5X4HEXIN,F11.3, 5X3HPKD,F12.2,           CMGS7750
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     1  5X5HTBLAD,F10.3// 10X5HA6MIN,F10.4, 5X5HFSLBO,F10.3,                CMGS7760
     2  5X3HPN2,F12.0, 5X6HTCASEC, F9.3  / )                                CMGS7770
      WRITE(N6,8723) ACMAX,FTUS,PT41,TFUEL,AL,FTYS,PT42,THGG                CMGS7780
 8723 FORMAT( 10X5HACMAX,F10.4, 5X4HFTUS,F11.3, 5X4HPT41,F11.0,             CMGS7790
     1  5X5HTFUEL,F10.2 // 10X2HAL,F13.4, 5X4HFTYS,F11.3,                   CMGS7800
     2  5X4HPT42,F11.0,  5X4HTHGG,F11.2  /  )                               CMGS7810
      WRITE(N6,8724) ANN,GMF,PT43,TMAX, CDB,IFTYPE,RGD,TSUS                 CMGS7820
 8724 FORMAT(10X3HANN,F12.4, 5X3HGMF,F12.3, 5X4HPT43,F11.0,                 CMGS7830
     1  5X4HTMAX,F11.2 // 10X3HCDB,F12.2, 5X6HIFTYPE,I9,                    CMGS7840
     2  5X3HRGD,F12.2, 5X4HTSUS,F11.2 /  )                                  CMGS7850
      WRITE(N6,8725) CLX,KFM, RHOINS,ULLG, CNM,MATPB,RHORJF,VPP             CMGS7860
 8725 FORMAT( 10X3HCLX,F12.2,5X3HKFM,I12,   5X6HRHOINS,F9.3,                CMGS7870
     1  5X4HULLG,F11.4 // 10X3HCNM,F12.4, 5X5HMATPB,I10,                    CMGS7880
     2  5X6HRHORJF,F9.3, 5X3HVPP,F12.4  / )                                 CMGS7890
      WRITE(N6,8726) DELT4,MATTK,RCB,X1, DROF,NB,RU,X2                      CMGS7900
 8726 FORMAT( 10X5HDELT4,F10.0, 5X5HMATTK,I10, 5X3HRCB,F12.3,               CMGS7910
     1  5X2HX1,F13.4 // 10X4HDROF,F11.2, 5X2HNB,I13,                        CMGS7920
     2  5X2HRU,F13.3, 5X2HX2,F13.4  / )                                     CMGS7930
      WRITE(N6,8727) EOR,       SPPWF,XMOMR, EEXP,PDF                       CMGS7940
 8727 FORMAT(10X3HEOR,F12.2,   20X,          5X5HSPPWF,F10.3,               CMGS7950
     1  5X5HXMOMR,F10.4 // 10X4HEEXP,F11.2, 5X3HPDF,F12.3  )                CMGS7960
      CALL PAGE                                                             CMGS7970
 8793 CONTINUE                                                              CMGS7980
      GO TO 902                                                             CMGS7990
   62 IF (Z3 .GT. 2 ) GO TO 63                                              CMGS8000
      NLIX = NLIX + 15                                                      CMGS8010
      IF ( NLIX  .GT.  50  )  CALL PAGE                                     CMGS8020
      NLINE = NLINE + 15                                                    CMGS8030
      GO TO 902                                                             CMGS8040
   63 IF (Z3 .GT. 3 ) GO TO 64                                              CMGS8050
      GO TO 902                                                             CMGS8060
   64 IF (Z3 .GT. 4 ) GO TO 65                                              CMGS8070
      GO TO 902                                                             CMGS8080
   65 IF (Z3 .GT. 5 ) GO TO 66                                              CMGS8090
      NLIX = NLIX + 10                                                      CMGS8100
      IF ( NLIX  .GT.  50  )  CALL PAGE                                     CMGS8110
      NLINE = NLINE + 10                                                    CMGS8120
      GO TO 902                                                             CMGS8130
   66 IF ( Z3 .GT. 6 ) GO TO 68                                             CMGS8140
      KRJF = 1                                                              CMGS8150
      CALL RJINPT ( Z4, NRAMP, INPRIN, Z5 )                                 CMGS8160
      GO TO 902                                                             CMGS8170
  160 IF ( Z3  .GT.  20  )  GO TO 260                                       CMGS8180
      IF ( Z3  .GT.  15  )  GO TO 167                                       CMGS8190
C     INPUT FOR VEHICLE PERFORMANCE                                         CMGS8200
      READ ( N5, NAMVPM )                                                   CMGS8210
      IF ( INPRIN .LE. 0) GO TO 8450                                        CMGS8220
      WRITE(N6,8415)                                                        CMGS8230
 8415 FORMAT(// 5X,29HTRAJECTORY PHASE CONTROL LIST  // )                   CMGS8240
      WRITE(N6,8413) NCPHAZ, ALTI, FARMAX, NDPHAZ, GAMMAI,                  CMGS8250
     1     TPCMGN, TT4MAX                                                   CMGS8260
 8413 FORMAT(/ 3X6HNCPHAZ,I7, 3X4HALTI,F10.0, 3X6HFARMAX,F9.4  //           CMGS8270
     1     3X6HNDPHAZ,I7, 3X6HGAMMAI,F8.4,                                  CMGS8280
     2   3X6HTPCMGN, F9.3  //  36X6HTT4MAX, F9.0   /   )                    CMGS8290
      WRITE(N6,8314) NLPHAZ, MOPT, NZLLRI, VELI, XMACHI                     CMGS8300
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 8314 FORMAT( 3X6HNLPHAZ,I7, 3X4HMOPT,I10  //  3X6HNZLLRI,I7,          CMGS8310
     1     3X4HVELI,F10.2  //  19X6HXMACHI  , F8.2      )             CMGS8320
      WRITE(N6,8437)                                                  CMGS8330
 8437 FORMAT( //    )                                                 CMGS8340
      WRITE(N6,8417)                                                  CMGS8350
 8417 FORMAT( 5X3HNO.,2X6HALPMAX,6X4HALTF, 1X6HANZMAX, 5X6HFVALUE,    CMGS8360
     1     1X6HGAMMAF, 1X5HICONT, 1X6HIPTYPE, 1X5HITERM, 1X5HMHGEN,    CMGS8370
     2     1X5HMODES, 1X5HNAERO, 1X6HXMACHF, 1X6HZPRINT,               CMGS8380
     3   2X6HTPHASE, 2X6HTTOTAL, 1X5HSLOPE  /  )                       CMGS8390
      DO 8475 NP = 1, 20                                              CMGS8400
      IF ( ICONT(NP)  .LE. 0 ) GO TO 8430                             CMGS8410
      WRITE(N6,8427) NP,ALPMAX(NP), ALTF(NP),ANZMAX(NP),FVALUE(NP),   CMGS8420
     1     GAMMAF(NP), ICONT(NP), IPTYPE(NP), ITERM(NP), MHGEN(NP),   CMGS8430
     2     MODES(NP), NAERO(NP), XMACHF(NP), ZPRINT(NP)               CMGS8440
     3   , TPHASE(NP), TTOTAL(NP), SLOPE(NP)                          CMGS8450
 8475 CONTINUE                                                        CMGS8460
 8427 FORMAT(5X,I3,2X,F6.1,F10.0,F7.1,F11.2,F7.2,I6,I7,4I6,F7.2,F7.1, CMGS8470
     1   F8.1, F8.1, F6.0  )                                          CMGS8480
 8430 CONTINUE                                                        CMGS8490
      WRITE(N6,8431)                                                  CMGS8500
 8431 FORMAT(// 5X,39HDALPH   DALT DCFN DELMAX   DHCL DMACH    ,      CMGS8510
     1   43HDMIN DSTART  DVCL    EREF ERRFAC GKG   GKV      ,        CMGS8520
     2   30HGKVCRU GTOPT RANGEI RTOL TIMEI       )                   CMGS8530
      WRITE(N6,8432) DALPH,DALT,DCFN,DELMAX,DHCL,DMACH,DMIN,DSTART,   CMGS8540
     1    DVCL,EREF,ERRFAC,GKG,GKV,GKVCRU,GTOPT,RANGEI,RTOL,TIMEI    CMGS8550
 8432 FORMAT( 5X,F5.3, F7.0, F5.2, F7.1, F7.0, F6.2, F6.4, F7.3, F6.0,CMGS8560
     1   F8.6, F7.1, F4.1, F6.4, F7.1, F6.1, F7.1, F5.1, F6.1   )    CMGS8570
C                                                                     CMGS8580
 8433 FORMAT(// 5X,6HIPROP1, 1X6HJPRINT, 1X6HMXSTEP, 1X5HNTRYS    )   CMGS8590
 8434 FORMAT( 5X,I6,2I7,I6 )                                          CMGS8600
      WRITE(N6,8437)                                                  CMGS8610
      DO 8440 NP=1,20                                                 CMGS8620
      ICTS = ICONT(NP)                                                CMGS8630
      IF (  (ICTS.LE.0)  .OR.  (ICTS.GT.12)  )  GO TO 8440            CMGS8640
      NPI = 10 * NP  -  9                                             CMGS8650
      NPD = NPI + 200                                                 CMGS8660
      NPIL = 10 * NP                                                  CMGS8670
      NPDL = NPIL + 200                                               CMGS8680
      WRITE(N6,8442) NP,(CONDZ(I),I=NPI,NPIL),                        CMGS8690
     1               NP,(CONDZ(I),I=NPD,NPDL)                         CMGS8700
 8442 FORMAT ( 5X4HCONI,I2, 10F10.2/ 5X4HCOND,I2, 10F10.2 /)          CMGS8710
 8440 CONTINUE                                                        CMGS8720
 8450 CONTINUE                                                        CMGS8730
      IF ( Z5 .LT. 1 ) Z5 = 1                                         CMGS8740
      IF ( Z5 .GT. 5 ) GO TO 8409                                     CMGS8750
      NTRAJ = MAXO ( NTRAJ, Z5 )                                      CMGS8760
C     SER TRAJ PARAM INTO STORAGE - INPUT VALUES                      CMGS8770
      DO 8407 ITR = 1, 670                                            CMGS8780
 8407 TRCON(ITR,Z5) = TRYSOM(ITR)                                     CMGS8790
      DO 1979 ITR=1,102                                               CMGS8800
 1979 TRMOR(ITR,Z5) = TREIX(ITR)                                      CMGS8810
 8409 CONTINUE                                                        CMGS8820
C     RESET TRAJ PARAM FOR FIRST TRAJ                                 CMGS8830
      DO 1976 ITR = 1, 102                                            CMGS8840
 1976 TREIX(ITR) = TRMOR(ITR,1)                                       CMGS8850
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      DO 1975 ITR = 1, 670                                              CMGS8860
 1975 TRYSOM( ITR ) = TRCON(ITR,1)                                      CMGS8870
      GO TO 900                                                         CMGS8880
  167 IF ( Z3  .GT.  17  )  GO TO 168                                   CMGS8890
      GO TO 902                                                         CMGS8900
  168 IF ( Z3  .GT.  18  )  GO TO 902                                   CMGS8910
      GO TO 900                                                         CMGS8920
  260 CONTINUE                                                          CMGS8930
      GO TO 902                                                         CMGS8940
   68 IF ( Z3 .GT. 8 ) GO TO 902                                        CMGS8950
      READ ( N5, NAMTJ )                                               CMGS8960
      ALETX = ALETJ                                                    CMGS8970
      IF ( INPRIN .GT. 0 ) WRITE ( N6, NAMTJ )                         CMGS8980
      GO TO 900                                                         CMGS8990
C                                                                       CMGS9000
C**CO READ BASIC TABLES                                                 CMGS9010
 7      IX = Z4                                                         CMGS9020
        IF (Z3.GE.2)  GO TO 72                                          CMGS9030
C**  READ  ASIC TABLES AND STORE ON DA DISK 11                          CMGS9040
        CALL  TBASIC(IX)                                                CMGS9050
        GO TO 902                                                       CMGS9060
 72     IF(IPR(1).EQ.0)   WRITE(6,2002)  ZCODE                          CMGS9070
        IF(Z3.GT.2)  GO TO 73                                           CMGS9080
        IF(Z4.GT.1)  GO TO 722                                          CMGS9090
C****   TRANSFER DISK 11 TO TAPE 2.                                     CMGS9100
        CALL TF1102                                                     CMGS9110
        GO TO 902                                                       CMGS9120
C****   TRANSFER TAPE 2 TO DISK 11.                                     CMGS9130
 722    CALL TF0211                                                     CMGS9140
        GO TO 902                                                       CMGS9150
C****   DELETE ALL TEMPORARY TABLES ON DISK 11                          CMGS9160
 73     IF (Z3.GT.3)  GO TO 74                                          CMGS9170
        K   =   0                                                      CMGS9180
        DO 7301 I=1,NB11                                                CMGS9190
        IF (INDX11(I,7).GE.0)  GO TO 7301                               CMGS9200
        K   = K + 1                                                     CMGS9210
        INDX11(I,2) = 0                                                 CMGS9220
 7301   CONTINUE                                                        CMGS9230
        NB11 = NB11 - K                                                 CMGS9240
        IF (K.GT.0)   ND11=INDX11(NB11+1,4)                             CMGS9250
        GO TO 902                                                       CMGS9260
 74     CALL  TBASIC(IX)                                                CMGS9270
       KBASVA  = 1                                                      CMGS9280
        GO TO 902                                                       CMGS9290
    8  CONTINUE                                                        CMGS9300
       CALL INCOST(Z3,INPRIN)                                           CMGS9310
       GO TO 900                                                        CMGS9320
C**    SETUP SEM WORTH AND DERIVATIVES                                  CMGS9330
 9      IF (Z3.GT.1)  GO TO 92                                          CMGS9340
        CALL PAGE                                                       CMGS9350
       READ (N5,NAM2)                                                   CMGS9360
       WRITE (N6,NAM2)                                                  CMGS9370
        NLINE = NLINE + 4                                               CMGS9380
        IP   = IPR(4)                                                   CMGS9390
C      CALL NEMWTH                                                      CMGS9400
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      WRITE (N6,NAM4)                                                    CMGS9410
       NLINE = NLINE + 4                                                 CMGS9420
       GO TO 902                                                         CMGS9430
C**    PUNCH CARDS FOR WORTH AND DERIVATIVES                             CMGS9440
 92    IF (Z3.GT.2)  GO TO 93                                            CMGS9450
      WRITE (N6,NAM3)                                                    CMGS9460
      WRITE ( N7, NAM3 )                                                 CMGS9470
      GO TO 900                                                          CMGS9480
C**   READ WORTH AND DERIVATIVES DIRECTLY                               CMGS9490
 93    IF (Z3.GT.3)  GO TO 94                                            CMGS9500
       IF (NLINE.GT.50)  CALL PAGE                                       CMGS9510
      READ (N5,NAM3)                                                     CMGS9520
      IF ( INPRIN .GT. 0 ) WRITE (N6, NAM3   )                           CMGS9530
       NLINE = NLINE + 8                                                 CMGS9540
      GO TO 900                                                          CMGS9550
 94    GO TO 902                                                         CMGS9560
C                                                                        CMGS9570
CXX   SYNTHESIZE COMPATIBILE CONFIGURATIONS                              CMGS9580
 11    IF (Z3.GT.1)  GO TO 112                                           CMGS9590
      IF ( Z4  .GE.  2  )  GO TO 111                                     CMGS9600
      IF ( KPASVA .LE.0) GO TO 111                                       CMGS9610
C**READ AND WRITE SETUPS                                                 CMGS9620
C****  COMPATIBILITY MATRICES REQ IF  Z4  =  0                           CMGS9630
       IX = Z4                                                           CMGS9640
      CALL SETUP1 ( IX, Z5, KASE, IXX, Z4   )                            CMGS9650
       IF (IXX.NE.0)  NFLAG=NFLAG + 1                                    CMGS9660
      IF (  Z4  .GT.  0   )  GO TO 110                                   CMGS9670
       CALL  WRT1(2)                                                     CMGS9680
      CALL PAGE                                                          CMGS9690
  110 CONTINUE                                                           CMGS9700
      IX = 1                                                             CMGS9710
       CALL  SETUP3(IX,Z5,Z6,IPR(5),NLINE,NPAGE,PCODE,IXX)               CMGS9720
      KPASVA  =  0                                                       CMGS9730
       IF (IXX.NE.0)  NFLAG2 = NFLAG2 + 1                                CMGS9740
  111 CONTINUE                                                           CMGS9750
       IX   =   2                                                        CMGS9760
C     READ SUPERVISORY NAMELIST WHICH OVERRIDES MISC LISTS               CMGS9770
      READ (N5,SUPER)                                                    CMGS9780
      IF ( ZXNB .LE. 0. ) ZXNB = 1.                                      CMGS9790
      IF(INPRIN.LE.0) GO TO 8853                                         CMGS9800
      WRITE(N6,8821)                                                     CMGS9810
 8821 FORMAT(/// 30X,15HSUPER  NAMELIST ///13X10HTRAJECTORY,             CMGS9820
     1   10X10HPROPULSION, 10X13HCONFIGURATION / 13X10HDATA ITEMS,       CMGS9830
     2   10X10HDATA ITEMS, 10X10HDATA ITEMS  // )                        CMGS9840
      WRITE(N6,8822) ALTI,BCANTA,ART,FARMAX,DIAFR,BRAT                   CMGS9850
 8822 FORMAT(10X4HALTI,F12.0,4X6HBCANTA,F10.2, 4X3HART,F13.4  //         CMGS9860
     1        10X6HFARMAX,F10.4, 4X5HDIAFR,F11.2, 4X4HBRAT,F12.4/)      CMGS9870
      WRITE(N6,9923) GAMMAI,        FINE,              FRBT              CMGS9880
 8823 FORMAT(10X6HGAMMAI,F10.2,    20X,           4X4HFINE,F12.4 //      CMGS9890
     1      26X,              20X,           4X4HFRBT,F12.4  / )        CMGS9900
      WRITE(N6,8824) MOPT,        IART,NCPHAZ,DVMULT,IARW                CMGS9910
 8824 FORMAT( 10X4HMOPT,I12,      20X,          4X4HIART,I12 //          CMGS9920
     1    10X6HNCPHAZ,I10, 4X6HDVMULT,F10.2, 4X4HIARW,I12 / )           CMGS9930
      WRITE(N6,8825) NDPHAZ,DVTOL,IBTL,NLPHAZ,INWORL,ICNTRL              CMGS9940
 8825 FORMAT(10X6HNDPHAZ,I10, 4X5HDVTOL,F11.2,  4X4HIBTL,I12 //          CMGS9950
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     1    10X6HNLPHAZ,I10, 4X6HINWORL,I10, 4X6HICNTRL,I10 / )                CMGS9960
      WRITE(N6,8826) NZLLRI,ITHR,ISURFT,TPCMGN,                             CMGS9970
     1                                    TT4MAX,KINLET,ISURFW              CMGS9980
8826 FORMAT(10X6HNZLLRI,I10, 4X4HITHR,I12, 4X6HISURFT,I10 //                CMGS9990
     A      10X6HTPCMGN,F10.3  //                                           CMGS*000
     1        10X6HTT4MAX,F10.0, 4X6HKINLET,I10,4X6HISURFW,I10/)            CMGS*010
      WRITE(N6,8827) VELI,KPROP,ITN,XMACHI,MAXNIT,ITSECT                    CMGS*020
8827 FORMAT(10X4HVELI,F12.2, 4X5HKPROP,I11, 4X3HITN,I13 //                  CMGS*030
     1        10X6HXMACHI,F10.2, 4X6HMAXNIT,I10, 4X6HITSECT,I10/)           CMGS*040
      WRITE(N6,8828)       IWSECT,NZTEMP,KINLET,VEOB,NW,VL,WMISC,           CMGS*050
     1              XLBDY, ZXNB                                             CMGS*060
8828 FORMAT(30X,     16X,     4X6HIWSECT,I10 //30X6HNZTEMP,I10,             CMGS*070
     1    4X6HKINLET,I10 //30X4HVEOB,F12.2, 4X2HNW,I14 //                   CMGS*080
     2    30X2HVL,F14.2, 4X5HWMISC,F11.2 //                                 CMGS*090
     3                          30X5HXLBDY,F11.2 //                         CMGS*100
     4     30X4HZXNB,F12.0    )                                            CMGS*110
      CALL PAGE                                                             CMGS*120
8853 CONTINUE                                                               CMGS*130
     IF ( KLNCH .GT. 0 ) GO TO 1920                                         CMGS*140
1920 CONTINUE                                                               CMGS*150
     DO 1925 I = 1, 10                                                      CMGS*160
1925 TRCON(I,1) = TRYSCM(I)                                                 CMGS*170
     INTYPE = KINLET                                                        CMGS*180
     TRMOP(83,1) = TPCMGN                                                   CMGS*190
     ITNX = ITN                                                             CMGS*200
     IARTX = IART                                                           CMGS*210
     IARWQ = IARW                                                           CMGS*220
     IARWX = IARW                                                           CMGS*230
     ERRTX=ERRT                                                             CMGS*240
     NAERX( 1)= ITN                                                         CMGS*250
     NAERX( 2)= IPTL                                                        CMGS*260
     NAERX( 3)= ILUG                                                        CMGS*270
     NAERX( 4)= NW                                                          CMGS*280
     NAERX( 5)= ICNTRL                                                      CMGS*290
     NAERX( 6)= IART                                                        CMGS*300
     NAERX( 7)= IARW                                                        CMGS*310
     NAERX(10)= ITSECT                                                      CMGS*320
     NAERX(11)= IWSECT                                                      CMGS*330
     NAERX(16)= IPLOT                                                       CMGS*340
     NAERX(30)= NCGVAR                                                      CMGS*350
     NWX = NW                                                               CMGS*360
     IWTPL = ZPOPT                                                          CMGS*370
     WSINPU = ZWSKIN                                                        CMGS*380
     HPEXX = HPEXT                                                          CMGS*390
     BRAZ = BRAT                                                            CMGS*400
     XAZ2(2) = THETAC                                                       CMGS*410
     KIND = KPROP                                                           CMGS*420
     EX(1)=PHI*.0174533                                                     CMGS*430
     EX(2) = THETA*.0174533                                                 CMGS*440
     WARD(7) = PHI    *.0174532S                                            CMGS*450
     ZPNACC(1) = DPNACC                                                     CMGS*460
     ZPTACC(1) = DPTACC                                                     CMGS*470
     ZPREFU(1) = DPREFU                                                     CMGS*480
     ITHI = ITHR                                                            CMGS*490
     FACT = 2. * ZXNB                                                       CMGS*500
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      C4 = C4 + WHARNS / FACT                                          CMGS*510
      C5 = C5 + WHARNS / FACT                                          CMGS*520
      FSULT = FSULX                                                    CMGS*530
      FSYLD = FSYLX                                                    CMGS*540
      ZCODES(1) = CODES                                                CMGS*550
      ZLADES(1) = CLADES                                               CMGS*560
      NOOP = 1                                                         CMGS*570
      JRJ = 1                                                          CMGS*580
      IFIRST = 1                                                       CMGS*590
      J = 1                                                            CMGS*600
      IF (WARD( 5) .GT. ICO.)J = C                                     CMGS*610
      NPASS = 0                                                        CMGS*620
      IEX = 0                                                          CMGS*630
      IF(KIND .EQ. 43 .OR. KIND .EQ. 44) IEX = 1                       CMGS*640
      IF(KIND .EQ. 44 .OR. KIND .EQ. 53) IBSTIN = 0                    CMGS*650
      CALL SUPRCM ( IX )                                               CMGS*660
      IF ( KFIL12 .GT. 0 ) GO TO 900                                   CMGS*670
      INTR = KSAVPL - KONPL                                            CMGS*680
      IF ( NCONFG  .GE.  INTR ) NCONFG = INTR - 1                      CMGS*690
      JD12 = KSAVPL - 1                                                CMGS*700
      WRITE(N12'JD12) NCONFG                                           CMGS*710
       GO TO 900                                                       CMGS*720
  112  IF (Z3.GT.2)   GO TO 113                                         CMGS*730
       GO TO 900                                                       CMGS*740
  113  IF (Z3.GT.3)  GO TO 114                                          CMGS*750
C     MOD TO NAMELIST                                                  CMGS*760
      READ ( N5, NAMSCR )                                              CMGS*770
      IF ( INPRIN .GT. 0 ) WRITE (N6, NAMSCR )                         CMGS*780
      Z4 = NLEVEL                                                      CMGS*790
      Z5 = LWF1                                                        CMGS*800
      Z6 = LWF2                                                        CMGS*810
      IF ( KFIL12 .GT. 0 ) GO TO 115                                   CMGS*820
      JD12 = KSAVPL - 1                                                CMGS*830
      READ (N12'JD12) NCONFG                                           CMGS*840
      IF ( NCONFG  .LE.  0  )  GO TO 115                               CMGS*850
      CALL SORTCM                                                      CMGS*860
       GO TO 900                                                       CMGS*870
  114 CONTINUE                                                         CMGS*880
      ICNO = 1                                                         CMGS*890
      CALL COST(ICNO)                                                  CMGS*900
      GO TO 900                                                        CMGS*910
  115 CONTINUE                                                         CMGS*920
      NCON = C                                                         CMGS*930
      WRITE (N6,116)                                                   CMGS*940
  116 FORMAT(10X40HNO CM CONCEPTS FOUND, SCREENING BYPASSED     )      CMGS*950
      JD12 = KSAVPL                                                    CMGS*960
      WRITE (N12'JD12) NCON                                            CMGS*970
  900 KRET = 0                                                         CMGS*980
      IF ( INPRIN  .LE.  0  )  GO TO 902                               CMGS*990
      RETURN                                                           CMGS*000
  902 KRET = 2                                                         CMGS*010
      RETURN                                                           CMGS*020
      END                                                              CMGS*030
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      SUBROUTINE SUPRCM ( IX )                                          SUPR0010
C   NUK.CM-CGSM  P.K.MCDONOUGH  FIV/EBCD   10/18/73                     SUPR0020
C  INITIALIZE AND LOOP ON BASIC VARIABLES                               SUPR0030
C                                                                       SUPR0040
COMMON GENERAL                                                          SUPR0050
      COMMON /QACOST/ QMAXQ, VMAXQ, DUMQA(8)                            SUPR0060
      INTEGER*2 ICM                                                     SUPR0070
      COMMON /BASVAR/ LWOPT,TOTL,TOTWT,TOTDIA,PROPL,TCTAR,RATIO,        SUPR0080
     1  WAREA,TAREA,ASPECT,PLCL,WHWT,GUIDWT,DUMZZZ(7)                   SUPR0090
      COMMON /BESYET/ ZXNB,PES14(14)                                    SUPR0100
      COMMON /COMVLS/ COM(51)                                           SUPR0110
      EQUIVALENCE ( COM(14), AX ),                                      SUPR0120
     1 (COM(30),ZXNBX),                                                 SUPR0130
     2 (COM(31),D3X),                                                   SUPR0140
     3 (COM(39),WWHXXX),                                                SUPR0150
     4 (COM(51),NCONFX)                                                 SUPR0160
      COMMON/CON1/INX(16),NCNCPT,NSSTYP,IL(30),NICOMA                   SUPR0170
      COMMON /CONLY/ KINDNS, DIAERT, SCMMOR(8)                          SUPR0180
      COMMON /CONSTA/  FUNFOR(4), RAD, FUNTHR(3)                        SUPR0190
      COMMON /COSTSC/ CTOT,CPTOT,CRTOT,COMPC(17)                        SUPR0200
      COMMON/CSET3/KASE,LBVIX,LABVIX,MBVIX,MABVIX,NBV,NAUXV,IMBVIX(24)  SUPR0210
     1,   BAUXV(16,10),BTC(4,30)                                        SUPR0220
     2,   BVIX(24,16),NT(30),LABT,MABT,NABT,NBT,BT(10,10,30)            SUPR0230
     3,   ICM(16,16,10)                                                 SUPR0240
      COMMON /FUNCVR/ MODEL                                             SUPR0250
      COMMON /GUIDCO/ COSN,NSCRC,WTGUID,DUM57(57)                       SUPR0260
      COMMON / INOU1 / IPR(16), JPAR(16), PAR(16)                       SUPR0270
      COMMON / INOU12 / JD12,ND12, NB12                                 SUPR0280
      COMMON / INOUT / NLINE,                                           SUPR0290
     X                 NPAGE,PCODE(20),MISC(7),XMISC(7),ZIP,ZCODE(19),  SUPR0300
     1  JBASH(20), TBASH(20),IBB(8),ICB(8), DUM(8), IDUM(8), NFLAG,     SUPR0310
     2  NFLAG2                                                         SUPR0320
      COMMON /NFILES/ N5,N6,N7,N11,N12,N1                               SUPR0330
      COMMON /PRINTR/ IPSM,KTIMES,IVP,IAIR,IPACK,ITOT,IALL              SUPR0340
      COMMON /ROUNDP/ PRNG(20), WORTZ, CEP, RANGE, RUF20(20)            SUPR0350
      COMMON/S13/MINX(70),IP(70),IC(70),IS1(70),IS2(70)                 SUPR0360
      COMMON /SCRNNL/ NPTS(20),PARVNL(7,20),DWNL(7,20),DUMMY(50)        SUPR0370
     1  ,NSCOST,IDU4M4(4)                                              SUPR0380
      EQUIVALENCE ( IDU4M4(1), KBYCST )                                 SUPR0390
      COMMON /SOLMIS/ SOL9(9), WSECT                                    SUPR0400
      COMMON / SWORTH/  KBASE, WORTH1, WORTH2, NPAR, KPAR(20), PARV(20),SUPR0410
     1   DERV1(20), DERV2(20)                                           SUPR0420
      COMMON/SY1/MCODE(6),NCODES,NCONFG                                 SUPR0430
      COMMON/SY2/TC,AC,FF                                               SUPR0440
      COMMON/TEMP/JX1(70),JX2(70),JX3(70),JX4(70),RX1(70),RX2(70),      SUPR0450
     1 RX3(70),RX4(70),JX(24)                                           SUPR0460
      EQUIVALENCE                                                       SUPR0470
     1 (IL(1),IL1),(IL(2),IL2),(IL(3),IL3),(IL(4),IL4),(IL(5),IL5),(IL(6SUPR0480
     2 ),IL6),(IL(7),IL7),(IL(8),IL8),(IL(9),IL9),(IL(10),IL10),(IL(11),SUPR0490
     3 IL11),(IL(12),IL12),(IL(13),IL13),(IL(14),IL14),(IL(15),IL15),(ILSUPR0500
     4 (16),IL16),(IL(17),IL17),(IL(18),IL18),(IL(19),IL19),(IL(20),IL20SUPR0510
     5 ),(IL(21),IL21),(IL(22),IL22),(IL(23),IL23),(IL(24),IL24),(IL(25)SUPR0520
     6 ,IL25),(IL(26),IL26),(IL(27),IL27),(IL(28),IL28),(IL(29),IL29),(ISUPR0530
     7 L(30),IL30)                                                      SUPR0540
      EQUIVALENCE                                                       SUPR0550
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     1 (JX(1),I1),(JX(2),I2),(JX(3),I3),(JX(4),I4),(JX(5),I5),(JX(6),I6)SUPR0560
     2 ,(JX(7),I7),(JX(8),I8),(JX(9),I9),(JX(10),I10),(JX(11),I11),(JX(1SUPR0570
     3 2),I12),(JX(13),I13),(JX(14),I14),(JX(15),I15),(JX(16),I16),(JX(1SUPR0580
     4 7),I17),(JX(18),I18),(JX(19),I19),(JX(20),I20),(JX(21),I21),(JX(2SUPR0590
     5 2),I22),(JX(23),I23),(JX(24),I24)                                SUPR0600
      COMMON /ZWORTH/ ZCEP(10), ZFORCE, ZGWTT(10), ZREL, ZWCTH(10)      SUPR0610
      EQUIVALENCE ( ZWOTH(1), NZLLRI )                                  SUPR0620
      EQUIVALENCE ( ZWOTH(9), WTH1 ), ( ZWOTH(10), WTH2 )               SUPR0630
COMMON PAYLOAD                                                          SUPR0640
      COMMON /SEVEN/ ITN,XZ2(2),IRADAR,IPAY,XZ22(2),WEQ,WMISC,XZ7(7),   SUPR0650
     1   IART,NW,IARW,PIVOT,INTYPE,XLPAYI,WPAYI,WWH,XZ29(29)            SUPR0660
COMMON ADM                                                              SUPR0670
      COMMON /AERO/ ARZ14(14), CFB, ARZ91(91)                           SUPR0680
      EQUIVALENCE ( ARZ91(43), XD1TP )                                  SUPR0690
      COMMON /AERPRO/ CDODES(10), CLADES(10)                            SUPR0700
      COMMON /AERZ/ CDO3(3), CDO, CDO37(37)                             SUPR0710
      COMMON /BOAT/ CDLUMP,CDPBTL,DUM8(8),CDBOAT(10)                    SUPR0720
      COMMON/OUTLNR/ XLNRVS(50)                                         SUPR0730
      EQUIVALENCE ( KLIMIT, XLNRVS(11) )                                SUPR0740
      COMMON /PYAIR/ SREFS, BVRNX(800)                                  SUPR0750
      COMMON /DRC/ DRG42(42), ARW, DRG444(4)                            SUPR0760
      COMMON /FORNOW/ NRM,NALT, RMV(20), ALTV(10), FRNC2(2)             SUPR0770
      COMMON /NAERC/ TNOZZ, TNZ5(5), DCASE, TNZ17(17), TLTHEO           SUPR0780
      COMMON /SKINF/ CDSKNF(10), XLBD7, KMANY                           SUPR0790
      COMMON /UPINLT/ PRAMBL(127), CNA, PRAM2(2)                        SUPR0800
COMMON PSM                                                              SUPR0810
      COMMON /ALFBLK/ ALF6(6), CDCX, ALF66(6),CLALX                     SUPR0820
      COMMON /ALL/ WORD, IDES, ALL27(27)                                SUPR0830
      COMMON /CMISC/ PARAM                                              SUPR0840
      COMMON /CMOPT/ KBYDRG,KBYPAK,KBYPSM,KBYVP                         SUPR0850
     1 ,KBYMOI, INWORL , KFIL12                                         SUPR0860
      COMMON /CODEXX/ KIND,ITYPE,ISIZE,NODP,KSUS,KEM,                   SUPR0870
     1   IRSTIN,IZI(6), NPASS,NOUT,IXXN                                 SUPR0880
      COMMON /DAM/ DIAER,DAMISC(19)                                     SUPR0890
      COMMON /EXTERN/ PLLT,PLEX,D3, RANGX,WTTOT,XLTOT,VL,               SUPR0900
     1    VEOB,DELVI,PLMASS,ARSURF,ARZ(9)                               SUPR0910
      COMMON /EMPT/ HPEM, AMACEM, ALFIEM,FARDEM                         SUPR0920
      COMMON /GOBOL/ DMZZ, WARDZZ(77)                                   SUPR0930
      EQUIVALENCE ( WARDZZ(4), BOOTW), ( WARDZZ(18), DMMAX )            SUPR0940
      COMMON /INDATA/ DIN2(2), WTINLT                                   SUPR0950
      COMMON /INSERT/ ZX17(17), TNOZL,  ZX15(15)                        SUPR0960
      COMMON /IPROP/ IND, IND3(3)                                       SUPR0970
      COMMON /ITERT/ DVTOL,DELDEL,NUMIT,MAXNIT,DVMULT                   SUPR0980
      COMMON /LOOPXX/ LOOPRJ,CENSAV,WTSAV,WSSAV,SLSAV                   SUPR0990
      COMMON /NAMSOL/ DCASEX, XE2(2), STGW, ZLTOT,WMILS,ZLPAY,          SUPR1000
     1     ZWPAY, ZARSUP, TTIT4(4)                                      SUPR1010
      EQUIVALENCE ( XE2(1), SOLISP ), ( TTIT4(1), SOLTW ),              SUPR1020
     1            (TTIT4(3), ITHR), ( TTIT4(4), SOLF  )                 SUPR1030
      COMMON /PINT/ FFX3(3), SOLPC, FFX26(26)                           SUPR1040
      COMMON /RJBLOK/ RJ(50)                                            SUPR1050
      EQUIVALENCE ( RJ(18), PCMGN )                                     SUPR1060
      EQUIVALENCE ( RJ(26), TT4 )                                       SUPR1070
      COMMON /RJDAT/ RJD7(7), BOSTLX, BUMXZ                             SUPR1080
      COMMON/RKBLK/RKX(10),RXXX(30)                                     SUPR1090
      COMMON /ROCKET/ RLIQSP, RLIQMR, RLIQX,RLIQPC,RLIQ31(31),          SUPR1100
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     1                  RLIQTh, RLIQZ, RLIQF, RLIQY                          SUPR1110
      COMMON /SUSDAT/ TX(44)                                                 SUPR1120
      COMMON /TRAJX/ TRAQZ(6), FARMAX, TT4MAX, FSLBO, ICCZEN                 SUPR1130
      COMMON /TRJCTA/  DPALT(10), DPMACH(10), DPNT(20), DPGAM(10),           SUPR1140
     1     DPER(10), DPTTEA(10)                                              SUPR1150
      COMMON/TURBI/ TV(30)                                                   SUPR1160
      EQUIVALENCE  ( TV(3), TJALT ),  ( TV(4), TJMACH),                      SUPR1170
     1             ( TV(5), TJTHR ),  ( TV(6), T4TJ  )                       SUPR1180
COMMON VPM                                                                   SUPR1190
      COMMON /NEWVPM/ TREIX(102)                                             SUPR1200
      COMMON /PERF/ SOME(7), NLPHAZ, NUZ, NUUZ, XMX(80), XPX(10,20),         SUPR1210
     1   YPX(10,20), IN(40), IPTYPX(20), REST(120)                           SUPR1220
      COMMON /MULTRJ/ NTRAJ,TRCON(670,5), PROPLT, XNOZ                       SUPR1230
     1   , TRMOR(102,5), KEMTY                                               SUPR1240
      DIMENSION TRYSOM(670)                                                  SUPR1250
      EQUIVALENCE ( TRYSOM(1), SOME(1) )                                     SUPR1260
      EQUIVALENCE ( TNZ17(12), WWING )                                       SUPR1270
      COMMON /TOVPER/ DUM555(5), SEXITZ,DUM666(66)                           SUPR1280
C                                                                            SUPR1290
 7070 FORMAT(/)                                                              SUPR1300
 7071 FORMAT(//)                                                             SUPR1310
      NAMELIST /NOTUS/ RMV,ALTV,CDODES,CLADES,CDSKNF,NODP,                   SUPR1320
     1   DCASE,TNOZZ,XLPDY,TLTHEO,KSTEP,TOTL                                 SUPR1330
C                                                                            SUPR1340
C    INITIAL SETUP LOGIC                                                     SUPR1350
C                                                                            SUPR1360
     1  NCODES=1+(NSSTYP-1)/5                                               SUPR1370
      NCONFG = 0                                                             SUPR1380
       IF(NSSTYP-24)6,20,3                                                   SUPR1390
     3  STEP=1.01                                                           SUPR1400
      WRITE(N6,2000) NSSTYP                                                  SUPR1410
 2000 FORMAT(/////5X,29HERROR IN B.V. TABLE - LIST IS , I10                  SUPR1420
     1     , 2X4HLONG /////)                                                 SUPR1430
      RETURN                                                                 SUPR1440
    6  L1=NSSTYP+1                                                         SUPR1450
       DO 8 I=L1,30                                                          SUPR1460
    8  IL(I)=0                                                             SUPR1470
   20 CONTINUE                                                             SUPR1480
       DOL=0.0                                                               SUPR1490
      DO 212 I = 1,24                                                        SUPR1500
  212 JX(I) = 1                                                              SUPR1510
C                                                                            SUPR1520
      KCONFG = 0                                                             SUPR1530
      KEUPST = 0                                                             SUPR1540
      DIAERT = DIAER                                                         SUPR1550
      KINDNS = KIND                                                          SUPR1560
      NODP=1                                                                 SUPR1570
      IAIR = IPR(10)                                                         SUPR1580
      IF ( IAIR  .GT.  1  )  IAIR = 1                                        SUPR1590
      IPACK = IPR(11)                                                        SUPR1600
      IVP = IPR(13)                                                          SUPR1610
      ITOT = IPR(14)                                                         SUPR1620
      IALL = IAIR + IPACK + IPSM + IVP                                       SUPR1630
      IALL = IALL + ITOT                                                     SUPR1640
      ZFARMX= FARMAX                                                         SUPR1650
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      ZTT4MX = TT4MAX                                                    SUPR1660
      DVMULS = DVMULT                                                    SUPR1670
      SAVMAC=ARZ(6)                                                      SUPR1680
      ZXNBX = ZXNP                                                       SUPR1690
C**                                                                      SUPR1700
C   STEP WING AREA                                                       SUPR1710
       DO 101 I1=1,IL1                                                   SUPR1720
      WAREA = BVIX(1, I1 )                                               SUPR1730
      WAREA = WAREA * 144.                                               SUPR1740
      RX1(1) = WAREA                                                     SUPR1750
C   STEP TAIL AREA                                                       SUPR1760
       DO 102 I2=1,IL2                                                   SUPR1770
      TAREA = BVIX ( 2, I2 )                                             SUPR1780
      TAREA = TAREA * 144.                                               SUPR1790
      RX1(2) = TAREA                                                     SUPR1800
      TOTAR = WAREA + TAREA                                              SUPR1810
      RATIO = 1.0E+10                                                    SUPR1820
      IF ( WAREA  .GT.  0.0 )  RATIO = TAREA / WAREA                     SUPR1830
C   STEP EXPOSED WING ASPECT RATIO                                       SUPR1840
       DO 103 I3=1,IL3                                                   SUPR1850
      ASPECT = BVIX(3,I3)                                                SUPR1860
      RX1(3) = ASPECT                                                    SUPR1870
      TNZ5(1) = TAREA                                                    SUPR1880
      TNZ5(4) = WAREA                                                    SUPR1890
      ARW = ASPECT                                                       SUPR1900
C   STEP PAYLOAD LENGTH                                                  SUPR1910
       DO 104 I4=1,IL4                                                   SUPR1920
      PLCL = BVIX(4,I4)                                                  SUPR1930
      RX1(4) = PLCL                                                      SUPR1940
      ZLPAY = PLCL                                                       SUPR1950
C     STEP WARHEAD WT                                                    SUPR1960
       DO 105 I5=1,IL5                                                   SUPR1970
      WHWT = BVIX(5,I5)                                                  SUPR1980
      WWHXXX = WHWT                                                      SUPR1990
      RX1(5) = WHWT                                                      SUPR2000
C     STEP CONTROLS WT                                                   SUPR2010
       DO 106 I6=1,IL6                                                   SUPR2020
      GUIDWT = BVIX(6,I6)                                                SUPR2030
C     CONTROLS WT FOR COSTING                                            SUPR2040
      COM(38) = GUIDWT                                                   SUPR2050
      GUIDWT = GUIDWT + WTGUID                                           SUPR2060
      RX1(6) = GUIDWT                                                    SUPR2070
      NVAR = 10                                                          SUPR2080
      CALL SLU(NVAR,ZGWTT,ZCEP,WTGUID,CEP,ILO,IHI)                       SUPR2090
C   STEP MISSILE DIAM                                                    SUPR2100
      DO 107 I7 = 1, IL7                                                 SUPR2110
      TOTDIA = BVIX(7,I7)                                                SUPR2120
      D3 = TOTDIA                                                        SUPR2130
      D3X = D3                                                           SUPR2140
      DCASEX = D3                                                        SUPR2150
      BOSTLX = 2. * D3                                                   SUPR2160
      A3  =  .7854 * D3**2  /  144.                                      SUPR2170
      SREFS = A3                                                         SUPR2180
      DM77 = DIAER * D3                                                  SUPR2190
      WARDZZ(18) = D3                                                    SUPR2200
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      TNAZZL = D3 / 2.                                                  SUPR2210
      IF ( KBYPSM .GT. 0 ) TNAZZL = XNOZ                                SUPR2220
      RX1(7) = TOTDIA                                                   SUPR2230
      INTYPE = ITYPE                                                    SUPR2240
      KFAIL = 0                                                         SUPR2250
      IMOI = 0                                                          SUPR2260
C   SIZE & PACKAGE PAYLOAD                                              SUPR2270
      CALL PAYLOD(KFAIL, IMOI )                                         SUPR2280
      WPAY =  WPAYI                                                     SUPR2290
      PLMASS = WPAY                                                     SUPR2300
      ZWPAY = WPAY                                                      SUPR2310
      IF(KFAIL  .GT.  0  )  GO TO 107                                   SUPR2320
 6957 CONTINUE                                                          SUPR2330
      DMMAX = D3                                                        SUPR2340
C  VARY BOOSTER T/W                                                     SUPR2350
      DO  1071 I8 =1, IL8                                               SUPR2360
      BOOTW = BVIX(8,I8)                                                SUPR2370
C  VARY L&S F OR T/W......OR.....RAMJET DESIGN ALT                      SUPR2380
C     OR TURBOJET DESIGN ALT                                            SUPR2390
      DO 1072 I9 = 1 , IL9                                              SUPR2400
      VAR1 = BVIX(9,I9)                                                 SUPR2410
C  VARY L&S ISP.....OR.....RAMJET DESIGN MACH NO.                       SUPR2420
C     OR TURBOJET DESIGN MACH NO.                                       SUPR2430
      DO 1073 I10=1, IL10                                               SUPR2440
      VAR2 = BVIX(10,I10)                                               SUPR2450
C  VARY L&S CHAMBER PRESSURE ...OR... RAMJET DESIGN GAMMA               SUPR2460
C     OR TURBOJET DESIGN THRUST                                         SUPR2470
      DO 1074 I11 = 1, IL11                                             SUPR2480
      VAR3 = BVIX(11,I11)                                               SUPR2490
C  VARY LIQUID MIXTURE RATIO ( NO SOLID ) ...OR... RAMJET DESIGN TT4    SUPR2500
C     OR TURBOJET DESIGN T4 ( TURBINE INLET TEMP )                      SUPR2510
      DO 1075 I12=1, IL12                                               SUPR2520
      VAR4 = BVIX(12,I12)                                               SUPR2530
      IF ( KIND  .GT. 49 ) GO TO 1077                                   SUPR2540
      IF ( KIND .GE.  40 ) GO TO 1079                                   SUPR2550
      IF ( KIND .GE.  20 ) GO TO 1078                                   SUPR2560
      IF ( ITHR  .LE. 0 ) SOLF = VAR1                                   SUPR2570
      IF ( ITHR .GT. 0 ) SOLTW = VAR1                                   SUPR2580
      SOLISP    = VAR2                                                  SUPR2590
      SOLPC     = VAR3                                                  SUPR2600
      GO TO 1080                                                        SUPR2610
 1077 CONTINUE                                                          SUPR2620
      TJALT = VAR1                                                      SUPR2630
      TJMACH= VAR2                                                      SUPR2640
      TJTHR = VAR3                                                      SUPR2650
      T4TJ = VAR4                                                       SUPR2660
      GO  TO 1080                                                       SUPR2670
 1078 CONTINUE                                                          SUPR2680
      IF ( ITHR  .LE. 0 ) RLIOF = VAR1                                  SUPR2690
      IF ( ITHR .GT. 0 ) RLIOTW= VAR1                                   SUPR2700
      RLIOSP    = VAR2                                                  SUPR2710
      RLIOPC    = VAR3                                                  SUPR2720
      RLIOMR    = VAR4                                                  SUPR2730
      GO TO 1080                                                        SUPR2740
 1079 CONTINUE                                                          SUPR2750
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      DPALT(1)= VAR1                                                    SUPR2760
      HPEM = VAR1                                                       SUPR2770
C     SET HEIGHT FOR INLETP AND CDINLT                                  SUPR2780
      ARZ(7) = VAR1                                                     SUPR2790
      DPMACH(1)= VAR2                                                   SUPR2800
      AMACEM = VAR2                                                     SUPR2810
      DPGAM(1) = VAR3                                                   SUPR2820
      DPTTEA(1) = VAR4                                                  SUPR2830
      TT4       = VAR4                                                  SUPR2840
 1080 CONTINUE                                                          SUPR2850
      RX1(8) = BOOTW.                                                   SUPR2860
      RX1(9) = VAR1                                                     SUPR2870
      RX1(10) = VAR2                                                    SUPR2880
      RX1(11) = VAR3                                                    SUPR2890
      RX1(12) = VAR4                                                    SUPR2900
C     RAMJET DESIGN FRACTION FUEL CONSUMED                              SUPR2910
      DO 1176 I13=1,IL13                                                SUPR2920
      DPFR(I)=RVIX(13,I13)                                              SUPR2930
C     R/J DESIGN NORMAL ACCELERATION                                    SUPR2940
      DO 1177 I14=1,IL14                                                SUPR2950
      DPNT(I)=RVIX(14,I14)                                              SUPR2960
C     R/J DESIGN TANGENTIAL ACCELERATION                                SUPR2970
      DO 1178 I15=1,IL15                                                SUPR2980
      DPNT(11) = RVIX(15,I15)                                           SUPR2990
C     RAMJET DESIGN PRESSURE MARGIN                                     SUPR3000
      DO 1179 I16=1,IL16                                                SUPR3010
      PDMGN=RVIX(16,I16)                                                SUPR3020
C   STEP MISSILE WT OR LENGTH                                           SUPR3030
      DO 118 I17=1,IL17                                                 SUPR3040
      BINX = RVIX(17,I17)                                               SUPR3050
      TT4 = VAR4                                                        SUPR3060
      RX1(13) = BINX                                                    SUPR3070
      PARAM = BINX                                                      SUPR3080
C**                                                                     SUPR3090
C   TEST FOR COMPATIBILITY MATRIX                                       SUPR3100
        DOL=DOL+1.0                                                     SUPR3110
      IF(AMOD(DOL,1000.) .EQ. 0.0) WRITE(N6,2010) DOL                   SUPR3120
 2010  FORMAT(6X,4HDOL=,1PE15.7)                                        SUPR3130
       IF (AMOD(DOL,10000.  ).NE.0.0) GO TO 60                          SUPR3140
      WRITE (N6,2010) DOL                                               SUPR3150
      WRITE (N6,2004)(JX(I),I=1,NSSTYP)                                 SUPR3160
 2004  FORMAT (6X,6(5I3,2X))                                            SUPR3170
   60 CONTINUE                                                          SUPR3180
      IF ( NICOMA  .LT.  0  )  GO TO 6420                               SUPR3190
C                                                                       SUPR3200
      DO 62 I = 1, NICOMA                                               SUPR3210
       K=IS1(I)                                                         SUPR3220
       L=IS2(I)                                                         SUPR3230
       M=IR(I)                                                          SUPR3240
       N=IC(I)                                                          SUPR3250
       K1=JX(K)                                                         SUPR3260
       K2=JX(L)                                                         SUPR3270
       IF ((K1.EQ.0).OR.(K2.EQ.0))  GO TO 300                           SUPR3280
       K3=ICM(K1,K2,I)                                                  SUPR3290
       IF(M*N.EQ.0)  K3=-1                                              SUPR3300
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      IF(K3.EQ.0)  GO TO 66                                              SUPR3310
   62 CONTINUE                                                           SUPR3320
 6420 CONTINUE                                                           SUPR3330
      DO 64 I=1,NSSTYP                                                   SUPR3340
      JX1(I)=JX(I)                                                       SUPR3350
      IF (IL(I).EQ.0)  JX1(I)=0                                          SUPR3360
 64   CONTINUE                                                           SUPR3370
C    GO TO HERE IF COMPATIBLE                                           SUPR3380
      ICNO = IABS(IAIR) + IABS( IPR(12) ) + IABS(IVP)                    SUPR3390
      IF ( ICNO  .EQ.  0  )  GO TO 7842                                  SUPR3400
      CALL PACE                                                          SUPR3410
      NCF = NCONFG + 1                                                   SUPR3420
      WRITE ( 6, 7841 ) NCF                                              SUPR3430
 7841 FORMAT ( /// 5X, 30HSEARCH FOR CONFIGURATION NO.        , I5 )     SUPR3440
      NCONOT = -47                                                       SUPR3450
      CALL PACKCM ( IX, KCONFG , NCONOT )                                SUPR3460
 7842 CONTINUE                                                           SUPR3470
C**                                                                     SUPR3480
      APZ(6)=CPMACH(1)                                                   SUPR3490
      IF   (  INWORL  .GT. 0  )  GO TO 7345                              SUPR3500
C     SIZE ON TOTAL WT                                                   SUPR3510
      LWOPT = 2                                                          SUPR3520
      TOTWT = BINX                                                       SUPR3530
      WTTOT = TOTWT                                                      SUPR3540
      IF ( KBYPSM .GT. 0 ) GO TO 7347                                    SUPR3550
      PROPL = 0.0                                                        SUPR3560
      TOTL = PLCL                                                        SUPR3570
      XLBDY = 2. * PLCL                                                  SUPR3580
      IF ( PROPLT .GT. 0.) XLBDY = PROPLT                                SUPR3590
      GO TO 7349                                                         SUPR3600
 7345 CONTINUE                                                           SUPR3610
C     SIZE ON LENGTH                                                     SUPR3620
      LWOPT = 1                                                          SUPR3630
      TOTL = BINX                                                        SUPR3640
      PROPL = TOTL - PLCL                                                SUPR3650
      XLBDY = PROPL                                                      SUPR3660
      TOTWT = 0.0                                                        SUPR3670
      WTTOT = 3. * WPAY                                                  SUPR3680
      IF ( KBYPSM .LE. 0 ) GO TO 7349                                    SUPR3690
      WRITE(6,7346)                                                      SUPR3700
 7346 FORMAT( // 2X36HPROPULSION SIZING CANNOT BE BYPASSED   /           SUPR3710
     1      2X30HMUST SIZE TO WEIGHT NOT LENGTH     )                   SUPR3720
      GO TO 9999                                                         SUPR3730
 7347 CONTINUE                                                           SUPR3740
      PROPL = PROPLT                                                     SUPR3750
      XLBDY = PROPLT                                                     SUPR3760
 7349 CONTINUE                                                           SUPR3770
      CUM666(2) = TOTWT                                                  SUPR3780
 7777 CONTINUE                                                           SUPR3790
C                                                                       SUPR3800
      STGW = TOTWT                                                       SUPR3810
      ZLTOT = XLBDY                                                      SUPR3820
      D3 = TOTDIA                                                        SUPR3830
      DCASE = D3                                                         SUPR3840
      TNOZZ = D3  /  2.                                                  SUPR3850
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      APZ(5)=DPMACH(1)                                                  SUPR3860
      APZ(8)=PROPLT/2.                                                  SUPR3870
      TX(33)=PROPLT/2.                                                  SUPR3880
      DUM666(9)=D3                                                      SUPR3890
      RJD7(5)=DUM666(8)                                                 SUPR3900
      IF ( KBYPSM .LE. 0 ) SEXITZ = A3 * .9                             SUPR3910
      IF ( KBYPSM .GT. 0 ) TNOZZ = XNOZ                                 SUPR3920
      XLTOT = XLBDY + PLCL                                              SUPR3930
      TNOZL = TNOZZ                                                     SUPR3940
      TLTHEO = XLBDY + PLCL                                             SUPR3950
      XD1TP = ( TLTHEO - DCASE/2. ) / DCASE                             SUPR3960
C   COMPUTE WING/TAIL WTS                                               SUPR3970
      CALL AEROWT ( ARSURF )                                            SUPR3980
      ZARSUR = ARSURF                                                   SUPR3990
      IF ( IPACK  .GT.  0  )  CALL PAGE                                 SUPR4000
      WTAIL = ARSURF - WWING                                            SUPR4010
      IF ( ICNC .NE. 0 ) WRITE(6,7851) WPAY, WWING, WTAIL               SUPR4020
 7851 FORMAT( // 5X14HPAYLOAD WEIGHT, F9.1  /                           SUPR4030
     1   5X,11HWING WEIGHT , F12.1   /  5X,11HTAIL WEIGHT , F12.1  /  ) SUPR4040
      XLBDZ = TLTHEO                                                    SUPR4050
C                                                                       SUPR4060
C   TEST TO BYPASS ADM STEP                                             SUPR4070
      IF(KBYPSM.GT.0) GO TO 4923                                        SUPR4080
      IF ( KIND  .LT.  40  )  GO TO 4923                                SUPR4090
      IF ( KIND  .GT.  49  )  GO TO 4923                                SUPR4100
C   COMPUTE LIFT/DRAG COEF FOR DESIGN PTS                               SUPR4110
      DO 8172 IPN = 1, 10                                               SUPR4120
 8172 CDSKNF(IPN) = 0.0                                                 SUPR4130
      IF ( KBYDRG .GT. 1 ) GO TO 4923                                   SUPR4140
      KSTEP = 1                                                         SUPR4150
      NRMSAV = NRM                                                      SUPR4160
      NRM = 1                                                           SUPR4170
      NALTSV = NALT                                                     SUPR4180
      NALT = 1                                                          SUPR4190
      RMVSAV = RMV(1)                                                   SUPR4200
      ALTSAV = ALTV(1)                                                  SUPR4210
      IAIRS = IAIR                                                      SUPR4220
      IF ( IAIRS.LE.0) IAIR = 0                                         SUPR4230
      DO 4921 IJK = 1, NODP                                             SUPR4240
      RMV(1) = DPMACH(IJK)                                              SUPR4250
      ALTV(1) =   DPALT(IJK)                                            SUPR4260
C     CALL AERO TO COMPUTE CDO & CLALFD FOR DESIGN POINTS               SUPR4270
      CALL ADM(KFAIL, KSTEP)                                            SUPR4280
      CDODES(IJK) = CDO                                                 SUPR4290
      CLADES(IJK) = CNA     /  57.29578                                 SUPR4300
      CDSKNF(IJK) = CFR                                                 SUPR4310
C     ADJUST BOATTAIL CDO FOR CHANGE IN NOZ LT                          SUPR4320
      CDBOAT(IJK)=CDPBTL                                                SUPR4330
 4921 CONTINUE                                                          SUPR4340
      NRM = NRMSAV                                                      SUPR4350
      NALT = NALTSV                                                     SUPR4360
      RMV(1) = RMVSAV                                                   SUPR4370
      ALTV(1) = ALTSAV                                                  SUPR4380
      IAIR=IAIRS                                                        SUPR4390
      IF ( IAIR .EQ. 0 ) GO TO 4923                                     SUPR4400
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      WRITE(N6,4931)                                                    SUPR4410
 4931 FORMAT ( // 5X,22HDESIGN POINT AERO DATA      //                  SUPR4420
     1  5X5HPOINT,  7X3HALT,  3X4HMACH,  3X6HCDODES,                   SUPR4430
     2     3X6HCLADES,   3X6HCDSKNF   )                                SUPR4440
      WRITE (N6,4933) ( ( IDE, DPALT(IDE), DPMACH(IDE), CDODES(IDE),   SUPR4450
     1    CLADES(IDE), CDSKNF(IDE)  )  ,  IDE=1, NODP  )               SUPR4460
 4933 FORMAT(5X,I5,F10.0, F7.2, 3F9.4   )                               SUPR4470
      CALL PAGE                                                         SUPR4480
 4923 CONTINUE                                                          SUPR4490
      CDOX = CDODES(1)                                                  SUPR4500
      CLALX = CLADES(1)                                                 SUPR4510
C                                                                       SUPR4520
      IPSM=IPR(12)                                                      SUPR4530
      KLIMIT = 1                                                        SUPR4540
      IF( (KBYPSM.GT.0) .OR. (KBYVP.GT.0) ) KLIMIT = 0                  SUPR4550
      IF( (IPSM.NE.-2) .OR. (IAIR.GT.0) .OR. (IVP.GT.0) ) KLIMIT = 0    SUPR4560
      KIPSM = IPSM                                                      SUPR4570
      KIAIR = IAIR                                                      SUPR4580
      KIVP = IVP                                                        SUPR4590
C    TEST TO BYPASS PSM                                                 SUPR4600
      IF( (KBYPSM.GT.0) .AND. (KBYORG.LE.0) ) GO TO 163                 SUPR4610
      IF ( KBYPSM  .GT.  0  )  GO TO 7679                               SUPR4620
C     SIZE PROPULSION SYSTEM                                            SUPR4630
      IRT = 0                                                           SUPR4640
      IFLY = 0                                                          SUPR4650
      KWUN = 0                                                          SUPR4660
      DELVSV = VEOR - VL                                                SUPR4670
      DELVI  = DELVSV * DVMULT                                          SUPR4680
      VOO=0.                                                            SUPR4690
      VIO=0.                                                            SUPR4700
      LOOPRJ=0                                                          SUPR4710
C     VALUES SET SAFE                                                   SUPR4720
      CFNSAV=.2                                                         SUPR4730
      WTSAV=3.*WPAY                                                     SUPR4740
      WSSAV = TOTWT / 3.                                                SUPR4750
      SLSAV = TOTL / 3.                                                 SUPR4760
      ISIZE = LWOPT                                                     SUPR4770
      NUMZIT=1                                                          SUPR4780
      NUMIT=1                                                           SUPR4790
  162 CONTINUE                                                          SUPR4800
      IF ( INWORL  .LE.  0  )  GO TO 163                                SUPR4810
      XLTOT = TOTL                                                      SUPR4820
      GO TO 164                                                         SUPR4830
  163 CONTINUE                                                          SUPR4840
      WTTOT = TOTWT                                                     SUPR4850
  164 CONTINUE                                                          SUPR4860
      PLLT = PLOL                                                       SUPR4870
      D3 = TOTDIA                                                       SUPR4880
      A3 = .7854 * D3 ** 2   /  144.                                    SUPR4890
      ARZ(1) = A3                                                       SUPR4900
      NPASS = 0                                                         SUPR4910
      MODEL = 0                                                         SUPR4920
      IPSM = IPR(12)                                                    SUPR4930
      IDES = 1                                                          SUPR4940
      IF(KBYPSM.LE.0) GO TO 165                                         SUPR4950
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      IF( (KIND.LT.40) .OR. (KIND.GT.49) ) GO TO 7679                    SUPR4960
      NOUT=IPSM                                                          SUPR4970
      IND=0                                                              SUPR4980
      CALL INLETP                                                        SUPR4990
      IF(IND.NE.0) GO TO 108                                             SUPR5000
      GO TO 7679                                                         SUPR5010
  165 CONTINUE                                                           SUPR5020
C                                                                        SUPR5030
      IF(IPSM.NE.0) WRITE(N6,5111) NUMZIT, DELVI                         SUPR5040
 5111 FORMAT(/////5X,8HLOOP NO., I3,2X29HCN BOOSTER DELIVERED VELOCITY   SUPR5050
     1   // 5X,26HIDEAL VELOCITY ASSIGNED AS  ,F10.1, 2X3HFPS///// )    SUPR5060
      IF(IPSM.NE.0) WRITE(N6,5520)                                       SUPR5070
 5520 FORMAT( /5X,37HGO DESIGN AND SIZE PROPULSION SYSTEMS  /  )         SUPR5080
C  SIZE PROP SYSTEM                                                      SUPR5090
      PCMGN = BVIX(16,116)                                               SUPR5100
      IF ( KLIMIT .GT. 0 ) IPSM = 0                                      SUPR5110
      IF( (IPSM.NE.0) .AND. (KLIMIT.LT.0) ) CALL PAGE                    SUPR5120
      CALL PSM ( IRT, IFLY )                                             SUPR5130
      IPSM = KIPSM                                                       SUPR5140
C                                                                        SUPR5150
      FARMAX = ZFARMX                                                    SUPR5160
      TT4MAX = ZTT4MX                                                    SUPR5170
      LOOPRJ = 1                                                         SUPR5180
      IF ( IFLY .GT. 0 ) WRITE(N6,3110 )                                 SUPR5190
 3110 FORMAT(///// 5X,31HMISSILE SYNTHESIS FAILED IN PSM    ///// )      SUPR5200
      IF ( IFLY  .GT.  0  )  GO TO 108                                   SUPR5210
      IF(IPSM.NE.0) WRITE(N6,5522)                                       SUPR5220
 5522 FORMAT(/5X,24HPROPULSION STEP COMPLETE  /  )                       SUPR5230
 7679 CONTINUE                                                           SUPR5240
C                                                                        SUPR5250
      D3 = TOTDIA                                                        SUPR5260
C   TEST TO BYPASS ADM STEP                                              SUPR5270
      IF ( KBYDRG  .GT.  0  )  GO TO 6753                                SUPR5280
      KFAIL = 0                                                          SUPR5290
      KSTEP = 2                                                          SUPR5300
      TLTHFD = XLTOT                                                     SUPR5310
      TNOZZ = TNOZL                                                      SUPR5320
C   PACK FULL AERO TABLES                                                SUPR5330
      IF(IAIP.NE.0) WRITE(N6,5524)                                       SUPR5340
 5524 FORMAT(/5X,30HGO COMPUTE AERO LIFT/DRAG DATA    /   )              SUPR5350
      IF ( KLIMIT .GT. 0 ) IAIR = 0                                      SUPR5360
      CALL ADM(KFAIL, KSTEP)                                             SUPR5370
      IAIR = KIAIR                                                       SUPR5380
      IF ( KFAIL .GT. 0 ) WRITE(N6,3111)                                 SUPR5390
 3111 FORMAT(///// 5X,31HMISSILE SYNTHESIS FAILED IN ADM    ///// )     SUPR5400
      IF ( KFAIL .GT. 0 ) GO TO 103                                      SUPR5410
      IF(IAIR.NE.0) WRITE(N6,5526)                                       SUPR5420
 5526 FORMAT( /5X,18HAERO STEP COMPLETE   /   )                          SUPR5430
 6753 CONTINUE                                                           SUPR5440
C                                                                        SUPR5450
      D2 = TOTDIA                                                        SUPR5460
      IF( (KBYPSM.GT.0) .OR. (KBYVP .GT. 0)  )  GO TO 3909               SUPR5470
      IF ( MAXNIT  .LE.  0  )  GO TO 3909                                SUPR5480
      IF ( KWUN  .GT.  0  )  GO TO 2909                                  SUPR5490
      DO 2907 I = 1, NLPHAZ                                              SUPR5500
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      INL = I                                                          SUPR5510
      IPTYPE = IPTYPX(I)                                               SUPR5520
      IF ( (IPTYPE.EQ.1) .OR. (IPTYPE.EQ.2)  )  GO TO 2908             SUPR5530
 2907 CONTINUE                                                         SUPR5540
      GO TO 3909                                                       SUPR5550
 2908 CONTINUE                                                         SUPR5560
      NLPSAV = NLPHAZ                                                  SUPR5570
      NLPHAZ = INL                                                     SUPR5580
      KWUN = 1                                                         SUPR5590
 2909 CONTINUE                                                         SUPR5600
      MODEL=1                                                          SUPR5610
      KFURST=0                                                         SUPR5620
C    HACK DELIVERED VEL TO SEE IF SUFF                                 SUPR5630
C    BOOSTER PHASE ONLY                                                SUPR5640
      IF(IPSM.NE.0) WRITE(N6,5528)                                     SUPR5650
 5528 FORMAT(/5X48HCOMPUTE DELIVERED VELOCITY BY FLYING BOOST PHASE /) SUPR5660
      IF ( KLIMIT .NE. 0 ) IVP = 0                                     SUPR5670
      CALL VEHPER(KFURST,KFAIL)                                        SUPR5680
      IVP = KIVP                                                       SUPR5690
      IF( (KLIMIT.LT.1).AND.(IVP.NE.3).AND.(IVP.NE.0) ) CALL PAGE      SUPR5700
      IF ( KFAIL .GT. 0 ) WRITE(N6,3112)                               SUPR5710
 3112 FORMAT(///// 5X,34HMISSILE SYNTHESIS FAILED IN VEHPER ///// )   SUPR5720
      IF ( KFAIL  .GT.  0  )  GO TO 108                                SUPR5730
      VACT=RKX(3) - VL                                                 SUPR5740
      DELDEL =DELVSV - VACT                                            SUPR5750
      IF ( ABS(DELDEL)  .LE.  DVTOL  )  GO TO 3908                     SUPR5760
      IF(NUMZIT.GT.MAXNIT) WRITE(N6,3113) NUMZIT                       SUPR5770
 3113 FORMAT(5X,34HFAILED TO CONVERGE ON DEL. VEL. IN,                 SUPR5780
     1     I5, 2X4HTRYS /// )                                         SUPR5790
      IF ( NUMZIT  .GT.  MAXNIT  )  GO TO 108                          SUPR5800
C    LOOP TO REFINE PROP SYSTEM                                        SUPR5810
      NUMZIT  =  NUMZIT  +  1                                          SUPR5820
      NUMIT = NUMZIT                                                   SUPR5830
      DVRAT = ( DELVI - VIO ) / ( VACT - VDO )                         SUPR5840
      DVRATT = DVRAT * ( VACT - DELVSV )                               SUPR5850
      DVWANT = DELVI - DVRATT                                          SUPR5860
      VIO = DELVI                                                      SUPR5870
      VDO = VACT                                                       SUPR5880
      DELVI = DVWANT                                                   SUPR5890
 3907 CONTINUE                                                         SUPR5900
      IF(IPSM.NE.0) WRITE(N6,5530) DELDEL                              SUPR5910
 5530 FORMAT(/5X28HDELIVERED VELOCITY MISSED BY , F10.1, 2X3HFPS  /  ) SUPR5920
C     GO TO REFINE PROPULSION SIZING BASED ON NEW DELTA V GUESS        SUPR5930
      GO TO 162                                                        SUPR5940
 3908 CONTINUE                                                         SUPR5950
      IF ( KLIMIT .LE. 0 ) GO TO 3919                                  SUPR5960
      KLIMIT = -1                                                      SUPR5970
      GO TO 3907                                                       SUPR5980
 3919 CONTINUE                                                         SUPR5990
      DELVI = DELVSV                                                   SUPR6000
      NLPHAZ = NLPSAV                                                  SUPR6010
      IF(IPSM.NE.0) WRITE(N6,5532) DELDEL                              SUPR6020
 5532 FORMAT(/5X,38HDELIVERED VELOCITY CONVERGED - MISS IS , F10.1,    SUPR6030
     1     2X3HFPS  /  )                                              SUPR6040
 3909 CONTINUE                                                         SUPR6050
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C   LOOP COMPLETE                                                        SUPR6060
C   FINAL PROP SYSTEM                                                    SUPR6070
      KFAIL = 0                                                          SUPR6080
C   TEST TO BYPASS MOI HACK                                              SUPR6090
      IF ( KBYMOI .GT. 0 )  GO TO 8522                                   SUPR6100
      IMOI = 1                                                           SUPR6110
C     COMPUTE MOI TERMS                                                  SUPR6120
      CALL PAYLOD(KFAIL, IMOI )                                          SUPR6130
      IF ( KFAIL  .GT.  0  )  GO TO 108                                  SUPR6140
      KSTEP = 3                                                          SUPR6150
C   HACK MOI TERMS FOR AERO SYS                                          SUPR6160
      CALL ADM(KFAIL, KSTEP)                                             SUPR6170
 1186 CONTINUE                                                           SUPR6180
 8522 CONTINUE                                                           SUPR6190
      CALL COSTWT(COSNX, WTTOT)                                          SUPR6200
C                                                                        SUPR6210
C   PACKAGING TESTS                                                      SUPR6220
      IF ( KBYPAK  .LE.  0  ) CALL PACKER (KFAIL)                        SUPR6230
      IF ( KFAIL .GT. C ) WRITE(N6,3114)                                 SUPR6240
 3114 FORMAT( ///// 5X,34HMISSILE DOES NOT FIT LAUNCHER       ///// )    SUPR6250
      KFAIL = 0                                                          SUPR6260
      DO 7940 ITR=1, NTRAJ                                               SUPR6270
      QMAXQ = 0.0                                                        SUPR6280
      VMAXQ = 0.0                                                        SUPR6290
      IF ( KBYVP  .GT.  0  )  GO TO 7680                                 SUPR6300
      MODEL = 1                                                          SUPR6310
      KFURST=0                                                           SUPR6320
      IDES = 0                                                           SUPR6330
C     JUGGLE SEGMENTS                                                    SUPR6340
      CALL COSTWT(COSNX, WTTOT)                                          SUPR6350
C   FINAL PERFORMANCE HACK                                               SUPR6360
      IF ( IVP .NE. 0 ) WRITE(N6,5534) ITR                               SUPR6370
 5534 FORMAT( 15X30HGO FLY COMPLETE TRAJECTORY NO. , I5  / )             SUPR6380
      CALL VEHPER(KFURST,KFAIL)                                          SUPR6390
      IF(IVP.NE.0) WRITE(N6,5536)                                        SUPR6400
 5536 FORMAT( /5X,24HTRAJECTORY STEP COMPLETE   /   )                    SUPR6410
      IF ( KFAIL .GT. 0 ) WRITE(N6,3112)                                 SUPR6420
      IF(KFAIL.GT.0) GO TO 792C                                          SUPR6430
 7680 CONTINUE                                                           SUPR6440
      D3 = TOTDIA                                                        SUPR6450
C     **                                                                 SUPR6460
C     COMPUTE COST  ( UNIT )                                             SUPR6470
      AX = PLMASS - GUIDWT - WHWT + ARSURF                               SUPR6480
      IF( (KIND.GT.20) .AND. (KIND.LT.30) ) AX = AX + WSECT              SUPR6490
      IF ( KIND .GT. 4C ) AX = AX + WTINLT                               SUPR6500
       NCONFG=NCONFG + 1                                                 SUPR6510
      NCONFX = NCONFG                                                    SUPR6520
      COSN = COSNX                                                       SUPR6530
      IF ( KBYCST .GT. 0 ) GO TO 3719                                    SUPR6540
      CALL COST(ICNO)                                                    SUPR6550
      IF( (NSCRC.LE.0) .AND. (NSCOST.LE.1) ) COSN = CPTOT                SUPR6560
      IF( (NSCRC.LE.0) .AND. (NSCOST.EQ.2) ) COSN = CRTOT                SUPR6570
      IF( (NSCRC.LE.0) .AND. (NSCOST.GE.3) ) COSN = CTOT                 SUPR6580
C                                                                        SUPR6590
 3719 CONTINUE                                                           SUPR6600
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      EMPTY = WHWT                                                      SUPR6610
      CALL  WORTH ( WTH1, WTH2, EMPTY )                                 SUPR6620
C                                                                       SUPR6630
C                                                                       SUPR6640
C                                                                       SUPR6650
C     **                                                                SUPR6660
      NCONOT = 0                                                        SUPR6670
      IXXY = 1                                                          SUPR6671
      IF ( ICNO .EQ. 0 ) IXXY = 0                                       SUPR6672
      CALL HACKOM ( IXXY, KCONFG, NCONOT )                              SUPR6680
C   CONCEPT OK                                                          SUPR6690
      IF ( KBYVP .GT. 0 ) GO TO 7960                                    SUPR6700
 7920 CONTINUE                                                          SUPR6710
      IF ( NTRAJ .LE. 1 ) GO TO 7960                                    SUPR6720
      IF ( ITR .GE. NTRAJ ) GO TO 7940                                  SUPR6730
      IF ( IVP .NE. 0 ) CALL PAGE                                       SUPR6740
      ITRP = ITR + 1                                                    SUPR6750
C     RESET TRAJ PARAM FROM STORAGE FOR NEXT TRAJ                       SUPR6760
      DO 1976 I=1,102                                                   SUPR6770
 1976 TRFIX(I) = TRMOR(I,ITRP)                                          SUPR6780
      KEMTY=0                                                           SUPR6790
      DO 7930 I = 1, 670                                                SUPR6800
 7930 TRYSOM(I) = TRCON(I,ITRP)                                         SUPR6810
 7940 CONTINUE                                                          SUPR6820
C     RESET TRAJ PARAM FOR FIRST TRAJ                                   SUPR6830
      DO 1977 I=1,102                                                   SUPR6840
 1977 TRFIX(I) = TRMOR(I,1)                                             SUPR6850
      DO 7950 I = 1, 670                                                SUPR6860
 7950 TRYSOM(I) = TRCON(I,1)                                            SUPR6870
 7960 CONTINUE                                                          SUPR6880
      GO TO 108                                                         SUPR6890
C                                                                       SUPR6900
C   GO TO HERE IF NOT COMPATIBLE                                        SUPR6910
C     FAILED COMPATIBILITY TEST---CONTINUE LOOPING                      SUPR6920
   66 K4 = MAXO(K,L)                                                    SUPR6930
      IF ( K4  .EQ.  0   )   GO TO 302                                  SUPR6940
      IF ( K4 .GT. 8 ) GO TO 108                                        SUPR6950
      GO TO ( 101, 102, 103, 104, 105, 106, 107, 108 ) , K4             SUPR6960
 9876 CONTINUE                                                          SUPR6970
 9879 FORMAT(10X22HTABLE EXCEEDED AT STEP, 6I5//(20X8G12.5)  )          SUPR6980
  108 CONTINUE                                                          SUPR6990
      JX2(17)=I17                                                       SUPR7000
  118 CONTINUE                                                          SUPR7010
 1179 JX2(16)=I16                                                       SUPR7020
 1178 JX2(15)=I15                                                       SUPR7030
 1177 JX2(14)=I14                                                       SUPR7040
 1176 JX2(13)=I13                                                       SUPR7050
 1075 JX2(12) = I12                                                     SUPR7060
 1074 JX2(11) = I11                                                     SUPR7070
 1073 JX2(10) = I10                                                     SUPR7080
 1072 JX2(9) = I9                                                       SUPR7090
 1071 JX2(8) = I8                                                       SUPR7100
  107 JX2(7)=I7                                                         SUPR7110
  106  JX2(6)=I6                                                        SUPR7120
  105  JX2(5)=I5                                                        SUPR7130
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  104  JX2(4)=I4                                                        SUPR7140
  103  JX2(3)=I3                                                        SUPR7150
  102  JX2(2)=I2                                                        SUPR7160
  101  JX2(1)=I1                                                        SUPR7170
 9999 CONTINUE                                                         SUPR7180
      ARZ(6)=SAVMAC                                                    SUPR7190
      DVMULT = DVMULS                                                  SUPR7200
      RETURN                                                           SUPR7210
  300 WRITE (N6,2006) K1,K2                                            SUPR7220
 2006 FORMAT ( 6X,3HK1=, I5, 3HK2=, I5)                                SUPR7230
      RETURN                                                           SUPR7240
  302 WRITE (N6,2008) K4                                               SUPR7250
 2008 FORMAT ( 6X,3HK4=,   I5)                                         SUPR7260
      RETURN                                                           SUPR7270
      END                                                              SUPR7280


      SUBROUTINE HACKCM ( IX, KCONFG, NCONOT  )                        HACK0010
C   NUK.CM-CGSM  R.K.MCDONOUGH  FIV/EBCD   10/18/73                    HACK0020
C   HACKCM  WRITES DATA                                                HACK0030
      COMMON /COSTSC/ COSDUM(20)                                       HACK0040
      COMMON/GUIDCO/COSTX,CDUM59(59)                                   HACK0050
      COMMON /ALFBLK/ ALF6(6), CDO, ALF66(6), CLA                      HACK0060
      COMMON /BESYET/ FACTOR,WBTO,BLUB,BLENG,BES11(11)                 HACK0070
      COMMON /BYAIR/ A3, BVBCC(800)                                    HACK0080
      COMMON /CMOPT/ KM6(6), KFIL12                                    HACK0090
      COMMON /CODEXX/ KIND,IFN(15)                                     HACK0100
       INTEGER*2  ICM                                                  HACK0110
      COMMON /CSET3/ KASE,KLIDUM(30), BAUXV(16,10),BTC(4,30),          HACK0120
     1      BVIX(24,16),NTB(34),BT(10,10,30), ICM(16,16,10)           HACK0130
      COMMON /EXTERN/ PLLT, PLEX,  DRVC(2),  WTTOT, XLTOT,VL,VECB,     HACK0140
     1      DELVI, PLMASS, ARSURF, ARZ(9)                              HACK0150
      COMMON/FILING/ KONPL, KSAVPL, KZIM                               HACK0160
      COMMON /INDATA/ CD2(2), WTINLT                                   HACK0170
      COMMON /INDATX/ FPROJ, HC, WC, ANGK6(6), XLE, ANGK13(13)         HACK0180
      COMMON / INOU12 / JD12,ND12, NB12                                HACK0190
      COMMON /INSERT/ BO31(31), WTNOZ, XISPV                           HACK0200
      COMMON /LIQOUT/ XLTP, WTP, WOXTNK, WFTANK,                       HACK0210
     1      XLTOX,WOX, XLTF,WF, XLPS, WPROPI, WNOZ                     HACK0220
      COMMON /NAERC/ DUM18(18),WWING, DUM6(6)                          HACK0230
      COMMON /NAMSOL/ SOL11(11), ITHR, FDES                            HACK0240
      COMMON /NFILES/ N5,N6,N7,N11,N12,N1                              HACK0250
      COMMON /PRINTR/ IOP6(6), IALL                                    HACK0260
      COMMON /RJCAT/ CEN2(2),  AAAA(3)  ,      SFC,BOSTWT,BCSTLT,BOSTPR HACK0270
      COMMON /ROUNDP/ PRNG(20),WORTH,CEP,RANGE,RCR,ACR,VCR,            HACK0280
     1      RLL,ALL,VLL, RUF14(14)                                     HACK0290
      COMMON /SCREEN/ NLEVEL,LWTM1,LWTM2, NUT6(6)                      HACK0300
      COMMON /SEPOWR/ WTSP, SEP47(47)                                  HACK0310
      COMMON /SOLR/ WVEH,WM,SOL4(4), DEXIT,WP                          HACK0320
      COMMON /SOLSAV/ PMF, WPOVWO, WN, WINERT                          HACK0330
      COMMON /SUREX/ DUMX18(18),WTAIL, DUMX6(6)                        HACK0340
      COMMON /SUSDAT/ TX32(32), SUSLT, SUSWT, TX10(10)                 HACK0350
      EQUIVALENCE ( TX32(24), WFMB )                                   HACK0360
       COMMON/SY1/MCODE(6),NCODES,NCONFG                               HACK0370
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      COMMON /TEMP/ JXX(560),I1,I2,I3, I4, I5, I6, I7, I8, I9,          HACK0380
     1      I10, I11, I12, I13, I14, I15, I16, JXXX(8)                  HACK0390
      COMMON /TOVPER/ WPROPZ,XISPB,TVACB,AEXB,WPROPS,AEXS,DUMME,         HACK0400
     1      WTFIN,WDROP,WDROPE, KIZ, A5A3,A6A3,ACA3,D3                  HACK0410
     2      ,  EXTRA(57)                                                HACK0420
      EQUIVALENCE ( EXTRA(57), XLM )                                     HACK0430
      COMMON /ZWORTH/ZCEP(10),FORCE, ZGWT(10), RELIB, NLLRT, ZW9(9)      HACK0440
      EQUIVALENCE ( ZW9(8), WTH1 ) , ( ZW9(9), WTH2 )                    HACK0450
      EQUIVALENCE (KASE,KAS), (NCONFG,JCONFG)                            HACK0460
      EQUIVALENCE ( I17, JXXX(1) )                                       HACK0470
      DIMENSION TAPE(100)                                                HACK0480
C                                                                        HACK0490
C**                                                                      HACK0500
      WPROPB = WPROPZ                                                    HACK0510
      IF ( NCONOT .EQ. -47 ) GO TO 666                                   HACK0520
      WTM1 = FLOAT(LWTM1)                                                HACK0530
      WTM2 = FLOAT(LWTM2)                                                HACK0540
      IF ( NCONOT  .GT.  0  )  GO TO 6000                                HACK0550
      NTEN = 10                                                          HACK0560
      NKIND =  MOD ( KIND, NTEN)                                         HACK0570
      KINDT = KIND / NTEN                                                HACK0580
      GO TO ( 100,100,100,400,100) , KINDT                               HACK0590
  100 CONTINUE                                                           HACK0600
      BOOL = BLENG                                                       HACK0610
      BOOW = WBTO                                                        HACK0620
      BOSTWT = BOOW                                                      HACK0630
      SUSW =  WTTOT - PLMASS - ARSURF                                    HACK0640
      SUSW = SUSW - BOSTWT                                               HACK0650
      SUSL = XLTOT - PLLT                                                HACK0660
      GO TO 600                                                          HACK0670
  400 CONTINUE                                                           HACK0680
      KINM = KIND - 40                                                   HACK0690
      GO TO ( 410,100,420,100 ) , KINM                                   HACK0700
  410 CONTINUE                                                           HACK0710
  420 CONTINUE                                                           HACK0720
      BOOL = BOSTLT                                                      HACK0730
      BOOW = BOSTWT                                                      HACK0740
      SUSL = SUSLT                                                       HACK0750
      SUSW = WTTOT - PLMASS - ARSURF - BOOW                              HACK0760
  600 CONTINUE                                                           HACK0770
      IF ( (NKIND.EQ.3) .OR. (KIND.EQ.41)  )  GO TO 654                  HACK0780
      BOOL = 0.                                                          HACK0790
      BOOW = 0.                                                          HACK0800
      WPROPB = 0.                                                        HACK0810
  654 CONTINUE                                                           HACK0820
      TAPE(58) = WNOZ                                                    HACK0830
      AC = A3 * ACA3                                                     HACK0840
      WORTH = ( WTH1*WTM1 + WTH2*WTM2 ) / ( WTM1 + WTM2 )                HACK0850
      TAPE(  1)= NCONFG                                                  HACK0860
      TAPE(  2)= WTTOT                                                   HACK0870
      TAPE(  3)= WWING                                                   HACK0880
      TAPE(  4)= RCR                                                     HACK0890
      TAPE(  5)= ACP                                                     HACK0900
      TAPE(  6)= VCR                                                     HACK0910
      TAPE(  7)= WORTH                                                   HACK0920
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      TAPE(   8)= WTAIL                                                 HACK0930
      TAPE(   9)= RLL                                                   HACK0940
      TAPE(  10)= ALL                                                   HACK0950
      TAPE(  11)= VLL                                                   HACK0960
      TAPE(  12)= CEP                                                   HACK0970
      TAPE(  13)= PLMASS                                                HACK0980
      TAPE(  14)= PLLT                                                  HACK0990
      TAPE(  15)= RANGE                                                 HACK1000
      TAPE(  16)= FORCE                                                 HACK1010
      TAPE(  17)= SUSW                                                  HACK1020
      TAPE(  18)= SUSL                                                  HACK1030
      TAPE(  19)= RELIB                                                 HACK1040
      TAPE(  20)= WPROPS                                                HACK1050
      TAPE(  21)= BOOW                                                  HACK1060
      TAPE(  22)= BOOL                                                  HACK1070
      TAPE(  23)= WPROPB                                                HACK1080
      TAPE(  24)= XLTOT                                                 HACK1090
      TAPE(  25)= WTH1                                                  HACK1100
      TAPE(  26)= WTH2                                                  HACK1110
      TAPE(  27)= WM                                                    HACK1120
      TAPE(  28)= XLM                                                   HACK1130
      TAPE(  29)= WP                                                    HACK1140
      TAPE(  30)= DEXIT                                                 HACK1150
      TAPE(  31)= WINERT                                                HACK1160
      TAPE(  32)= PMF                                                   HACK1170
      TAPE(  33)= WN                                                    HACK1180
      TAPE(  34)= WPOVWO                                                HACK1190
      TAPE(  35)= XLPS                                                  HACK1200
      TAPE(  36)= WPROPI                                                HACK1210
      TAPE(  37)= XLTF                                                  HACK1220
      TAPE(  38)= WF                                                    HACK1230
      TAPE(  39)= XLTOX                                                 HACK1240
      TAPE(  40)= WOX                                                   HACK1250
      TAPE(  41)= WFTANK                                                HACK1260
      TAPE(  42)= WOXTNK                                                HACK1270
      TAPE(  43)= XLTP                                                  HACK1280
      TAPE(  44)= WTP                                                   HACK1290
      TAPE(  45)= ACA3                                                  HACK1300
      TAPE(  46)= PC                                                    HACK1310
      TAPE(  47)= WTSP                                                  HACK1320
      TAPE(  48)= A5A3                                                  HACK1330
      TAPE(  49)= WC                                                    HACK1340
      TAPE(  50)= WFMB                                                  HACK1350
      TAPE(  51)= A6A3                                                  HACK1360
      TAPE(  52)= WTINLT                                                HACK1370
      TAPE(  53)= WTNOZ                                                 HACK1380
      TAPE(  54)= AC                                                    HACK1390
      TAPE(  55)= XLE                                                   HACK1400
      TAPE(  56)= CDO                                                   HACK1410
      TAPE(  57)= CLA                                                   HACK1420
      ILU = 60                                                          HACK1430
      DO 677 I = 1, 13                                                  HACK1440
  677 TAPE(ILU+I) = COSDUM(I)                                           HACK1450
      TAPE(100)=COSTX                                                   HACK1460
  666 CONTINUE                                                          HACK1470
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      TAPE(81) = BVIX(1,I1)                                                  HACK1480
      TAPE(82) = BVIX( 2,I2 )                                                HACK1490
      TAPE(83) = BVIX( 3,I3 )                                                HACK1500
      TAPE(84) = BVIX( 4,I4 )                                                HACK1510
      TAPE(85) = BVIX( 5,I5 )                                                HACK1520
      TAPE(86) = BVIX( 6,I6 )                                                HACK1530
      TAPE(87) = BVIX( 7,I7 )                                                HACK1540
      TAPE(88) = BVIX( 8,I8 )                                                HACK1550
      TAPE(89) = BVIX( 9,I9 )                                                HACK1560
      TAPE(90) = BVIX(10,I10)                                                HACK1570
      TAPE(91) = BVIX(11,I11)                                                HACK1580
      TAPE(92) = BVIX(12,I12)                                                HACK1590
      TAPE(93) = BVIX(17,I17)                                                HACK1600
      TAPE(94) = BVIX(13,I13)                                                HACK1610
      TAPE(95) = BVIX(14,I14)                                                HACK1620
      TAPE(96) = BVIX(15,I15)                                                HACK1630
      TAPE(97) = BVIX(16,I16)                                                HACK1640
      IF ( NCONOT .EQ. -47 ) GO TO 777                                       HACK1650
      IF ( KFIL12  .GT.  0  )  GO TO 8497                                    HACK1660
C     LOAD CONCEPT ON FILE 12 FOR SCREENING                                  HACK1670
      JD12  =  NCONEG                                                        HACK1680
      IF (  NCONEG  .GT.  KSAVFL )  GO TO 1393                               HACK1690
      WRITE (N12'JD12)  TAPE                                                 HACK1700
      ND12  =  JD12 - 1                                                      HACK1710
 1393 CONTINUE                                                               HACK1720
 8497 CONTINUE                                                               HACK1730
 6007 FORMAT ( 5X5HTAPE* ( 10X, 5G15.8)  )                                   HACK1740
      GO TO 6999                                                             HACK1750
 6000 CONTINUE                                                               HACK1760
      JD12 = NCONOT                                                          HACK1770
      READ( N12'JD12 ) TAPE                                                  HACK1780
      NCONEG = TAPE(1)                                                       HACK1790
      WTH1 = TAPE(25)                                                        HACK1800
      WTH2 = TAPE(26)                                                        HACK1810
      WORTH = ( WTH1*WTM1 + WTH2*WTM2 ) / ( WTM1 + WTM2 )                    HACK1820
 6999 CONTINUE                                                               HACK1830
      IF ( IX .EQ. 0 ) GO TO 7198                                            HACK1831
      IF ( NCONOT  .EQ.  0  )  CALL PAGE                                     HACK1840
      WRITE (N6,3711 ) NCONEG                                                HACK1850
 3711 FORMAT(12X,6H******/ 2X,10HCONCEPT  *, I5, 7H * COMP,6X,5HWT.LB,       HACK1860
     1      5X,5HLT.IN,3X,30HPHASE  RANGE.NM  ALT.FT  VEL.M    /            HACK1870
     2      12X,6H******  ,3X,2H**,8X,3H***,7X3H***,6X3H***,3X3H*** ,       HACK1880
     3      8X,3H***, 4X3H***     )                                         HACK1890
      WRITE(N6,3712) TAPE(100), (TAPE(I),I=3,6)                              HACK1900
 3712 FORMAT(2X,5HCOST*,F10.2,3X,4HWING,F10.0,13X,6HCRUISE,F8.1,            HACK1910
     1   F9.0, F7.2 )                                                       HACK1920
      WRITE (N6,3713) ( TAPE(I),I=7,11)                                      HACK1930
 3713 FORMAT(2X5HWORTH,F10.2,3X4HTAIL,F10.0,15X4HLLRI,F8.1,                  HACK1940
     1      F9.0, F7.2 )                                                    HACK1950
      WRITE (N6,3714) ( TAPE(I),I=12,15)                                     HACK1960
 3714 FORMAT(2X3HCEP,F12.2,3X3HPLC,F11.0,F10.0,4X5HTOTAL,F8.1)               HACK1970
      WRITE (N6,3715) ( TAPE(I),I=16,18)                                     HACK1980
 3715 FORMAT(2X,5HFORCE,F10.0, 3X,5HSUST.,  F9.0,F10.0  )                    HACK1990
      WRITE (N6,3716) ( TAPE(I),I=19,20)                                     HACK2000
 3716 FORMAT(2X,5HRELIB, F10.2,5X, 6HS.PROP, F10.0 )                         HACK2010
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      WRITE (N6,3717) ( TAPE(I),I=21,23), TAPE(2), TAPE(24)                HACK2020
 3717 FORMAT( 20X, 7HBOOSTER, F7.0, F10.0 / 22X,6HB.PROP, F10.0 /          HACK2030
     1      20X,5HTOTAL,  F9.0, F10.0  )                                   HACK2040
      WRITE(N6,7777) TAPE(62), ( TAPE(I), I=64,68), TAPE(63),              HACK2051
     1      ( TAPE(I), I=69,73 )                                           HACK2052
 7777 FORMAT(// 9X14H*COST SUMMARY*   / 24X5HTOTAL,5X4HAF+I,               HACK2053
     1  6X4HPROP, 6X4HGUID, 6X4HCONT, 6X3HW/H    /                       HACK2054
     2      9X6HF.U.P.,4X,6F10.3  / 9X5HRDT+E, 5X,6F10.3   )              HACK2055
  777 CONTINUE                                                             HACK2050
      IF (  KIND  .GT.  49  )  GO TO 5450                                  HACK2060
      WRITE (N6, 3019)                                                     HACK2070
 3019 FORMAT ( /// )                                                       HACK2080
      WRITE ( N6, 3027 )                                                   HACK2090
 3027 FORMAT ( 6X,20HBASIC VARIABLES LIST   /   )                          HACK2100
      IF ( KIND .GE. 39 ) WRITE (N6, 3042 )                                HACK2110
 3042 FORMAT(6X4HWING,3X4HTAIL,14H  W.A.R  L.P/L,2X5HW.W/H,2X5HW.G/C,      HACK2120
     1      3X4HDIAM,2X,5HB.T/W,2X,7HD.P.ALT,2X5HD.P.M,2X6HC.P.GM,         HACK2130
     2 2X5HD.TT4,2X6HW.OR.L,1X7HD.P.FCN,1X7HD.P.NAC,1X7HD.P.TAC,           HACK2140
     3   1X7HD.P.PMG    )                                                 HACK2150
      IF ( KIND  .LT. 39 ) WRITE (N6, 3052 )                               HACK2160
 3052 FORMAT( 6X4HWING,3X4HTAIL,14H  W.A.R  L.P/L,2X5HW.W/H,2X5HW.G/C,     HACK2170
     1      3X4HDIAM,2X,5HB.T/W,2X,7HF.PARAM,2X5HS.ISP,2X6HC.PRES,         HACK2180
     2      2X,5HMIX.R,2X,6HW.OR.L    )                                    HACK2190
      IF ( KIND .GT. 39 ) GO TO 3032                                       HACK2200
C     LIQ/SOL CASE WITH ITHR=0 FOR F INPUT                                 HACK2210
      IF (ITHR  .EQ. 0 ) WRITE ( N6,3062 ) ( TAPE(I),I=81,93)              HACK2220
 3062 FORMAT(3X, 3F7.2, F7.1, 2F7.0,F7.1,F7.2, F9.0 ,F7.1,F8.0,           HACK2230
     1      F7.2, F8.0  )                                                 HACK2240
      IF ( ITHR .NE. 0 ) WRITE (N6,3082) ( TAPE(I),I=81,93)                HACK2250
 3082 FORMAT(3X, 3F7.2, F7.1, 2F7.0,F7.1,F7.2, F9.0 ,F7.1,F8.0,           HACK2260
     1      F7.0, F8.0  )                                                 HACK2270
      GO TO 3092                                                           HACK2280
 3032 CONTINUE                                                             HACK2290
C     RAMJET CASE                                                          HACK2300
      WRITE(N6,3072) ( TAPE(I),I=81,97)                                    HACK2310
 3072 FORMAT(3X, 3F7.2, F7.1, 2F7.0,F7.1,F7.2, F9.2 ,F7.1,F8.0,           HACK2320
     1   F7.0, F8.0, 4F8.2   )                                            HACK2330
 3092 CONTINUE                                                             HACK2340
      WRITE (N6,3018 )                                                     HACK2350
 3018 FORMAT(// )                                                          HACK2360
      IF ( NCONOT .EQ. -47 ) GO TO 5450                                    HACK2370
      IF ( KIND  .GT.  29 ) GO TO 5440                                     HACK2380
      IF ( KIND  .GT.  19 ) GO TO 5420                                     HACK2390
C     FOR SOLID                                                            HACK2400
      WRITE (N6,5461) ( TAPE(I),I=27,34)                                   HACK2410
 5461 FORMAT( 6X6HWT.MTR,F13.0, 5X6HLT.MTR,F9.0  /                         HACK2420
     1      6X7HWT.PROP, F12.0,  5X6HEXIT.D, F9.2   /                     HACK2430
     2      6X7HWT.INRT,F12.0,  5X3HPWF, F12.2   /                        HACK2440
     3      6X6HWT.NOZ, F13.0,  5X6HMASS.R, F9.2   )                      HACK2450
      GO TO 5450                                                           HACK2460
 5420 CONTINUE                                                             HACK2470
C     FOR LIQUID                                                           HACK2480
      WRITE (N6,5471) ( TAPE(I),I=35,40), TAPE(37), TAPE(41),              HACK2490
     1      TAPE(39), ( TAPE(I),I=42,44), TAPE(58)                        HACK2500
 5471 FORMAT( 15X5HLT.IN,5X5HWT.LB  /  6X3HENG,F11.0,F10.0  /              HACK2510
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     1      6X4HFUEL,2F10.0  /  6X2HOX, F12.0,F10.0  /                          HACK2520
     2      6X4HFTNK,2F10.0  /  6X4HOXTK, 2F10.0  /  6X4HTPMP,2F10.0 /         HACK2530
     3      6X4HNOZL, 10X,F10.0  )                                              HACK2540
      GO TO 5450                                                               HACK2550
 5440 CONTINUE                                                                 HACK2560
C     FOR RAMJET                                                               HACK2570
      WRITE (N6,5481) ( TAPE(I),I=45,50)                                       HACK2580
 5481 FORMAT(6X,4HACA3, F10.4, 5X7HHT.INLT,F8.1, 5X6HWT.SPP,F11.1  /           HACK2590
     1      6X,4HASA3,F10.4, 5X7HWI.INLT,F8.1, 5X6HWT.FMB,F11.1  )            HACK2600
      WRITE (N6,5482) ( TAPE(I),I=51,55)                                       HACK2610
 5482 FORMAT(6X4HA6A3,F10.4, 5X7HWT.INLT,F8.1, 5X6HWT.NOZ,F11.1  /             HACK2620
     1      6X6HC.AREA,F8.2, 5X7HLE.INLT,F8.1  )                               HACK2630
 5450 CONTINUE                                                                 HACK2640
      NTEN = 10                                                                HACK2650
      NKIND = MOD ( KIND, NTEN )                                               HACK2660
      IF ( KIND  .EQ.  41  )  GO TO 7111                                       HACK2670
      IF ( NKIND  .NE. 3  )  GO TO 7188                                        HACK2680
      IF ( FACTOR  .GT.  1  )  GO TO 7107                                      HACK2690
      WRITE ( 6, 7112  )                                                       HACK2700
 7112 FORMAT(6X 18HSINGLE EXT BOOSTER        )                                 HACK2710
      GO TO 7198                                                               HACK2720
 7107 CONTINUE                                                                 HACK2730
      WRITE ( 6, 7122 )                                                        HACK2740
 7122 FORMAT ( 6X17HDUAL EXT BOOSTERS      )                                   HACK2750
      GO TO 7198                                                               HACK2760
 7111 CONTINUE                                                                 HACK2770
      WRITE ( 6, 7132 )                                                        HACK2780
 7132 FORMAT ( 6X 16HINTEGRAL BOOSTER     )                                    HACK2790
      GO TO 7198                                                               HACK2800
 7188 CONTINUE                                                                 HACK2810
      WRITE (6,7142)                                                           HACK2820
 7142 FORMAT ( 6X 9HUNBOOSTED     )                                           HACK2830
 7198 CONTINUE                                                                 HACK2840
      RETURN                                                                   HACK2850
      END                                                                      HACK2860


      SUBROUTINE COSTWT(COSN,WTTOT)                                            COST0010
      IC = ( WTTOT + 5. ) / 10.                                                COST0020
      COSN = IC                                                                COST0030
      COSN = COSN*10.                                                          COST0040
      RETURN                                                                   COST0050
      END                                                                      COST0060


      SUBROUTINE PACKER ( KFAIL )                                              PACK0010
C   NUK.CM-CGSM  R.K.MCDONOUGH  FIV/EBCD   10/18/73                            PACK0020
      INTEGER VTCODE                                                           PACK0030
      COMMON /AFTAR/ ARVT2(2), BVT, ARV11(11)                                  PACK0040
      COMMON /CODEXX/ KIND, ITYPE, XYZ14(14)                                   PACK0050
      COMMON /DRG/ DR36(36), NW, TCW,TCT, BT, BW, DR6(6)                       PACK0060
      COMMON /EXTERN/ AR20(20)                                                 PACK0070
      EQUIVALENCE (AR20(5),WVEH), ( AR20(6), XLVEH), ( AR20(3), DCASE )        PACK0080
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      COMMON /GDBCL/ DBOOST, WARD77(77)                                  PACK0090
      COMMON/INDATX/HPROJ,HC,W,ZZ(5),HBLDIV,ZZZ(11),TSTART,ZZZZ(2)       PACK0100
      COMMON /LFT/ XLF10(10), IART, XLF3(3)                              PACK0110
      COMMON /PRINTR/ IP4(4), IPACK, IP2(2)                              PACK0120
      COMMON /SUPERB/ KSYSA, KLNCH, KFGBV                                PACK0130
      COMMON /TUB/ BCLR,CLRA,CLRF,DELVX,FCLR,GCLR,KMT,PSUB,              PACK0140
     1      RATCLR, REH, THEAD, THEBST, TUBTHK, VTCODE, WCLR,            PACK0150
     2      WTMAX, XLTMAX,DTUBMX, XLTBMX, DPYLON                         PACK0160
      NAMELIST/BUG1/DENV,RENV,ADIM,BDIM,CDIM,DDIM,PHIP,SDIM,TDIM,UDIM,   PACK0170
     1VDIM,THETBP,CDIMX,CDIMXX,KBUG                                      PACK0180
      NAMELIST/BUG2/EDIM,FDIM,GDIM,PHI,GAMA,HDIM,PSI,QDIM,PDIM,THETZ,    PACK0190
     17DIM,DELDIM,DELDEL,DELVT,KOUNT,KBUG,RENV                           PACK0200
      NAMELIST/BUG3/RDIM,THETBX,BDIMP,CDIMP,DDIMP,BDIMX,GDIMX,PSIB,XI,   PACK0210
     1XJ,PSIBP,THETBZ,XK,XL,SDIMX,XM,XN,THETBY,PSIBX,XO,XP,KBUG          PACK0220
      NAMELIST/BUG4/STUB,BEXP,WFOLD,RESW,PHIW,WDIM,IART,STUBHT,BEXPH,    PACK0230
     1HTFOLD,VTFOLD,VTLSTB,BETT,  VTLUST,VTLLST,VTLFLD,VTUFLD,STUBVT,    PACK0240
     2GAMX,XDIM,STUBT,BETX,ALPH,XDIMP,TFOLD,ALPHX,BETXX,XDIMU,STUBTU,    PACK0250
     3TFOLDU,STUBTL,BETZX,GAMXZ,XDIML,TFOLDL,KBUG                        PACK0260
      NAMELIST/BUG6/ TUBID,TUBCD,XLHEAD,TUBLT,TUBCYL                     PACK0270
      NAMELIST/BUG5/ KCNT,DTUBI,RENV                                     PACK0280
      NAMELIST/BUG7/WCLR,FCLR,DPYLON,GCLR,PSUB,KMT,ZS,ZI,ZT,ZTOT,BVT,    PACK0290
     1HTOT,BT                                                            PACK0300
      NAMELIST/INPUT/ DBOOST, DCASE,BCLR, THEBST, DTUBX,DELVX, RATCLR,   PACK0310
     1 WTOT, HTOT, ITYPE, IART, NW, BW, BT, BVT, DELTUB, TUBTHK, REH,    PACK0320
     2 CLRF, CLRA, THEAD,XLVEH,VTCODE,WCLR,FCLR,DPYLON,GCLR,PSUB,        PACK0330
     3 WTMAX, XLTMAX,KMT, KLNCH,WVEH,KIND                                PACK0340
      DTUBX = 2. * DCASE                                                 PACK0350
      DELTUB = .05 * DTUBX                                               PACK0360
      IPSM = IPACK                                                       PACK0370
      KFAIL = 0                                                          PACK0380
      IF(IPSM.GT.0) WRITE(6,    INPUT)                                   PACK0390
      PI=3.14159                                                         PACK0400
      DPR=57.296                                                         PACK0410
      THETAB=THEBST/DPR                                                  PACK0420
      RBOOST=0.5*DBOOST                                                  PACK0430
      DELVT=DELVX                                                        PACK0440
      DTUBI=DTUBX                                                        PACK0450
      KCNT=0                                                             PACK0460
      KOUNT=0                                                            PACK0470
      RCASE=0.5*DCASE                                                    PACK0480
      IF(ITYPE.EQ.1) GO TO 7849                                          PACK0490
C********SIDE MOUNTED INLETS******                                       PACK0500
      WTOT=HBLDIV + W + 2.* TSTART                                       PACK0510
      HTOT=HC + HPROJ + 2.* TSTART                                       PACK0520
      GO TO 7850                                                         PACK0530
C******BELLY MOUNTED INLETS*******                                       PACK0540
 7849 WTOT=W + 2.* TSTART                                                PACK0550
      HTOT=HBLDIV + HC + HPROJ + 2.* TSTART                              PACK0560
 7850 CONTINUE                                                           PACK0570
      K10=10                                                             PACK0580
      IF(MOD(KIND,K10)  .LT.  3)  RBOOST=0.0                             PACK0590
      IF(KIND.LE.20) HTOT=0.0                                            PACK0600
      IF(KIND.LE.20) WTOT=0.0                                            PACK0610
      IF(KLNCH.EQ.1) GO TO 120                                           PACK0620
   15 DENV=DTUBI-2.0*RATCLR                                              PACK0630
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      RENV=0.5*DENV                                                     PACK0640
   20 IF((RCASE + DELVT).EQ.RENV)GO TO 70                               PACK0650
      ADIM=RENV-RCASE-DELVT                                             PACK0660
      IF((DELVT + RCASE).GT.RENV) ADIM=DELVT+RCASE-RENV                 PACK0670
      BDIM=RCASE + RBOOST + BCLR                                        PACK0680
      CDIM=SQRT(ADIM**2 + BDIM**2 - 2.0*ADIM*BDIM*COS(THETAB))          PACK0690
      DDIM=CDIM + RBOOST                                                PACK0700
      IF(DDIM.GT.RENV) GO TO 1000                                       PACK0710
      IF(ITYPE.EQ.2)GO TO 900                                           PACK0720
C****BELLY MOUNTED INLETS                                               PACK0730
      IF((HTOT + RCASE + DELVT).GT.DENV) GO TO 2000                     PACK0740
      PHIP=ATAN(0.5*WTOT/(HTOT + RCASE))                                PACK0750
      SDIM=SQRT(0.25*WTOT**2 + (HTOT + RCASE)**2)                       PACK0760
      TDIM=SQRT(ADIM**2 + SDIM**2 - 2.0*ADIM*SDIM*COS(PHIP))            PACK0770
      IF(TDIM.GT.RENV) GO TO 2000                                       PACK0780
      UDIM=RBOOST + 0.5*WTOT + 1.0                                      PACK0790
      VDIM= BDIM*SIN(THETAB)                                            PACK0800
      IF(UDIM.GT.VDIM) GO TO 50                                         PACK0810
      KBUG=1                                                            PACK0820
      IF(IPSM.GT.0) WRITE(6,BUG1)                                       PACK0830
      GO TO 60                                                          PACK0840
   50 VDIM=UDIM                                                         PACK0850
      KBUG=2                                                            PACK0860
      THETBP=ARSIN(VDIM/BDIM)                                           PACK0870
      CDIMX=SQRT(ADIM**2 + BDIM**2 - 2.0*ADIM*BDIM*COS(THETBP))         PACK0880
      CDIMXX=CDIMX + RBOOST                                             PACK0890
      KBUG=3                                                            PACK0900
      IF(IPSM.GT.0) WRITE(6,BUG1)                                       PACK0910
      IF(CDIMXX.GT.RENV) GO TO 3000                                     PACK0920
      GO TO 60                                                          PACK0930
C****TWO-INLET CONFIGURATIONS***                                        PACK0940
  900 EDIM=0.5*HTOT                                                     PACK0950
      FDIM=RCASE + WTOT                                                 PACK0960
      GDIM=SQRT(FDIM**2 + EDIM**2)                                      PACK0970
      PHI=ATAN(EDIM/FDIM)                                               PACK0980
      GAMA=0.5*PI + PHI                                                 PACK0990
      HDIM=SQRT(ADIM**2 + GDIM**2 -2.0*ADIM*GDIM*COS(GAMA))             PACK1000
      IF((HDIM-RENV).GT.0.25) GO TO 920                                 PACK1010
      PSI=0.5*PI -THETAB                                                PACK1020
      CDIM=BDIM*SIN(PSI)                                                PACK1030
      DDIM=FDIM + RBOOST + 1.0                                          PACK1040
      KBUG=4                                                            PACK1050
      IF(IPSM.GT.0) WRITE(6,BUG2)                                       PACK1060
      KBUG=5                                                            PACK1070
      IF(DDIM.GT.ODIM) GO TO 950                                        PACK1080
      GO TO 60                                                          PACK1090
  920 DELT=HDIM - RENV                                                  PACK1100
      KBUG=4                                                            PACK1110
      DTURI=DTURI + DELT*2.0                                            PACK1120
      KOUNT=KOUNT + 1                                                   PACK1130
      IF(IPSM.GT.0) WRITE(6,BUG2)                                       PACK1140
      IF(KOUNT.GT.10) GO TO 999                                         PACK1150
      GO TO 15                                                          PACK1160
  950 RDIM=RBOOST + 0.5                                                 PACK1170
      THETBX=ARSIN(RDIM/BDIM)                                           PACK1180
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      IF(THETBX.GT.THETAB) GO TO 5000                                    PACK1190
      BDIMP=BDIM + 1.0                                                   PACK1200
      CDIMP=SQRT(ADIM**2 + BDIM**2 - 2.0*ADIM*BDIM*COS(THETBX))          PACK1210
      DDIMP=CDIMP + RBOOST                                               PACK1220
      IF(DDIMP.GT.RENV) GO TO 6000                                       PACK1230
      GO TO 60                                                           PACK1240
C***CENTER LINE OF MISSILE ON CENTER LINE OF TUBE***                     PACK1250
   70 BDIMX=RCASE + RBOOST + BCLR                                        PACK1260
      IF(BDIMX.GT.RENV) GO TO 1000                                       PACK1270
      IF(ITYPE.EQ.1) GO TO 80                                            PACK1280
C****TWO INLET CONFIGURATIONS***                                         PACK1290
      EDIMX=SQRT(EDIM**2 + FDIM**2)                                      PACK1300
      IF(EDIMX.GT.RENV) GO TO 4000                                       PACK1310
      PSIB=0.5*PI - THETAB                                               PACK1320
      XI=BDIM*SIN(PSIB)                                                  PACK1330
      XJ=FDIM + RBOOST + 1                                               PACK1340
      KBUG=6                                                             PACK1350
      IF(XJ.GT.XI) GO TO 75                                              PACK1360
      GO TO 60                                                           PACK1370
   75 XI=XJ                                                              PACK1380
      KBUG=7                                                             PACK1390
      PSIBP=ARSIN(XI/BDIM)                                               PACK1400
      THETBZ=0.5*PI-PSIBP                                                PACK1410
      XK=BDIM*SIN(THETBZ)                                                PACK1420
      XL=RBOOST + 0.5                                                    PACK1430
      IF(XL.GT.XK) GO TO 5000                                            PACK1440
      GO TO 60                                                           PACK1450
C****BELLY MOUNTED INLETS***                                             PACK1460
   80 SDIMX=SQRT(0.25*WTOT**2 + (RCASE + HTOT)**2)                       PACK1470
      KBUG=8                                                             PACK1480
      IF(SDIMX.GT.RENV) GO TO 2000                                       PACK1490
      XM=BDIM*SIN(THETAB)                                                PACK1500
      XN=RBOOST + 0.5*WTOT + 1.0                                         PACK1510
      KBUG=9                                                             PACK1520
      IF(XN.GT.XM) GO TO 60                                              PACK1530
      THETBY=ARSIN(XN/BDIM)                                              PACK1540
      PSIBX=0.5*PI - THETBY                                              PACK1550
      XO=RBOOST + 1.0                                                    PACK1560
      XP=BDIM*SIN(PSIBX)                                                 PACK1570
      IF(XP.GT. XO ) GO TO 60                                            PACK1580
      GO TO 7000                                                         PACK1590
C***MISSILE + BOOSTER + INLETS WILL FIT INSIDE CAN ENVELOPE****          PACK1600
   60 CONTINUE                                                           PACK1610
      IF(IPSM.GT.0) WRITE(6,17)                                          PACK1620
   17 FORMAT(/10X,52HMISSILE + BOOSTER + INLETS FIT WITHIN TUBE ENVELOPE)PACK1630
     1    )                                                             PACK1640
      IF(IPSM.GT.0) WRITE(6,BUG1)                                        PACK1650
      IF(IPSM.GT.0) WRITE(6,BUG2)                                        PACK1660
      IF(IPSM.GT.0) WRITE(6,BUG3)                                        PACK1670
      IF(IPSM.GT.0) WRITE(6,BUG4)                                        PACK1680
      IF(IPSM.GT.0) WRITE(6,BUG5)                                        PACK1690
      TUBID=DTUBI                                                        PACK1700
      IF(TUBID.GT.DTUBMX) GO TO 9100                                     PACK1710
      TUBOD=DTUBI + TUBTHK                                               PACK1720
      XLHEAC=TUBOD*0.5/REH                                               PACK1730
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      TUBLT=XLVEH + CLRF + CLRA + 2.0*THEAD                              PACK1740
      IF(TUBLT.GT.XLTBMX) GO TO 9000                                     PACK1750
      TUBCYL=TUBLT -2.C*XLHEAD                                           PACK1760
      IF(IPSM.GT.0) WRITE(6,BUG6)                                        PACK1770
      IF(NW.NE.1) GO TO 90                                               PACK1780
      IF(IPSM.GT.C) WRITE(6,BUG3)                                        PACK1790
      STUB=SQRT(RENV**2 - ADIM**2) - RCASE                               PACK1800
      BEXP=BW/2.                                                         PACK1810
      WFOLD=BEXP-STUB                                                    PACK1820
      RESW=SQRT(WFOLD**2 +(STUB + RCASE)**2)                             PACK1830
      PHIW=0.5*PI - ARSIN(WFOLD/RESW)                                    PACK1840
      WDIM=SQRT(ADIM**2 + RESW**2 - 2.0*ADIM*RESW*COS(PHIW))             PACK1850
      IF(WDIM.GT.RENV) GO TO 8000                                        PACK1860
   90 IF(IART.GT.1) GO TO 95                                             PACK1870
      IF(IPSM.GT.0) WRITE(6,BUG3)                                        PACK1880
      KBUG=10                                                            PACK1890
      STUBHT=SQRT(RENV**2 - ADIM**2) - RCASE                             PACK1900
      BEXPH=BT/2.                                                        PACK1910
      HTFOLD=BEXPH - STUBHT                                              PACK1920
      IF(VTCODE.GT.1) GO TO 100                                          PACK1930
      VTFOLD=BVT-DELVT                                                   PACK1940
      GO TO 95                                                           PACK1950
  100 VTLSTB=RENV-DELVT-RCASE-ADIM                                       PACK1960
      IF((RCASE+DELVT).GT.RENV)VTLSTB=RENV-ADIM-RCASE                    PACK1970
      IF((RCASE+DELVT).EQ.RENV)VTLSTB=RENV-RCASE                         PACK1980
      VTFOLD=BVT-VTLSTB                                                  PACK1990
      GO TO 113                                                          PACK2000
   95 IF(IART.GT.2) GO TO 105                                            PACK2010
      KBUG=11                                                            PACK2020
      IF((RCASE + DELVT).EQ.RENV) ADIM=C.0                               PACK2030
      STUBHT=SQRT(RENV**2-ADIM**2)-RCASE                                 PACK2040
      HTFOLD=0.5*BT -STUBHT                                              PACK2050
      VTLUST=DELVT                                                       PACK2060
      VTLLST= DENV - DCASE - DELVT                                       PACK2070
      VTLFLD= 0.5*BT - VTLLST                                            PACK2080
      VTUFLD=0.5*BT  - VTLUST                                            PACK2090
      GO TO 113                                                          PACK2100
  105 IF(IART.GT.3) GO TO 110                                            PACK2110
      KBUG=12                                                            PACK2120
      STUBVT=DELVT                                                       PACK2130
      IF((RCASE + DELVT).GE.RENV) GO TO 106                              PACK2140
      BETT=ARSIN(ADIM/(RENV*SIN(PI/3.)))                                 PACK2150
      CAMX=PI-BETT-PI/3.                                                 PACK2160
      XDIM=RENV*SIN(PI/3.)*SIN(BETT)                                     PACK2170
      STUBT=0.5*BT - XDIM                                                PACK2180
      GO TO 108                                                          PACK2190
  106 IF((RCASE + DELVT).EQ.RENV) GO TO 107                              PACK2200
      IF((RCASE + DELVT).GT.RENV) ADIM=DELVT + RCASE -RENV               PACK2210
      BETX=ARSIN(ADIM*SIN(2.*PI/3.)/RENV)                                PACK2220
      ALPH=PI-BETX-2.0*PI/3.                                             PACK2230
      XDIMP=ADIM*SIN(ALPH)/SIN(BETT)                                     PACK2240
      STUBT =0.5*BT-XDIMP                                                PACK2250
      GO TO 108                                                          PACK2260
  107 STUBT=RENV-RCASE                                                   PACK2270
  108 TFOLD=0.5*BT- STUBT                                                PACK2280
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      IF((RCASE + DELT).GE.RENV) GO TO 111                              PACK2290
      GO TO 113                                                         PACK2300
  110 ALPHX=ARSIN(ADIM*SIN(0.75*PI)/RENV)                               PACK2310
      KBUG=13                                                           PACK2320
      BETXX=0.25*PI - ALPHX                                             PACK2330
      XDIMU=ADIM*SIN(BETXX)/SIN(ALPHX)                                  PACK2340
      STUBTU=XDIMU-RCASE                                                PACK2350
      TFOLDU=0.5*BT - STUBTU                                            PACK2360
      GO TO 112                                                         PACK2370
  111 IF((RCASE + DELT).GT. RENV) GO TO 112                             PACK2380
      STUBTU=RENV - RCASE                                               PACK2390
      STUBTL=STUBTU                                                     PACK2400
      TFOLDU=0.5*BT - STUBTU                                            PACK2410
      TFOLDL=TFOLDU                                                     PACK2420
      GO TO 113                                                         PACK2430
  112 BETZX=ARSIN(ADIM*0.707/RENV)                                      PACK2440
      GAMXZ=PI - BETZX - PI/4.                                          PACK2450
      XDIML=RENV*SIN(GAMXZ)/0.707                                       PACK2460
      STUBTL=XDIML - RCASE                                              PACK2470
      TFOLDL=0.5*BT - STUBTL                                            PACK2480
  113 CONTINUE                                                          PACK2490
      IF(IPSW.GT.0) WRITE(6,BUG4)                                       PACK2500
      GO TO 8888                                                        PACK2510
  120 CONTINUE                                                          PACK2520
C*****WCLR= WING HEIGHT ABOVE DECK - IN                                 PACK2530
C*****FCLR= FUSELAGE HEIGHT ABOVE DECK- IN                              PACK2540
C*****PYLON DEPTH - IN                                                  PACK2550
C*****MINIMUM GROUND CLEARANCE - IN                                     PACK2560
C*****PSUB= PERCENT SUBMERGENCE OF BELLY MOUNTED ASM - RSUB/RMISSILE    PACK2570
C*****KMT=1  BELLY MOUNTED,  KMT=2   WING MOUNTED                       PACK2580
C****  ITYPE=1 BELLY INLET,  ITYPE=2  DUAL SIDE MOUNTED INLETS          PACK2590
      ZS= (2.0 - PSUB)*0.5*DCASE                                        PACK2600
      IF(KMT.GT.1) ZS= DPYLON +     DCASE                               PACK2610
      ZI=HTOT                                                           PACK2620
      IF(ITYPE.GT.1)ZI=0.0                                              PACK2630
      IF(IART.GT.1) GO TO 200                                           PACK2640
      ZT=0.0                                                            PACK2650
      IF(VTCODE.GT.1) ZT=BVT                                            PACK2660
      GO TO 500                                                         PACK2670
  200 IF(IART.GT.2) GO TO 300                                           PACK2680
      ZT=0.5*BT                                                         PACK2690
      GO TO 500                                                         PACK2700
  300 IF(IART.GT.3) GO TO 400                                           PACK2710
      ZT=0.25*BT                                                        PACK2720
      GO TO 500                                                         PACK2730
  400 ZT=0.3535*BT                                                      PACK2740
  500 IF(HTOT.GT.ZT ) ZT=0.0                                            PACK2750
      IF(ZT.GT.HTOT)  ZI=0.0                                            PACK2760
      ZTOT=ZS + ZI + ZT + GCLR                                          PACK2770
      AGCLR1=FCLR-ZTOT                                                  PACK2780
      AGCLR2=WCLR - ZTOT                                                PACK2790
      IF(KMT.GT.1) GO TO 600                                            PACK2800
      IF(ZTOT.GT.FCLR) GO TO 8500                                       PACK2810
      GO TO 700                                                         PACK2820
  600 IF(ZTOT.GT.WCLR) GO TO 8600                                       PACK2830
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 7C0 CONTINUE                                                          PACK2840
     IF ( IPSM  .GT.  0  )  WRITE (6,BUG7)                             PACK2850
     IF(WVEH.GT.WTMAX) GO TO 8700                                      PACK2860
     IF(XLVEH .GT.XLTMAX)GO TO 88CC                                    PACK2870
     IF(IPSM.GT.0) WRITE(6,    9)                                      PACK2880
   9 FORMAT(10X,30HASM EXTERNAL CARRIAGE POSSIBLE  )                   PACK2890
     GO TO 8888                                                        PACK2900
85C0 KFAIL=1                                                           PACK2910
     IF(IPSM.GT.0) WRITE(6,    10) ZTOT,FCLR,AGCLR1                    PACK2920
  10 FORMAT(/10X,47HBELLY MOUNTED ASM FAILS CLEARANCE TEST  ZTOT = ,   PACK2930
    1F6.2,2H, ,5HFCLR=,F6.2,2H, ,19HACTUAL GROUND CLR.=,F6.2,4H IN.  ) PACK2940
     GO TO 8888                                                        PACK2950
86C0 KFAIL=1                                                           PACK2960
     IF(IPSM.GT.0) WRITE(6,    11 ) ZTOT,WCLR,AGCLR2                   PACK2970
  11 FORMAT(/10X,46HWING MOUNTED ASM FAILS CLEARANCE TEST  ZTOT = ,    PACK2980
    1F6.2,2H, ,5HWCLR=,F6.2,2H, ,19HACTUAL GROUND CLR.=,F6.2,4H IN.  ) PACK2990
     GO TO 8888                                                        PACK3000
87C0 KFAIL=1                                                           PACK3010
     IF(IPSM.GT.0) WRITE(6,    12)                                     PACK3020
  12 FORMAT(/10X,21HASM FAILS WEIGHT TEST  )                           PACK3030
     GO TO 8888                                                        PACK3040
88C0 KFAIL=1                                                           PACK3050
     IF(IPSM.GT.0) WRITE(6,   13)                                      PACK3060
  13 FORMAT(/10X,21HASM FAILS LENGTH TEST  )                           PACK3070
     GO TO 8888                                                        PACK3080
10C0 CONTINUE                                                          PACK3090
     IF(IPSM.GT.0) WRITE(6,   1)                                       PACK3100
   1 FORMAT(/10X,36HMISSILE + BOOSTER TOO LARGE FOR TUBE )             PACK3110
     GO TO 999                                                         PACK3120
20C0 CONTINUE                                                          PACK3130
     IF(IPSM.GT.0) WRITE(6,    2)                                      PACK3140
   2 FORMAT(/10X,48HMISSILE + BELLY MOUNTED INLET TOO LARGE FOR TUBE  )PACK3150
     GO TO 999                                                         PACK3160
30C0 CONTINUE                                                          PACK3170
     IF(IPSM.GT.0) WRITE(6,    3)                                      PACK3180
   3 FORMAT(/10X,49HMISSILE + B.M. INLET + BOOSTER TOO LARGE FOR TUBE )PACK3190
     GO TO 999                                                         PACK3200
40C0 CONTINUE                                                          PACK3210
     IF(IPSM.GT.0) WRITE(6,   4)                                       PACK3220
   4 FORMAT(/10X,44HMISSILE + SIDE MTD. INLET TOO LARGE FOR TUBE  )    PACK3230
     GO TO 999                                                         PACK3240
50C0 CONTINUE                                                          PACK3250
     IF(IPSM.GT.0) WRITE(6,   5)                                       PACK3260
     GO TO 999                                                         PACK3270
   5 FORMAT(/10X,40HINSUFFICIENT CLEARANCE BETWEEN BOOSTERS  )         PACK3280
60C0 CONTINUE                                                          PACK3290
     IF(IPSM.GT.0) WRITE(6,  6)                                        PACK3300
   6 FORMAT(/10X,49HMISSILE + S.M. INLET + BOOSTER TOO LARGE FOR TUBE )PACK3310
     GO TO 999                                                         PACK3320
70C0 CONTINUE                                                          PACK3330
     IF(IPSM.GT.0) WRITE(6,    7)                                      PACK3340
   7 FORMAT(/10X,30HBOOSTER INTERFERENCE WITH WING  )                  PACK3350
80C0 CONTINUE                                                          PACK3360
     IF(IPSM.GT.0) WRITE(6,    8)                                      PACK3370
   8 FORMAT(/10X,34HWING FOLD WILL NOT FIT IN ENVELOPE  )              PACK3380
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      GO TO 8888                                                        PACK3390
 9CCO KFAIL=1                                                           PACK3400
      IF(IPSM.GT.0) WRITE(6,  14) TUBLT, XLTBMX                         PACK3410
   14 FORMAT(/10X,14HTUBE LENGTH = ,F6.2,43H IN., GREATER THAN INPUT MAXPACK3420
     1IMUM LENGTH OF ,F6.2,4H IN.   )                                   PACK3430
      GO TO 8888                                                        PACK3440
 91CO KFAIL=1                                                           PACK3450
      IF(IPSM.GT.0) WRITE(6,  16) TUBID, DTUB                           PACK3460
   16 FORMAT(/10X,12HTUBE I.D. = ,F6.2,41H IN., GREATER THAN INPUT MAXIMPACK3470
     1UM I.D. OF ,F6.2,4H IN.   )                                       PACK3480
      GO TO 8888                                                        PACK3490
  999 CONTINUE                                                          PACK3500
       DTUBI=DTUBI + DELTUB                                             PACK3510
      KCNT=KCNT + 1                                                     PACK3520
      IF(IPSM.GT.0) WRITE(6,BUG5)                                       PACK3530
      IF(KCNT.GT.10) GO TO 8888                                         PACK3540
      GO TO 15                                                          PACK3550
 8888 CONTINUE                                                          PACK3560
      RETURN                                                            PACK3570
      END                                                               PACK3580


      SUBROUTINE SURF(SEI,ARI,ISURFI,IPLANI, BI,RCI,TCI,TANSI,TRI,IWT,  SURF0010
     1  STEI )                                                          SURF0020
      REAL KDW,KVS,KRHT                                                 SURF0030
      COMMON /AERO/ X57(57), XDIT, X35(35), SLET, X12(12)               SURF0040
      COMMON /AFTAR/ ARVT,TRVT,BVT,RCVT,TCVT,TANSVT                     SURF0050
     1   , STEVT, GGMIS(7)                                             SURF0060
      COMMON /DRG/ DR36(36), NW, DR4(4), ART,ARW,TRT,TRW,DR2(2)         SURF0070
      COMMON /LFT/ SFT10(10), IART, SFT3(3)                             SURF0080
      COMMON /NAERO/ TNZL,ST,STZL,THKRT, SW,THKRW,DI,TNZLII(11)         SURF0090
     1  ,  WWING,IARW,TNZL5(5)                                          SURF0100
      COMMON /PRINTR/ IZ3(4),IPACK, IZ33(2)                             SURF0110
      COMMON /SURFX/ RMDES,WDG,GULT,IWTS,WWINGI,WTI,WOVAW,WOVAHT,       SURF0120
     1     WOVAVT,WOVAT,WT,WHT,WVT,VTALOC,STAIL,SHTPAN,SHT,SVT,WTAILS   SURF0130
     2   ,SLEW,SLEVT,ISURFW,IPLANW,ISURFT,IPLANT                        SURF0140
      COMMON /UPINLT/ PRAMBL(129), XCGD1                                SURF0150
      COMMON /VERT/ VE18(18), THKRVT, VE2(2)                            SURF0160
      COMMON /XINERT/ X26(45),PANWW, XX4(4),PANWHT, XXX4(4),PANWVT,     SURF0170
     1     X61(61), PANWT, X14(14)                                     SURF0180
      NAMELIST/BUG/ BWTOT,SWTOT,SWINT,ARWTOT,TRWTOT,WDGNZ,AWW,BWW,      SURF0190
     1 CWW,DWW,EWW,FWW,WWING                                            SURF0200
      NAMELIST/BUG1/ STINT,BTTOT,STTOT,ARTTOT,TRTTOT,WHTAIL,WDGNZ       SURF0210
     2   ,BVTOT,SVTINT,COS4VT,SVTOT,ARVTOT,TRVTOT,AVT,BVTX,CVT,        SURF0220
     3     CVT,EVT,FVT,GVT,HVT,WVT,WHTAIL                              SURF0230
C      ISURFI=1----TRAPEZOIDAL WING******                               SURF0240
C      ISURFI,1----DELTA WING*****                                      SURF0250
C*****IPLANI=1----INPUT SEI,ARI,TRI *****                               SURF0260
C*****IPLANI=2----INPUT SEI,ARI,L.E.SWEEP ****                          SURF0270
C*****IPLANI=3----INPUT SEI,ARI,DES MACH NO *****                       SURF0280
C*****IWTS=1----INPUT SURFACE WEIGHTS----**********                     SURF0290
C*****IWTS=2-----SURFACE WEIGHTS BASED ON WT/UNIT AREA ---********      SURF0300
C******IWTS=3-----COMPUTE WEIGHTS BASED ON REF---- *****                SURF0310
      IAIR=IPACK                                                        SURF0320
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      CCASE = D1                                                        SURF0330
      IF(ISURFI.GT.1) GO TO 100                                         SURF0340
      IF(IPLANI.GT.1) GO TO 110                                         SURF0350
      BI=SQRT(SEI*ARI)                                                  SURF0360
      RCI=SEI/(0.5*BI)/(1.0 + TRI)                                      SURF0370
      TCI=RCI*TRI                                                       SURF0380
      TANSI=4.*(1.-TRI)/((1.+TRI)*ARI)                                  SURF0390
      GO TO 500                                                         SURF0400
  100 CONTINUE                                                          SURF0410
      IF(IPLANI.GT.1) GO TO 200                                         SURF0420
      TRI=0.0                                                           SURF0430
      TANSI=4.0/ARI                                                     SURF0440
      BI=SQRT(SEI*ARI)                                                  SURF0450
      RCI=2.0*SEI/BI                                                    SURF0460
      TCI=RCI*TRI                                                       SURF0470
      GO TO 500                                                         SURF0480
  200 CONTINUE                                                          SURF0490
      IF(IPLANI.GT.2) GO TO 300                                         SURF0500
      BI=SQRT(SEI*ARI)                                                  SURF0510
      RCI=2.0*SEI/BI                                                    SURF0520
      TCI=RCI*TRI                                                       SURF0530
      GO TO 500                                                         SURF0540
  300 IF( IPLANI  .GT.  3  ) GO TO 3505                                 SURF0550
      TANSI=SQRT(ABS(RMDES**2-1.))                                      SURF0560
      BI=SQRT(SEI*ARI)                                                  SURF0570
      RCI=2.0*SEI/BI                                                    SURF0580
      TCI=RCI*TRI                                                       SURF0590
      GO TO 500                                                         SURF0600
 3505 BI = SQRT( SEI * ARI )                                            SURF0610
      RCI = 2. * SEI / BI                                               SURF0620
      TCI = RCI * TRI                                                   SURF0630
      SLEI = ATAN ( 2.*( RCI+.5*BI*TAN( STEI/57.296 ) - TCI )/BI)       SURF0640
      TANSI = TAN ( SLEI )                                              SURF0650
      SLEI = SLEI * 57.296                                              SURF0660
      GO TO 500                                                         SURF0670
  110 CONTINUE                                                          SURF0680
      IF(IPLANI.GT.2) GO TO 120                                         SURF0690
      BI=SQRT(SEI*ARI)                                                  SURF0700
      CONI=TANSI*ARI*0.25                                               SURF0710
      IF(CONI.GT.1.0) GO TO 130                                         SURF0720
      TRI=(1.0-CONI)/(1.0 + CONI)                                       SURF0730
      BI=SQRT(SEI*ARI)                                                  SURF0740
      RCI=SEI/(0.5*BI)/(1.0+TRI)                                        SURF0750
      TCI=RCI*TRI                                                       SURF0760
      GO TO 500                                                         SURF0770
  120 IF ( IPLANI  .GT.  3  ) GO TO 3600                                SURF0780
      TANSI=SQRT(ABS(RMDES**2-1.))                                      SURF0790
      CONI=TANSI*ARI*0.25                                               SURF0800
      IF(CONI.GT.1.0) GO TO 130                                         SURF0810
      TRI=(1.0-CONI)/(1.0+CONI)                                         SURF0820
      BI=SQRT(SEI*ARI)                                                  SURF0830
      RCI=SEI/(0.5*BI)/(1.0+TRI)                                        SURF0840
      TCI=RCI*TRI                                                       SURF0850
      GO TO 500                                                         SURF0860
  130 CONTINUE                                                          SURF0870
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      ISURFI=3.0                                                        SURF0880
      TRI=0.0                                                           SURF0890
      ARI=4.0/TANSI                                                     SURF0900
      BI=SQRT(SEI*ARI)                                                  SURF0910
      RCI=2.0*SEI/BI                                                    SURF0920
      TCI=TRI*RCI                                                       SURF0930
      GO TO 500                                                         SURF0940
 3600 BI = SQRT ( SEI * ARI )                                           SURF0950
      RCI = SEI / (.5*BI)/(1.+TRI)                                      SURF0960
      TCI = RCI * TRI                                                   SURF0970
      SLEI = 2. * (RCI+.5*BI*TAN(STEI/57.296) - TCI ) / BI              SURF0980
      SLEI = ATAN ( SLEI )                                              SURF0990
      TANSI = TAN(SLEI)                                                 SURF1000
      SLEI = SLEI * 57.296                                              SURF1010
  500 CONTINUE                                                          SURF1020
      IF(IWTS.EQ.1) GO TO 400                                           SURF1030
      IF(IWTS.EQ.2) GO TO 450                                           SURF1040
      IF(IWTS.EQ.4) GO TO 350                                           SURF1050
      IF(IWT.GT.0) GO TO 700                                            SURF1060
      IF(NW.EQ.0) GO TO 700                                             SURF1070
C *******COMPUTE SURFACE WEIGHTS BASED ON REF.        *************     SURF1080
      COS4I=1.0/(TANSI*SQRT((1.0/TANSI)**2 + 0.5625))                   SURF1090
      IF(TRI.EQ.0.0) KDW=0.768                                          SURF1100
      IF(TRI.GT.0.0) KDW=1.0                                            SURF1110
      KVS=1.0                                                           SURF1120
      IF(NW.EQ.0) GO TO 700                                             SURF1130
      BWTOT= BI + D1                                                    SURF1140
      SWINT=0.5*RCI*D1 + 0.125*D1*TANSI*D1                              SURF1150
      SWTOT=SEI + 2.0*SWINT                                             SURF1160
      ARWTOT=BWTOT**2/SWTOT                                             SURF1170
      TRWTOT=TCI/(RCI + 0.5*D1*TANSI)                                   SURF1180
      WDGNZ=WDG*GULT                                                    SURF1190
      AWW=SQRT(WDGNZ)                                                   SURF1200
      BWW=(SWTOT/144.)**0.622                                           SURF1210
      CWW=ARWTOT**0.785                                                 SURF1220
      DWW=THKRW**(-0.40)                                                SURF1230
      EWW=(1.0 + TRWTOT)**0.05                                          SURF1240
      FWW=1.0/COS4I                                                     SURF1250
      WWING=0.0103*KDW*KVS*AWW*BWW*CWW*DWW*EWW*FWW                      SURF1260
      IF(IARW.EQ.4) WWING=2.*WWING                                      SURF1270
      IF(IAIR.GT.0) WRITE(6,BUG)                                        SURF1280
      GO TO 600                                                         SURF1290
  700 CONTINUE                                                          SURF1300
      WDGNZ=WDG*GULT                                                    SURF1310
      STINT=0.5*RCI*D1 + 0.125*D1*TANSI*D1                              SURF1320
      BTTOT=BI + D1                                                     SURF1330
      STTOT=SEI + 2.0*STINT                                             SURF1340
      STTOTF=STTOT/144.                                                 SURF1350
      ARTTOT=BTTOT**2/STTOT                                             SURF1360
      TRTTOT=TCI/(RCI + 0.5*D1*TANSI)                                   SURF1370
      COS4I=1.0/(TANSI*SQRT((1.0/TANSI)**2 + 0.5625))                   SURF1380
      WETAIL=4.049*STTOTF**.789*(WDGNZ/1000.)**0.25/(1.0 + D1/BTTOT)**2 SURF1390
      IF(IART.NE.1) GO TO 111                                           SURF1400
      GO TO 112                                                         SURF1410
  111 CONTINUE                                                          SURF1420
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AD-A048 366 LTV AEROSPACE CORP DALLAS TEX VOUGHT SYSTEMS DIV F/G 15/7
SEATIDE ANALYSIS PROCESS. VOLUME III E. CRUISE MISSILE - CONCEP--ETC(U)
FEB 75 R K MCDONOUGH DAAB09-72-C-0062
UNCLASSIFIED VSD-00.1636-VOL-3E-REV-A NL

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                    WTAILS=8.098*STTOTF**.789*(WDGNZ/1414.)**0.25/      SURF1430
     1(1.0 + D1/BTTOT)**2                                               SURF1440
      IF(IAIR.GT.0) WRITE(6,BUG1)                                       SURF1450
C*****WT=WEIGHT OF CRUCIFORM TAIL                                       SURF1460
      GO TO 1000                                                        SURF1470
  112 CONTINUE                                                          SURF1480
      KRHT=1.00                                                         SURF1490
      BVTOT=BVT  + .5 * D1                                              SURF1500
      SVTINT = .5 * RCVT * D1 + .125 * D1 * TANSVT                      SURF1510
      COS4VT=1.0/(TANSVT*SQRT((1.0/TANSVT)**2+ 0.5625))                 SURF1520
      SVTTOT=SVT + SVTINT                                               SURF1530
      ARVTOT=BVTOT**2/SVTTOT                                            SURF1540
      TRVTOT=TCVT/(RCVT + 0.5*D1*TANSVT)                                SURF1550
      AVT=WDGNZ**0.324                                                  SURF1560
      BVTX=(SVTTOT/144.)**0.606                                         SURF1570
      CVT=RMDES**0.404                                                  SURF1580
      ARMT=XDIT-XCGD1                                                   SURF1590
      IF(ARMT.LT.4.) ARMT=4.0                                           SURF1600
      DVT=(ARMT*DCASE/12.)**(-.516)                                     SURF1610
      EVT=ARVTOT**0.344                                                 SURF1620
      FVT=THKRVT**(-0.250)                                              SURF1630
      GVT=(1.0 + TRVTOT)**0.25                                          SURF1640
      HVT=COS4VT**(-0.332)                                              SURF1650
      WVT=0.597*KRHT*AVT*BVTX*CVT*DVT*EVT*FVT*GVT*HVT                   SURF1660
      WTAILS=WVT + WHTAIL                                               SURF1670
      IF ( IAIR  .GT.  0  )  WRITE(6,BUG1)                              SURF1680
 1000 CONTINUE                                                          SURF1690
      GO TO 600                                                         SURF1700
  400 CONTINUE                                                          SURF1710
C ********* COMPONENT WEIGHTS MUST BE INPUT  **********                SURF1720
      IF(IART.NE.1) GO TO 1110                                          SURF1730
      WVT=VTALOC * WTI                                                  SURF1740
      WHT = WTI - WVT                                                   SURF1750
      WWING=WWINGI                                                      SURF1760
      IF(NW.EQ.0) WWING=0.0                                             SURF1770
      WTAILS=WHT + WVT                                                  SURF1780
      GO TO 600                                                         SURF1790
 1110 CONTINUE                                                          SURF1800
C ******INSERT TAIL WEIGHT HERE *******                                 SURF1810
      WTAILS=WTI                                                        SURF1820
      WWING=WWINGI                                                      SURF1830
      IF(NW.EQ.0) WWING=0.0                                             SURF1840
      GO TO 600                                                         SURF1950
  350 CONTINUE                                                          SURF1860
      IF(NW.EQ.0) GO TO 360                                             SURF1870
      NWPAN=2.0                                                         SURF1880
      IF(IARW.EQ.4) NWPAN=4.                                            SURF1890
      WWING=PANWW*NWPAN                                                 SURF1900
  360 CONTINUE                                                          SURF1910
      NTPAN=4.0                                                         SURF1920
      IF(IART.EQ.3) NTPAN=3.                                            SURF1930
      IF(IART.EQ.1) NHTPAN=2.                                           SURF1940
      IF(IART.EQ.1) NVTPAN=1.                                           SURF1950
      IF(IART.EQ.1) GO TO 380                                           SURF1960
      WTAILS=PANWT*NTPAN                                                SURF1970
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      GO TO 600                                                          SURF1980
  380 WTAILS=PANWVT*NVTPAN + PANWHT*NHTPAN                               SURF1990
      GO TO 600                                                          SURF2000
  450 CONTINUE                                                           SURF2010
      IF(NW.EQ.0) GO TO 205                                              SURF2020
      WWING=WOVAW*SW/144.                                                SURF2030
  205 CONTINUE                                                           SURF2040
      WWING=0.0                                                          SURF2050
      IF(IART.NE.1) GO TO 210                                            SURF2060
      WHT=WOVAHT*SHT/144.                                                SURF2070
      WVT=WOVAVT*SVT/144.                                                SURF2080
      WTAILS=WHT + WVT                                                   SURF2090
      GO TO 600                                                          SURF2100
  210 WT=WOVAT*ST /144.                                                  SURF2110
      WTAILS=WT                                                          SURF2120
  600 CONTINUE                                                           SURF2130
      RETURN                                                             SURF2140
      END                                                                SURF2150


      SUBROUTINE WORTH ( WTH1, WTH2, EMPTY )                             WORT0010
C     NUK.CM-CGSM  R.K.MCDONOUGH  FIV/EBCD   10/18/73                    WORT0020
C   COMPUTE RELATIVE WORTH -- SIDE 1 AND 2 FIRST                         WORT0030
      COMMON /SCRNNL/ NPTS(20),PARVNL(7,20),DWNL(7,20),DUMMY(50)         WORT0040
     1  ,NSCOST,IDU4M4(4)                                               WORT0050
      COMMON / SWORTH/  KBASE, WORTH1, WORTH2, NPAR, KPAR(20), PARV(20),WORT0060
     1   DERV1(20), DERV2(20)                                            WORT0070
      DIMENSION PARDON ( 20 )                                            WORT0080
      COMMON /PERF/ KBY2(2),PE4(4),MOPT, NLPHAZ, NCPHAZ, NDPHAZ,         WORT0090
     1     XMACHF(20), ALTF(20), GAMMAF(20), EVALUE(20), PE580(580)      WORT0100
      COMMON/ROUNDP/PRNG(20),WORTZ,CEP,RANGE,RCR,ACR,VCR,                WORT0110
     1     RLL,ALL,VLL, RUF14(14)                                        WORT0120
      COMMON /ZWORTH/ZX(10), FORCE, ZSX(10), RELIB, NLLRI, ZAX(9)        WORT0130
C     COMPUTE PHASE VARIABLES FROM PHASE STORES                          WORT0140
      IF ( (NCPHAZ.LE.0) .OR. (NCPHAZ.GT.NLPHAZ) ) GO TO 3501            WORT0150
      NC = NCPHAZ -1                                                     WORT0160
      VCR = XMACHF(NCPHAZ)                                               WORT0170
      ACR = ALTF( NCPHAZ )                                               WORT0180
      IF ( NCPHAZ .EQ. 1 ) RCR = PRNG(1)                                 WORT0190
      IF ( NCPHAZ .NE. 1 ) RCR = PRNG(NCPHAZ) - PRNG(NC)                 WORT0200
      GO TO 3505                                                         WORT0210
 3501 CONTINUE                                                           WORT0220
      VCR = 0.                                                           WORT0230
      ACR = 0.                                                           WORT0240
      RCR = 0.                                                           WORT0250
 3505 CONTINUE                                                           WORT0260
      IF ( (NLLRI.LE.0) .OR. (NLLRI.GT.NLPHAZ) ) GO TO 3511              WORT0270
      NL = NLLRI - 1                                                     WORT0280
      VLL = XMACHF( NLLRI )                                              WORT0290
      ALL = ALTF ( NLLRI )                                               WORT0300
      IF ( NLLRI .EQ. 1 ) RLL = PRNG(1)                                  WORT0310
      IF ( NLLRI .NE. 1 ) RLL = PRNG(NLLRI) - PRNG(NL)                   WORT0320
      GO TO 3515                                                         WORT0330
 3511 CONTINUE                                                           WORT0340
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      ALL = 0.                                                          WORT0350
      VLL = 0.                                                          WORT0360
      RLL = 0.                                                          WORT0370
 3515 CONTINUE                                                          WORT0380
      RANGE = PRNG (NLPHAZ)                                             WORT0390
      CONF = 6076.1155                                                  WORT0400
      RCR = RCR / CONF                                                  WORT0410
      RLL = RLL / CONF                                                  WORT0420
      RANGE = RANGE / CONF                                              WORT0430
      DO 10 I = 1, 20                                                   WORT0440
   10 PARDON(I)  =  PARV(I)                                             WORT0450
      PARDON ( 1 )  =   CEP                                             WORT0460
      PARDON( 2)=  RANGE                                                WORT0470
      PARDON ( 3 )  =   FORCE                                           WORT0480
      PARDON( 4)=  RELIB                                                WORT0490
      PARDON( 5)=  EMPTY                                                WORT0500
      PARDON( 6)=  RCR                                                  WORT0510
      PARDON( 7)=  RLL                                                  WORT0520
      PARDON( 8)=  ACR                                                  WORT0530
      PARDON( 9)=  ALL                                                  WORT0540
      PARDON(10)=  VCR                                                  WORT0550
      PARDON(11)=  VLL                                                  WORT0560
      WTH1  =  WORTH1                                                   WORT0570
      WTH2  =  WORTH2                                                   WORT0580
      NPAR = 11                                                         WORT0590
      DO 100 I = 1, NPAR                                                WORT0600
      IF ( NPTS(I) .LE. 0 ) GO TO 100                                   WORT0610
      CALL SLU(NPTS(I),PARVNL(1,I),DWNL(1,I),PARDON(I),WTHD,ILO,IHI)    WORT0620
      WTH1 = WTH1 + WTHD                                                WORT0630
      WTH2 = WTH2 + WTHD                                                WORT0640
  100 CONTINUE                                                          WORT0650
      ZAX(8) = WTH1                                                     WORT0660
      ZAX(9) = WTH2                                                     WORT0670
      RETURN                                                            WORT0680
      END                                                               WORT0690


      SUBROUTINE PSM ( IRT, IFLY )                                      PSM 0010
C     PGM=NUK.CMCGSM     GGJ/RKM     FIV/EBCD     9/10/73               PSM 0020
C     EXECUTIVE FOR PROPULSION SYSTEM SIZING                            PSM 0030
      COMMON /BESYET/ FACBES, WBOOSX, BES13(13)                         PSM 0040
      COMMON/CODEXX/  ISIZ, IZAP(15)                                    PSM 0050
      EQUIVALENCE ( IZAP(2), ILW )                                      PSM 0060
      COMMON /EXTERN/ AR(20)                                            PSM 0070
      COMMON /GUPOL/ WARD(78)                                           PSM 0080
      COMMON /INPTTJ/ END,ALPDES,AMDES,T4DES,SKSTR,DIAM,WTTJ,           PSM 0090
     1    PAYLT,RINP3(3), PAYWT,RINP5(5), WTSUR, WBOOST, RIN55(5)       PSM 0100
      COMMON /INSERT/ ZX17(17), TNOZR, ZX15(15)                         PSM 0110
      COMMON /NAMSOL/ DCAS, XE2(2), STGW, ZLTOT, WMILS,                 PSM 0120
     1    ZLPAY, ZWPAY, ZARSUR, SOL4(4)                                 PSM 0130
      COMMON /PINT/ FHI,FLO,PINT28(28)                                  PSM 0140
      COMMON /PRINTR/ IPSM, I76(6)                                      PSM 0150
      COMMON /ROCKET/ ROC20(20), DCAL, ROC6(6), XLL, WTL,               PSM 0160
     1    XLPLL, WARL, WPLL, ROC7(7)                                    PSM 0170
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      COMMON /RJDAT/ ZX3(3), ZA6A3, ZX5(5)                                  PSM 0180
      COMMON /SAVL/ FLOS, FHIS, SVL5(5)                                     PSM 0190
      COMMON /SOLR/ SOL7(7), WPX                                            PSM 0200
      COMMON /TOVPER/ BOOWP,BISPV,BTHVAC,BEXIT,SUSWP,SEXIT,BCANTA,WTI,      PSM 0210
     1     DROPST,DROPEB,KIND,A5A3,A6A3,ACA3,D3,                            PSM 0220
     2     TVACMX,TVACMN,YISP(20),XTHRTL(20),EXTRA(15)                      PSM 0230
      COMMON /TURBI/ WAFCOS,ALFTJ,TJALT,TJMACH,TJTHR,T4TJ,TUR3(3),          PSM 0240
     1     A9, WFUEL, XTOTAL, XLPS, XLNOZ, TUR16(16)                        PSM 0250
      COMMON /WATIN/ WAT9(9), TIT, WAT3(3)                                  PSM 0260
      EQUIVALENCE ( SOL7(1), WTSOL )                                        PSM 0270
      EQUIVALENCE ( AR(5), WTTOT )                                          PSM 0280
      EQUIVALENCE ( AR(6), XLTOT )                                          PSM 0290
      EQUIVALENCE ( EXTRA(14), XLPAY ), ( EXTRA(15), XLMSCL )               PSM 0300
     1          ,( EXTRA(13), TNOZS )                                      PSM 0310
      NAMELIST/PERFL/ IPERF, FREQ,    XISPLO, XISPHI, WDOT                  PSM 0320
     1   ,YISP,XTHRTL,FREQD,FHI,FLO,WPX                                     PSM 0330
      DIMENSION FREQ(20)                                                    PSM 0340
C     **                                                                    PSM 0350
C     **                                                                    PSM 0360
      KFAIL=0                                                               PSM 0370
      IFLY=0                                                                PSM 0380
      DCASE = DCAS                                                          PSM 0390
      WTOTSV = WTTOT                                                        PSM 0400
      IFB = 0                                                               PSM 0410
      WBOOST = 0.                                                           PSM 0420
      WBOOSX = 0.                                                           PSM 0430
      DROPST=0.                                                             PSM 0440
      DROPEB=0.                                                             PSM 0450
      IF ( (ISIZ.GE.40) .AND. (ISIZ.LT.50) ) GO TO 400                      PSM 0460
      NTEN = 10                                                             PSM 0470
      NKIND = MOD ( KIND, NTEN )                                            PSM 0480
      IF ( NKIND .NE. 3 ) GO TO 93                                          PSM 0490
      IF ( ILW  .LT.  2  )  GO TO 93                                        PSM 0500
      WTOTAL = WTTOT                                                        PSM 0510
      IFB = 1                                                               PSM 0520
      CALL BEXEC ( WTOTAL, WBOOST, XLBOC, IFLY )                            PSM 0530
      IF ( IFLY  .GT.  0  )  GO TO 900                                      PSM 0540
C     CALL FOR EXTERNAL BOOSTERS                                            PSM 0550
   93 CONTINUE                                                              PSM 0560
      IF ( ISIZ.LT. 19 ) GO TO 100                                          PSM 0570
      IF ( ISIZ.LT. 29 ) GO TO 200                                          PSM 0580
      IF ( ISIZ.LT. 39 ) GO TO 300                                          PSM 0590
      IF ( ISIZ.LT. 59 ) GO TO 500                                          PSM 0600
      GO TO 900                                                             PSM 0610
  100 CONTINUE                                                              PSM 0620
C     SIZE SOLID PROP SYS FOR CRUISE MISSILE CGSM                           PSM 0630
      IPERF=0                                                               PSM 0640
      FREQD=0.0                                                             PSM 0650
      STGW = STGW - WBOOST                                                  PSM 0660
C     SIZE SOLID  ROCKET PROPULSION SYSTEM                                  PSM 0670
      CALL SOLROC(IPERF, FREQD,   XISPLO,WDOT,IFLY )                        PSM 0680
      SUSWP = WPX                                                           PSM 0690
      WTSOL = WTSOL + WBOOST                                                PSM 0700
      WTTOT = WTTOT                                                         PSM 0710
      WTI = WTI                                                             PSM 0720
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      TVACMX = FHI                                                      PSM 0730
      TVACMN = FLO                                                      PSM 0740
      GO TO 105                                                         PSM 0750
  200 CONTINUE                                                          PSM 0760
C     SIZE LIQUID ROCKET PROPULSION SYSTEM                              PSM 0770
C     PARAMETERS SET FOR SOLID & USED FOR LIQUID                        PSM 0780
      DCAL = DCAS                                                       PSM 0790
      XLL = ZLTOT                                                       PSM 0800
      WTL = STGW                                                        PSM 0810
      WTL = WTL - WBOOST                                                PSM 0820
      XLPLL = ZLPAY                                                     PSM 0830
      WARL = ZARSUR                                                     PSM 0840
      WPLL = ZWPAY                                                      PSM 0850
      IPERF=0                                                           PSM 0860
      FREQD=0.                                                          PSM 0870
      CALL ROCLIQ(IPERF,FREQD,XISPLC,WDOT,KFAIL)                        PSM 0880
      TRAP = 0.03                                                       PSM 0890
      SUSWP = ( 1.0 - TRAP ) * SUSWP                                    PSM 0900
      IFLY = KFAIL                                                      PSM 0910
      WTTOT = WTI + WBOOST                                              PSM 0920
      TVACMX = FHIS                                                     PSM 0930
      TVACMN = FLOS                                                     PSM 0940
  105 CONTINUE                                                          PSM 0950
      IF ( IFLY .GT. 0 ) GO TO 900                                      PSM 0960
C     GENERATE PERFORMANCE MAP FOR ROCKETS - - -  ISP VS. THR.RAT       PSM 0970
C     THR.RAT IS   ( F - FMIN) / ( FMIN - FMAX )                        PSM 0980
C     RAT FROM 0 TO 1                                                   PSM 0990
C     SET IN CONSTANTS FOR VPM & ADM                                    PSM 1000
      TNOZR = TNOZS                                                     PSM 1010
      SEXIT = SEXIT / 144.                                              PSM 1020
      XLSOL = XLPAY + XLMSOL                                            PSM 1030
      XLTOT = XLSOL                                                     PSM 1040
      DROPST = 0.                                                       PSM 1050
      IPERF=1                                                           PSM 1060
      TAX = TVACMX - TVACMN                                             PSM 1070
      DTAX = TAX / 19.                                                  PSM 1080
      FREQ(1) = TVACMN                                                  PSM 1090
      FREQ(20) = TVACMX                                                 PSM 1100
      FRE = TVACMN                                                      PSM 1110
      XTHRTL(1)=0.                                                      PSM 1120
      XTHRTL(20)=1.                                                     PSM 1130
      DO 110 I = 2, 19                                                  PSM 1140
      FRE = FRE + DTAX                                                  PSM 1150
      FREQ ( I ) = FRE                                                  PSM 1160
      XTHRTL(I) = ( FRE - TVACMN ) / TAX                                PSM 1170
  110 CONTINUE                                                          PSM 1180
      IF ( IPSM .NE. 0 ) CALL PAGE                                      PSM 1190
      DO 120 I = 1, 20                                                  PSM 1200
      FREQD=FREQ(I)                                                     PSM 1210
      IF ( ISIZ .GT. 19 ) GO TO 114                                     PSM 1220
      CALL SOLROC(IPERF,FREQD,   XISPLC,WDOT, KFAIL)                    PSM 1230
      YISP(I) = PINT28(13)                                              PSM 1240
      GO TO 116                                                         PSM 1250
  114 CONTINUE                                                          PSM 1260
      CALL ROCLIQ(IPERF,FREQD, XISPLO,WDOT,KFAIL)                       PSM 1270
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      YISP(I) = XISPLO                                                  PSM 1280
  116 CONTINUE                                                          PSM 1290
  120 CONTINUE                                                          PSM 1300
      IFLY = KFAIL                                                      PSM 1310
      IF ( IPSM  .GT.  0  )  WRITE(6,PERFL)                             PSM 1320
      GO TO 900                                                         PSM 1330
  300 CONTINUE                                                          PSM 1340
C     COMBINED CYCLE                                                    PSM 1350
      GO TO 900                                                         PSM 1360
  400 CONTINUE                                                          PSM 1370
C     RAMJET ( EXT BOO, INT BOO, UNBOO )                                PSM 1380
      IF ( IRT  .GT.  0  )  RETURN                                      PSM 1390
C     **                                                                PSM 1400
C                                                                       PSM 1410
      CANT = WARD(17)                                                   PSM 1420
      CALL PROPXX (IFLY)                                                PSM 1430
      WARD(17) = CANT                                                   PSM 1440
      WTI = WTTOT                                                       PSM 1450
C                                                                       PSM 1460
C     **                                                                PSM 1470
      GO TO 900                                                         PSM 1480
  500 CONTINUE                                                          PSM 1490
C     DESIGN AND SIZE TURBOJET PROPULSION SYSTEM                        PSM 1500
      END= TJTHR                                                        PSM 1510
      ALPDES = ALFTJ                                                    PSM 1520
      AMDES = TJMACH                                                    PSM 1530
      T4DES = T4TJ                                                      PSM 1540
      TIT = T4TJ                                                        PSM 1550
      DIAM = DCASE                                                      PSM 1560
      WTTJ = WTTOT                                                      PSM 1570
      WTTJ = WTTJ - WBOOST                                              PSM 1580
      PAYLT = ZLPAY                                                     PSM 1590
      PAYWT = ZWPAY                                                     PSM 1600
      WTSUR = ZARSUR                                                    PSM 1610
      CALL TURBO ( IFLY )                                               PSM 1620
      ZA6A3 = A9 / AR(12)                                               PSM 1630
      TNOZR = XLNOZ                                                     PSM 1640
      SEXIT = A9                                                        PSM 1650
      XLTOT = XTOTAL                                                    PSM 1660
      SUSWP = WFUEL                                                     PSM 1670
      WTI = WTTOT                                                       PSM 1680
  900 CONTINUE                                                          PSM 1690
      IF(IEB.EQ.1) STGW = WTOTSV                                        PSM 1700
      IF(IEB.EQ.1) WTL  = WTOTSV                                        PSM 1710
      IF(IEB.EQ.1) WTTJ = WTOTSV                                        PSM 1720
      IF ( NKIND  .NE.  3  )  BEXIT = SEXIT                             PSM 1730
      RETURN                                                            PSM 1740
      END                                                               PSM 1750


      SUBROUTINE SOLROC(IPERF, FREQ,     XISPX, WDOT, KFAIL)            SOLR0010
C   NUK.CM-CGSM  R.K.MCDONOUGH  FIV/EBCD   10/18/73                     SOLR0020
      COMMON /SOLMIS/ CSTAR1, CSTAR2, ETAISP, DUM7(7)                   SOLR0030
      COMMON /CONLY/ KPIST,DIAFRZ,WMC,DTHRT,RNOZI,WMX,SOMMOR(4)         SOLR0040
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      COMMON /COMVLS/ COM(51)                                                  SOLR0050
      EQUIVALENCE ( COM(47),WPX),                                              SOLR0060
     5            ( COM(48),DP ),                                              SOLR0070
     6            ( COM(49),WNX)                                               SOLR0080
        DIMENSION TABPRG(12)                                                   SOLR0090
      COMMON/NAMSOL/  DCASE,          XISPHJ,EPHJ,     STGW,XTOTAL,            SOLR0100
     1 WMISC,XLPAY,                   WPAY,WASURF,TOWDES,TRATIO,              SOLR0110
     1 ITHR,FDES                                                               SOLR0120
      COMMON/PRINTR/ IPSM,IZ6(6)                                               SOLR0130
      COMMON/CODEXX/ZQ(2),ISIZ,ZAP(13)                                         SOLR0140
      COMMON/COMP/TABEPS(505)                                                  SOLR0150
      NAMELIST/TOWPR/ ICOUNT, KCOUNT, FHI, FLO, TOWERR                         SOLR0160
      NAMELIST/WINPUT/ TERMP,TERMQ,TERMR,TERMS,TERMT,XLC,WSC,WIC,WPC,          SOLR0170
     1WC,WI,WP,WM,WN,WAH,WC,WFH,WMISC,XLM                                      SOLR0180
      NAMELIST/PINNOZ/PCHI, PCLO, EPHI, EPLO,CSTARH,CSTARL, CFDELL,            SOLR0190
     1CFDELH,ATHI,ATLO,CFTLO,TARAT                                             SOLR0200
      DIMENSION X(3),NINV(3),PCLO(10)                                          SOLR0210
      COMMON /TOVPER/ ZXX5(5), SEXIT, XX66(66)                                 SOLR0220
      EQUIVALENCE  ( XX66(66), XLM )                                           SOLR0230
      COMMON/SOLR/ WVEH, WM, XIROLL, XIPTCH, XCGMBX, XCGLAX, DEXIT, WP         SOLR0240
      COMMON /SOLSAV/ PMF, WPOVWO, WN, WINERT                                  SOLR0250
      COMMON/SOLSV/ FLOS,FHIS,PCHIS, SISPLO, SISPHI, EPHIS, CSTRHS,            SOLR0260
     1 CFDLLS, CFDLHS, ATHIS, DEXITS                                           SOLR0270
      COMMON/PINT/                                                             SOLR0280
     1    FHI      ,FLO     ,XISPHI   ,PCHI     ,ETACF    ,EXPBR    ,PHINOZ  , SOLR0290
     2    PBELL    ,RHOMTL  ,RHOINL   ,SIGMTL   ,REFH     ,APAT     ,RHOP    , SOLR0300
     3 XISPLO                                                                  SOLR0310
     4    ,PHOINS, AIAT, TIC, REAH, PS, ZUMW10(10)                             SOLR0320
      COMMON/PINSOL/TABISP(719)                                                SOLR0330
      COMMON/TABSET/ NMP,NPC,NISP,NMRP,NPCP,NEXR                               SOLR0340
      NAMELIST/INPUT/ DCASE,          XISPHJ,EPHJ,PCHI,STGW,XTOTAL,            SOLR0350
     1 WMISC,XLPAY,ISIZ,ETACF,EXPBR,WPAY,WASURF,TOWDES,TRATIO,                 SOLR0360
     2 ITHR, FDES                                                              SOLR0370
      NAMELIST/NOZL/ DTHRT,DEXIT,PHINOZ,XL1,XL2,XL3,TIAHM,RNOZI,               SOLR0380
     1ANOZI,CONRAT,XL4,XLNOZ                                                   SOLR0390
      NAMELIST/PINTL/ WNSA, WNCS, WNT, WNEC, WNSC, WPIN, WHS, WN               SOLR0400
      NAMELIST/DOG/ TWC,WFS,XLNS,DELS,WAS,AP,TERMG,TERMH,TERMI,WPFH,           SOLR0410
     1RZERO,AZERO,RP,TERMJ,TERMK,TERML,TERMM,WPR,DELSP,WPAHR                   SOLR0420
      NAMELIST/CAT/ RONE,AONE,WPAHR,WPCR,TERMN,TERMO,WPAH,ISIZ,TERMP,          SOLR0430
     1TERMQ,TERMR,TERMS,TERMT,XLC,WSC,WIC,WPC,WC,WI,WP,WM                      SOLR0440
      NAMELIST/FWDAFT/TFH,XLFH,AIGN,TERMA,TERMB,WSFH,TIC,TIFH,TERMC,           SOLR0450
     1WIFH,WBFH,WFH,REFH,REAH,XLAH,TAH,TERMD,TERME,WSAH,TIAH,TERMF,            SOLR0460
     2WBAH,WAH                                                                 SOLR0470
      NAMELIST/CGPAV/ XLK, ZNSA, RT, ZNCS, ZNT, ZEC, ZPIN, ZHS, ZBFH,          SOLR0480
     1 ZSFH, ZIFH, ZPFH1, ZPFH2, RPFH1, WPFH1, WPFH2, ZPFH, ZBAH,              SOLR0490
     2 ZSAH, ZIAH, ZPAH, ZC, ZP, ZFS, ZAS, ZI, XMOME, XCGMBX, XCGLAX           SOLR0500
      NAMELIST/CG/ WINERT,PMF,XCGMBO,XCGMLA,XMISC,XISPLO                       SOLR0510
      NAMELIST/XINPUT/XTOTAL,XLPAY,XLNS,XLAH,XLFH,XLM,WSC,WIC,WC,              SOLR0520
     1WI,WPC,WP,WPAH,WPFH,WM,WN,WAH,WFH,WMISC                                  SOLR0530
      NAMELIST/XMOI/ STGLOD,RGPOVL,RGP,XIPTCH,RGROVD,RGR,XIROLL                SOLR0540
      DATA TABPRG/ 0.50,   0.56,   1.0,   0.375,   1.5,   0.325,               SOLR0550
     1             2.00,   0.31,   3.0,   0.300,   20.,   0.290/              SOLR0560
      CSTAR(X) = 37.*ALOG(X) + 4946.                                           SOLR0570
      PRAT(X) = X*1.15*EXP(0.0265*X)                                           SOLR0580
      XX66(65) = XLPAY                                                         SOLR0590
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      XISPHI=XISPHJ                                                    SOLR0600
      KCOUNT=0                                                         SOLR0610
      ICOUNT=0                                                         SOLR0620
      IF(IPSM.GT.C) WRITE(6,INPUT)                                     SOLR0630
      WEST=0.32725*DCASE**3                                            SOLR0640
      WVEH=STGW                                                        SOLR0650
      PI=3.14159                                                       SOLR0660
      FHI=TOWDES*WEST                                                  SOLR0670
      IF(ITHR.EQ.C) FHI=FDES                                           SOLR0680
      FLO=FHI/TRATIO                                                   SOLR0690
      G=32.17                                                          SOLR0700
      IF(PCHI.GT.2000.C) PCHI=2000.0                                   SOLR0710
C******EPHI=HIGH THRUST EXPANSION RATIO---TLU(XISPHI)                   SOLR0720
      DUM=1.0                                                          SOLR0730
      X(1)=DUM                                                         SOLR0740
      X(2)=PCHI                                                        SOLR0750
      X(3)=XISPHI                                                      SOLR0760
      NVAR=3                                                           SOLR0770
      NINV(1)=NMR                                                      SOLR0780
      NINV(2)=NPC                                                      SOLR0790
      NINV(3)=NISP                                                     SOLR0800
      CALL FASTS(NVAR,NINV,TABEPS(1),X,EPHI)                           SOLR0810
      CSTARH = CSTAR1 * ALOG(PCHI) + CSTAR2                            SOLR0820
   11 CFTHI=G*XISPHI/CSTARH                                            SOLR0830
      CFDELH=ETACF*CFTHI                                               SOLR0840
   12 CONTINUE                                                         SOLR0850
      IF(IPERF.EQ.0) GO TO 13                                          SOLR0860
      IF(FREQ.LE.FLOS) GO TO 131                                       SOLR0870
      IF(FREQ.GE.FHIS) GO TO 132                                       SOLR0880
      FLO=FREQ                                                         SOLR0890
      FHI=FHIS                                                         SOLR0900
      PCHI=PCHIS                                                       SOLR0910
      ATHI=ATHIS                                                       SOLR0920
      CEXIT=DEXITS                                                     SOLR0930
      GO TO 13                                                         SOLR0940
  131 FLO=FLOS                                                         SOLR0950
      XISPLO=SISPLO                                                    SOLR0960
      XISPLO = XISPLO * ETAISP                                         SOLR0970
      GO TO 985                                                        SOLR0980
  132 FHI=FHIS                                                         SOLR0990
      XISPHI=SISPHI                                                    SOLR1000
      XISPHI = XISPHI * ETAISP                                         SOLR1010
      GO TO 986                                                        SOLR1020
   13 ATHI= FHI/(PCHI*CFDELH)                                          SOLR1030
      PCRAT=PRAT(FHI/FLO)                                              SOLR1040
      PCLO(1)=PCHI/PCRAT                                               SOLR1050
      DO 102 I=2,10                                                    SOLR1060
      K=I-1                                                            SOLR1070
      TARAT=(PCHI/PCLO(K))**(1.-EXPBR)                                 SOLR1080
  101 ATLO=ATHI*TARAT                                                  SOLR1090
      EPLO=EPHI/TARAT                                                  SOLR1100
      DTHRT=2.0*SQRT(ATLO/PI)                                          SOLR1110
      IF(IPERF.EQ.1) GO TO 980                                         SOLR1120
      CEXIT=DTHRT*SQRT(EPLO)                                           SOLR1130
      SEXIT = .25 * PI * DEXIT**2                                      SOLR1140
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      IF(DEXIT-(DCASE-1.0).GT.0.1) GO TO 99                          SOLR1150
      GO TO 990                                                      SOLR1160
   99 CONTINUE                                                       SOLR1170
      DEXIT=DCASE-1.                                                 SOLR1180
      AREEN=0.7854*(DCASE-1.)**2                                     SOLR1190
      SEXIT = AREEN                                                  SOLR1200
       EPLO=AREEN/ATLO                                               SOLR1210
      EPHI=AREEN/ATHI                                                SOLR1220
      ICOUNT=ICOUNT + 1                                              SOLR1230
      IF(ICOUNT.GT.10) RETURN                                        SOLR1240
      IF ( IPSM  .GT.  0  )  WRITE(6,PINNOZ)                         SOLR1250
      DUM=1.0                                                        SOLR1260
      X(1)=DUM                                                       SOLR1270
      X(2)=PCHI                                                      SOLR1280
      X(3)=EPHI                                                      SOLR1290
      NVAR=3                                                         SOLR1300
      NINV(1)=NMRP                                                   SOLR1310
      NINV(2)=NPCP                                                   SOLR1320
      NINV(3)=NEXR                                                   SOLR1330
      CALL FASTS(NVAR,NINV,TABISP(1),X,XISPHI)                       SOLR1340
      GO TO 11                                                       SOLR1350
  980 CONTINUE                                                       SOLR1360
      DEXIT=DEXITS                                                   SOLR1370
      EPLO=DEXIT**2/DTHRT**2                                         SOLR1380
  990 CONTINUE                                                       SOLR1390
C******XISPLO= LOW THRUST ISP---TLU(EPLO)                           SOLR1400
      DUM=1.0                                                        SOLR1410
      X(1)=DUM                                                       SOLR1420
      X(2)=PCLO(K)                                                   SOLR1430
      X(3)=EPLO                                                      SOLR1440
      NVAR=3                                                         SOLR1450
      NINV(1)=NMRP                                                   SOLR1460
      NINV(2)=NPCP                                                   SOLR1470
      NINV(3)=NEXR                                                   SOLR1480
      CALL FASTS(NVAR,NINV,TABISP(1),X,XISPLO)                       SOLR1490
      CSTAR1 = CSTAR1 * ALOG(PCLO(K)) + CSTAR2                       SOLR1500
      CFTLO=G*XISPLO/CSTAR1                                          SOLR1510
      CFDELL=ETACF*CFTLO                                             SOLR1520
      PCLO(I)=FLO/(CFDELL*ATLO)                                      SOLR1530
      IF ( IPSM  .GT.  0  )  WRITE(6,PINNOZ)                         SOLR1540
      IF(PCLO(I).LT.30.) GO TO 998                                   SOLR1550
      IF(ABS(PCLO(I)-PCLO(K)).LT.10.)  GO TO 103                     SOLR1560
  102 CONTINUE                                                       SOLR1570
  103 CONTINUE                                                       SOLR1580
      IF(IPERF.EQ.1) GO TO 987                                       SOLR1590
      FLOS=FLO                                                       SOLR1600
      EHIS=EHI                                                       SOLR1610
      PCHIS=PCHI                                                     SOLR1620
      SISPLO=XISPLO                                                  SOLR1630
      SISPHI=XISPHI                                                  SOLR1640
      EPHIS=EPHI                                                     SOLR1650
      CSTRHS=CSTARH                                                  SOLR1660
      CFDLLS=CFDELL                                                  SOLR1670
      CFDLHS=CFDELH                                                  SOLR1680
      ATHIS=ATHI                                                     SOLR1690
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      DEXITS=DEXIT                                                      SOLR1700
      GO TO 104                                                         SOLR1710
  985 CONTINUE                                                          SOLR1720
      WDOT =FLO/XISPLO                                                  SOLR1730
      RETURN                                                            SOLR1740
  986 CONTINUE                                                          SOLR1750
      WDOT =FHI/XISPHI                                                  SOLR1760
      RETURN                                                            SOLR1770
  987 CONTINUE                                                          SOLR1780
      XISPLO = XISPLO * ETAISP                                          SOLR1790
      WDOT = FREQ / XISPLO                                              SOLR1800
      RETURN                                                            SOLR1810
  104 CONTINUE                                                          SOLR1820
      XL1=  DTHRT*PBELL*(SQRT(EPLO) -2.0 + COS(PHINOZ))/(200.*TAN(PHINOZSOLR1830
     1))                                                                SOLR1840
      XL2= DTHRT*PBELL*SIN(PHINOZ)/200.                                 SOLR1850
      XL3=0.433*DTHRT                                                   SOLR1860
      TIAHM=1.26E-6*PCHI**0.8*(CSTARH/G)**1.7                           SOLR1870
      RNOZI=1.299*DTHRT + 0.5*TIAHM + 1.600                             SOLR1880
      ANOZI=PI*RNOZI*RNOZI                                              SOLR1890
      AREFN=0.7854*(DCASE-1.)**2                                        SOLR1900
      IF(ANOZI.GT.AREFN) ANOZI=AREFN                                    SOLR1910
      CONRAT=ANOZI/ATLO                                                 SOLR1920
      XL4=0.2887*DTHRT*(SQRT(CONRAT)-1.5)                               SOLR1930
      XLNOZ=XL1 + XL2 + XL3 + XL4                                       SOLR1940
      IF(IPSM.GT.0) WRITE(6,NOZL)                                       SOLR1950
C**** COMPUTE NOZZLE WEIGHT                                             SOLR1960
      WNSA=0.74*RHOMTL*ANOZI                                            SOLR1970
      WNCS=(ANOZI-2.25*ATLO)*(RHOINS*TIAHM + 0.25*RHOMTL)               SOLR1980
      WNT=0.0315*ATLO**1.5                                              SOLR1990
      TBURNB=10.                                                        SOLR2000
      TBURNS=150.                                                       SOLR2010
      WNEC=(1.68E-8/SIN(PHINOZ))*RHOINS*ATLO*(EPLO-(2.-COS(PHINOZ))**2) SOLR2020
     1*(CSTARH/G)**1.7*(PCHI**0.8*TBURNB + PCLO(I)**0.8*TBURNS)         SOLR2030
      WNSC=(3.14E-5/SIN(PHINOZ))*RHOMTL*ATLO**1.5*PCHI*                 SOLR2040
     1(EPLO-(2.-COS(PHINOZ))**2)                                        SOLR2050
      WPIN=0.068*PI*DTHRT**3                                            SOLR2060
      WHS=EXP(0.588 + 0.064*ATHI)                                       SOLR2070
      WN= WNSA + WNCS + WNT + WNEC + WNSC + WPIN + WHS                  SOLR2080
      IF(IPSM.GT.0) WRITE(6,PINTL)                                      SOLR2090
C****COMPUTE FORWARD HEAD  WEIGHT                                       SOLR2100
      TFH=0.54*REFH*DCASE*PCHI/SIGMTL                                   SOLR2110
      XLFH=DCASE/(2.*REFH)                                              SOLR2120
      AIGN=AIAT*ATLO                                                    SOLR2130
C****COMPUTE FORWARD HEAD STRUCTURE WEIGHT                              SOLR2140
      REFH2=REFH*REFH                                                   SOLR2150
      TERMA=(REFH + SQRT(REFH2-1.))/(REFH - SQRT(REFH2-1.))             SOLR2160
      TERMB=0.3925/(REFH*SQRT(REFH2-1.))                                SOLR2170
      WSFH=RHOMTL*TFH*( DCASE**2*( 0.7854 + TERMB*ALOG(TERMA))-AIGN)    SOLR2180
      TIFH= (TIAHM + 2.*TIC)/4.                                         SOLR2190
C****COMPUTE FORWARD HEAD INSULATION WEIGHT                             SOLR2200
      TERMC=(REFH + SQRT(REFH2 + 1.))/(REFH - SQRT(REFH2 - 1.))         SOLR2210
      WIFH=TIFH*RHOINS*( (DCASE-2.*TFH)**2*( 0.7854 + TERMB*ALOG(TERMC))SOLR2220
     1-AIGN)                                                            SOLR2230
      WBFH=3.*RHOMTL*SQRT(ATLO)                                         SOLR2240
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      WFH=WSFH + WIFH + WBFH                                                    SOLR2250
      REAH2=REAH*REAH                                                          SOLR2260
      XLAH=SQRT(0.25*DCASE**2 -ANOZI/PI)/REAH                                  SOLR2270
      TAH=0.54*REAH*DCASE*PCHI/SIGMTL                                          SOLR2280
C**** COMPUTE AFT HEAD STRUCTURE WEIGHT                                        SOLR2290
      TERMD=(REAH + SQRT(REAH2 -1.))/(REAH- SQRT(REAH2 -1.))                   SOLR2300
      TERME=0.3925/(REAH*SQRT(REAH2 -1.))                                      SOLR2310
      WSAH=TAH*RHOMTL*( DCASE**2*(0.7854 + TERME*ALOG(TERMD))-ANOZI)           SOLR2320
      TIAH=(TIAHM + TIC)/2.                                                    SOLR2330
      TERMF=(REAH + SQRT(REAH2 - 1.))/(REAH - SQRT(REAH2 -1.))                 SOLR2340
      WIAH=TIAH*RHOINS*((DCASE-2.*TAH)**2*( 0.7854 + TERME*ALOG(TERMF))        SOLR2350
     1-ANOZI)                                                                  SOLR2360
      WBAH=17.76*TAH*RHOMTL*DCASE                                              SOLR2370
      WAH= WSAH + WIAH + WBAH                                                  SOLR2380
      IF(IPSM.GT.0) WRITE(6,FWDAFT)                                            SOLR2390
C***COMPUTE SKIRT WEIGHTS                                                      SOLR2400
      TWC=1.08*DCASE*PCHI/SIGMTL                                               SOLR2410
      IF(TWC.LT.0.02)TWC=0.02                                                  SOLR2420
      WFS=PI*RHOMTL*DCASE*TWC*XLFH                                             SOLR2430
      PS = 0.0                                                                 SOLR2440
      DELS = 0.0                                                               SOLR2450
      XLNS=(1.-PS/100.)*XLNOZ                                                  SOLR2460
      BTLSOL = XLAH + XLNS                                                     SOLR2470
      XX66(64) = BTLSOL                                                        SOLR2480
      WAS=PI*RHOMTL*DCASE*TWC*(XLAH + XLNS -0.25*DEXIT)                        SOLR2490
      XLAS=XLAH + XLNS -0.25*DEXIT                                             SOLR2500
C****COMPUTE HEAD PROPELLANT WEIGHTS                                           SOLR2510
      AP=ATLO*APAT                                                             SOLR2520
      TERMG=(0.5*DCASE - TFH - TIC)**2                                         SOLR2530
      TERMH=(0.5*DCASE/REFH-TFH-TIAHM)                                         SOLR2540
      TERMI=AP*DCASE*0.5/REFH                                                  SOLR2550
      WPFH=0.9*RHOP*((2.09*TERMG*TERMH)-TERMI)                                 SOLR2560
      RZERO=1.209*DTHRT                                                        SOLR2570
      AZERO=PI*RZERO*RZERO                                                     SOLR2580
      RP=SQRT(AP/PI)                                                           SOLR2590
      TERMJ=0.75 + DELS                                                        SOLR2600
      TERMK=ANOZI-AP                                                           SOLR2610
      TERML=(RZERO-RP)/0.577                                                   SOLR2620
      TERMM=AZERO +AP + SQRT(AZERO*AP)                                         SOLR2630
      XLPR=TERMJ + TERML                                                       SOLR2640
      TTTX=XLAH - TAH - TIAHM                                                  SOLR2650
      WPR=RHOP*(  TERMJ*TERMK  +TERML*(   TERMM/3. -AP))                       SOLR2660
      DELSP=DELS + 0.75                                                        SOLR2670
      IF(XLPR.LE.TTTX) GO TO 800                                               SOLR2680
      XLVC=XLPR - TTTX                                                         SOLR2690
      RONE=XLVC*0.577  + RP                                                    SOLR2700
      AONE=PI*RONE*RONE                                                        SOLR2710
      TERMLL=RZERO-RONE                                                        SOLR2720
      WPAHR= RHOP*(  TERMJ*TERMK + (TERMLL/0.577)*( 0.333*(AZERO + AONE SOLR2730
     1 + SQRT(AZERO*AONE)) - AP))                                              SOLR2740
      IF(IPSM.GT.0) WRITE(6,DOG)                                               SOLR2750
      GO TO 550                                                                SOLR2760
  800 WPAHR=WPR                                                                SOLR2770
      IF(IPSM.GT.0) WRITE(6,DOG)                                               SOLR2780
      GO TO 550                                                                SOLR2790
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  550 CONTINUE                                                          SOLR2800
      TERMN=(.5*DCASE - TAH -TIC)**2                                    SOLR2810
      TERMO= 0.5*DCASE/REAH -TAH - TIAHM                                SOLR2820
      WPAH=RHOP*( 2.09*TERMN*TERMO -AP*TERMO)- WPAHR                    SOLR2830
      WPCR=WPR-WPAHR                                                    SOLR2840
      IF(IPSM.GT.0) WRITE(6,CAT)                                        SOLR2850
      IF(ISIZ.EQ.1) GO TO 5000                                          SOLR2860
C****COMPUTE WEIGHTS FOR WT. INPUT                                      SOLR2870
      TERMP= 0.01766*DCASE*SQRT(AP)/REFH                                SOLR2880
      TERMQ=PI*RHOMTL*DCASE*TWC                                         SOLR2890
      TERMR=PI*RHOINS*TIC                                               SOLR2900
      TERMS= DCASE - 2.*TWC                                             SOLR2910
      TERMT= (0.5*DCASE - TWC - TIC)**2                                 SOLR2920
      XLC=(WVEH - WFH -WAH -WMISC - TERMP - WPFH - WPAH - WN-WPAY+WPCR  SOLR2930
     1-WASURF)/                                                         SOLR2940
     1(TERMQ + TERMR*TERMS + RHOP*(TERMT*PI - AP) + 0.01766*SQRT(AP))   SOLR2950
      IF(XLC.LE.0.0) GO TO 998                                          SOLR2960
      XLM=XLNS + XLAH + XLC + XLFH                                      SOLR2970
      WSC=PI*RHOMTL*TWC*DCASE*XLC                                       SOLR2980
      WIC=PI*TIC*RHOINS*(DCASE - 2.*TWC)*XLC                            SOLR2990
      WPC=((0.5*DCASE -TWC - TIC)**2*PI -AP)*RHOP*XLC - WPCR            SOLR3000
      WC=WSC + WIC                                                      SOLR3010
      WI= 0.01766*SQRT(AP)*(XLC + DCASE/REFH)                           SOLR3020
      WP=WPFH + WPAH + WPC                                              SOLR3030
      WM= WN + WAH + WC + WFH + WI + WMISC + WP                         SOLR3040
      IF(IPSM.GT.0) WRITE(6,WINPUT)                                     SOLR3050
      GO TO 5050                                                        SOLR3060
C***** COMPUTE WEIGHTS FOR LENGTH INPUT OPTION******                    SOLR3070
 5000 CONTINUE                                                          SOLR3080
      IF(IPSM.GT.0) WRITE(6,CAT)                                        SOLR3090
      XLV=XTOTAL                                                        SOLR3100
      XLC= XLV          -XLNS  - XLAH - XLFH                            SOLR3110
      IF(XLC.LE.0.0) GO TO 998                                          SOLR3120
      XLM= XLNS + XLAH + XLC + XLFH                                     SOLR3130
      WSC= PI*RHOMTL*TWC*DCASE*XLC                                      SOLR3140
      WIC= PI*TIC*RHOINS*XLC*(DCASE - 2.*TWC)                           SOLR3150
      WC=WSC + WIC                                                      SOLR3160
      WI= 0.01766*SQRT(AP)*(XLC + DCASE/REFH)                           SOLR3170
      WPC=((0.5*DCASE - TWC -TIC)**2*PI - AP)*RHOP*XLC - WPCR           SOLR3180
      WP=WPAH + WPFH + WPC                                              SOLR3190
      WM= WN + WAH + WC + WFH + WI + WMISC + WP                         SOLR3200
 5050 XMISC=0.5*(XLFH + XLC + XLAH)                                     SOLR3210
      TOTIMH = WP * XISPHI * ETAISP                                     SOLR3220
      TOTIML = WP * XISPLO * ETAISP                                     SOLR3230
      TBURNL=TOTIML/FLO                                                 SOLR3240
      TBURNH=TOTIMH/FHI                                                 SOLR3250
      WVEH=WM + WPAY + WASURF                                           SOLR3260
      IF(ITHR.EQ.1) GO TO 5060                                          SOLR3270
      TOW=FHI/WVEH                                                      SOLR3280
      GO TO 5065                                                        SOLR3290
 5060 TOW=FHI/WVEH                                                      SOLR3300
      TOWERR=TOWDES-TOW                                                 SOLR3310
      IF(ABS(TOWERR).LE.0.1) GO TO 5065                                 SOLR3320
 5075 FHI=TOWDES*WVEH                                                   SOLR3330
      FLO=FHI/TRATIO                                                    SOLR3340
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      KCOUNT=KCOUNT + 1                                                    SOLR3350
      IF ( IPSW  .GT.  0  )  WRITE(6,TOWPR)                                SOLR3360
      IF(KCOUNT.GT.10) GO TO 998                                           SOLR3370
      GO TO 12                                                             SOLR3380
 5065 CONTINUE                                                             SOLR3390
      WPOVWO=WP/WVEH                                                       SOLR3400
      STGLOD=XLM/DCASE                                                     SOLR3410
      CALL LINE(6,STGLOD,TABPRC(1), RGPOVL)                                SOLR3420
      RGP=RGPOVL*XLM                                                       SOLR3430
      XIPTCH=WM*RGP**2                                                     SOLR3440
      RGROVD=0.35                                                          SOLR3450
      RGR=RGROVD*DCASE                                                     SOLR3460
      XIROLL=WM*RGR**2                                                     SOLR3470
      WINERT=WM-WP                                                         SOLR3480
      PMF=WP/WM                                                            SOLR3490
      XLK= XLAH + XLC + XLFH                                               SOLR3500
      ZNSA= XLK + 1.                                                       SOLR3510
      RT=0.5*DTHRT                                                         SOLR3520
      ZNCS= XLK + XL4/3. + 0.144*(TIAHM + 0.25)*((3*RT + RNOZI + 0.75)/    SOLR3530
     1(1.5*RT + RNOZI + 0.5)) - TIAHM - 0.25                               SOLR3540
      ZNT= XLK + XL4 +(XL3 + XL2)/2. - TIAHM - 0.25                        SOLR3550
      ZEC= XLK + XL4 + XL3 + XL2 + XL1 - 0.3333*XL1*((4.0*RT*(2.-          SOLR3560
     1COS(PHINOZ) +DEXIT))/(2.*RT*(2.-COS(PHINOZ) + DEXIT)))               SOLR3570
      ZPIN=XLK - 1.73*RNOZI + 5.53*RT + 1.56                               SOLR3580
      ZHS= ZNT                                                             SOLR3590
      ZBFH=0.0                                                             SOLR3600
      ZSFH= XLFH/2. + TFH/4.                                               SOLR3610
      ZIFH=(XLFH + TFH)/2. + TIAHM/4.                                      SOLR3620
      ZPFH1=  0.625*XLFH + 0.375*(TFH + TIFH)                              SOLR3630
      ZPFH2= 0.5*(XLFH + TFH + TIFH)                                       SOLR3640
      HPFH1= 0.5*DCASE/BFFH -TFH -TIFH                                     SOLR3650
      RPFH1= C.5*DCASE -TFH - TIC                                          SOLR3660
      WPFH1= C.6667*PI * RHOP * HPFH1 * RPFH1**2                           SOLR3670
      WPFH2=RHOP*AP*HPFH1                                                  SOLR3680
      ZPFH=(ZPFH1*WPFH1 - ZPFH2 * WPFH2)/(WPFH1 - WPFH2)                   SOLR3690
      ZPAH=XLK                                                             SOLR3700
      ZSAH= XLK-(XLAH + 0.125)/2.                                          SOLR3710
      ZIAH= XLFH+ XLC + 0.5*(XLAH-0.25 - 0.5*TIAHM)                        SOLR3720
      ZPAH= XLFH + XLC + 0.375*(XLAH - 0.25 - TIAHM)                       SOLR3730
      ZC=  0.5*XLC + XLFH                                                  SOLR3740
      ZP=(ZPFH*WPFH + ZPAH*WPAH +ZC*WPC)/WP                                SOLR3750
      ZFS= 0.5*XLFH                                                        SOLR3760
      ZAS= XLFH + XLC + 0.5*(XLAH +XLNS -0.25*DEXIT)                       SOLR3770
      ZI = 11.2* WI/AIGN                                                   SOLR3780
      XMOME= WNSA*ZNSA + WNCS*ZNCS + WNT*ZNT + WNSC*ZEC + WNEC*ZEC         SOLR3790
     1 + WPIN*ZPIN + WAS*ZHS + WBFH*ZBFH + WSFH*ZSFH + WIFH*ZIFH           SOLR3800
     2 + ZPFH*WPFH + WPAH*ZPAH + WSAH*ZSAH + WIAH*ZIAH + ZPAH*WPAH         SOLR3810
     3 + ZC*WC + ZFS*WFS + ZAS*WAS + ZI*WI                                SOLR3820
      XCGMBX= XMOME/(WM-WP)                                                SOLR3830
      XCGLAX=(XMOME + ZP*WP)/WM                                            SOLR3840
      IF ( IPSW  .LE.  0  ) GO TO 606                                      SOLR3850
      WRITE(6,CGRAV)                                                       SOLR3860
      WRITE(6,XINPUT)                                                      SOLR3870
      WRITE(6,XMOI)                                                        SOLR3880
      WRITE(6,CG)                                                          SOLR3890
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 6C0 CONTINUE                                                          SOLR3900
     IF ( IPSM  .LE.  0  )  GO TO 606                                  SOLR3910
     WRITE(6,XINPUT)                                                   SOLR3920
     WRITE(6,XMOI)                                                     SOLR3930
     WRITE(6,CG)                                                       SOLR3940
 6C6 CONTINUE                                                          SOLR3950
     IF(IPSM.EQ.0) GO TO 999                                           SOLR3960
     CALL PAGE                                                         SOLR3970
     WRITE(6,6000)                                                     SOLR3980
6000 FORMAT(//10X,27H PINTLE NOZZLE SOLID ROCKET    )                  SOLR3990
     IF(ISIZ.LE.1)GO TO 6001                                           SOLR4000
5900 FORMAT(/30X,14HCASE DIAMETER=,F5.2,4H IN.,4X,19HWEIGHT INPUT OPTIOSOLR4010
    1N,3X,15HVEHICLE WEIGHT=,F10.3,4H LB. )                            SOLR4020
     GO TO 6022                                                        SOLR4030
6001 CONTINUE                                                          SOLR4040
     IF(IPSM.EQ.0) GO TO 999                                           SOLR4050
5800 FORMAT(/30X,14HCASE DIAMETER=,F5.2,4H IN.,4X,19HLENGTH INPUT OPTIOSOLR4060
    1N,3X,15HVEHICLE LENGTH=,F10.3,4H IN. )                            SOLR4070
6022 IF(ITHP.LT.1) GO TO 6050                                          SOLR4080
6040 CONTINUE                                                          SOLR4090
6080 FORMAT(/30X,30HDESIGN THRUST TO WEIGHT RATIO=,F6.2,5X,15HTHROTTLE SOLR4100
    1RATIO=,F6.2)                                                      SOLR4110
     GO TO 6002                                                        SOLR4120
6050 CONTINUE                                                          SOLR4130
6090 FORMAT(/30X,14HDESIGN THRUST=,F10.2,4H LBF,13X,23HTHRUST TO WEIGHTSOLR4140
    1 RATIO=,F6.2)                                                     SOLR4150
     GO TO 6002                                                        SOLR4160
 998 KFAIL=1                                                           SOLR4170
     IF(IPSM.EQ.0) GO TO 999                                           SOLR4180
     WRITE(6,7500)                                                     SOLR4190
7500 FORMAT(//40X,42HCYLINDER LENGTH EQUAL TO OR LESS THAN ZERO    )   SOLR4200
     GO TO 999                                                         SOLR4210
6002 CONTINUE                                                          SOLR4220
     IF(IPSM.EQ.0) GO TO 999                                           SOLR4230
     WRITE(6,6100)                                                     SOLR4240
6100 FORMAT(//10X,9HCOMPONENT,15X,10HWEIGHT-LB.,5X,10HLENGTH-IN.,     SOLR4250
    118X,39HPERFORMANCE PARAMETERS(COMPOSITE HTPB)      )              SOLR4260
     WRITE(6,6200)WFS,XLFH,FHI                                         SOLR4270
6200 FORMAT(/10X,13HFORWARD SKIRT,11X,F10.3,5X,F10.3,18X,15HMAXIMUM THRSOLR4280
    1UST=  ,F10.3,4H LBF )                                             SOLR4290
     WRITE(6,6300)WFH,XLFH,FLC                                         SOLR4300
6300 FORMAT(/10X,12HFORWARD HEAD,12X,F10.3,5X,F10.3,18X,15HMINIMUM THRUSOLR4310
    1ST=  ,F10.3,4H LBF )                                              SOLR4320
     WRITE(6,6400)WC,XLC,XISPHI                                        SOLR4330
6400 FORMAT(/10X,8HCYLINDER,16X,F10.3,5X,F10.3,18X,15HISP AT MAX THR=, SOLR4340
    1F10.3,4H SEC )                                                    SOLR4350
     WRITE(6,6500)WAH,XLAH,XISPLC                                      SOLR4360
6500 FORMAT(/10X,8HAFT HEAD,16X,F10.3,5X,F10.3,18X,15HISP AT MIN THR=, SOLR4370
    1F10.3,4H SEC )                                                    SOLR4380
     WRITE(6,6600)WN,XLNOZ,PCHI                                        SOLR4390
6600 FORMAT(/10X,13HNOZZLE(TOTAL),11X,F10.3,5X,F10.3,18X,15HPC  AT MAX SOLR4400
    1THR=,F10.3,5H PSIA )                                              SOLR4410
     WRITE(6,6700)XLNS,PCLO(I)                                         SOLR4420
6700 FORMAT(/10X,16HNOZZLE(EXTERNAL),23X,F10.3,18X,15HPC  AT MIN THR=, SOLR4430
    1F10.3,5H PSIA )                                                   SOLR4440
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      WRITE(6,6800)WAS,XLAS,ATHI                                        SOLR4450
 6800 FORMAT(/10X,9HAFT SKIRT,15X,F10.3,5X,F10.3,18X,15HTHROAT AREA AT ,SOLR4460
     1/77X,15HMAX THRUST     =,F10.3,8H SQ. IN.   )                    SOLR4470
      WRITE(6,6900)WMISC,ATLO                                           SOLR4480
 6900 FORMAT(/10X,13HMISCELLANEOUS,11X,F10.3, 33X,15HTHROAT AREA AT ,   SOLR4490
     1/78X,15HMIN THRUST     =,F10.3,8H SQ. IN. )                      SOLR4500
      WRITE(6,7000)WM,DEXIT                                             SOLR4510
 7000 FORMAT(/10X,19HTOTAL MOTOR WEIGHT=,F10.3,4H LB.,34X,15HEXIT  DIA. SOLR4520
     1   =,F10.3,4H IN. )                                              SOLR4530
      WRITE(6,7100)WINERT,EPHI                                          SOLR4540
 7100 FORMAT(/10X,19HTOTAL INERT WEIGHT=,F10.3,4H LB.,34X,15HEXP. RATIO SOLR4550
     1AT  ,/77X,15HMAX THRUST     =,4X,F5.2)                           SOLR4560
      WRITE(6,7200)WP,EPLO                                              SOLR4570
 7200 FORMAT(/10X,19HTOTAL PROP. WEIGHT=,F10.3,4H LB.,34X,15HEXP. RATIO SOLR4580
     1AT  ,/77X,15HMIN THRUST     =,4X,F5.2)                           SOLR4590
      WRITE(6,7300)XLM,TOTIMH                                           SOLR4600
 7300 FORMAT(/10X,19HTOTAL MOTOR LENGTH=,F10.3,4H IN.,34X,13HTOTAL IMPULSOLR4610
     1SE,/77X,16HAT MAX THRUST  =,F10.2,7H LB-SEC  )                    SOLR4620
      WRITE(6,7400)PMF,TOTIML                                           SOLR4630
 7400 FORMAT(/10X,19HPROP. WT. FRACTION=,3X,F5.2,40X,13HTOTAL IMPULSE,  SOLR4640
     1/77X,16HAT MIN THRUST  =,F10.2,7H LB-SEC  )                       SOLR4650
      WRITE(6,7900) WVEH                                                SOLR4660
 7900 FORMAT( 10X,19HMISSILE WEIGHT     =,F10.3)                       SOLR4670
      WRITE(6,7600) TDW,TBURNH                                          SOLR4680
 7600 FORMAT(/10X,19HTHRUST TO WEIGHT  =,F6.2,42X,13HBURN TIME AT ,/77X,SOLR4690
     116HMAX THRUST     =,F6.2,4H SEC  )                               SOLR4700
      WRITE(6,7700) TBURNL                                              SOLR4710
 7700 FORMAT(/77X,13HBURN TIME AT ,/77X,16HMIN THRUST     =,F8.2,       SOLR4720
     14H SEC  )                                                         SOLR4730
      WRITE(6,7800) WPOVWO                                              SOLR4740
 7800 FORMAT(/10X,19HMISSILE MASS RATIO=,3X,F5.2)                       SOLR4750
  999 CONTINUE                                                          SOLR4760
      WMC=WSEH+WBEH+WSAH+WPAH+WES+WAS+WSC                               SOLR4770
      DP = (WIEH+WIAH+WIC) / RHOINS                                     SOLR4780
      WNX = WN                                                          SOLR4790
      WPX=WP                                                            SOLR4800
      WMX = WM                                                          SOLR4810
      RETURN                                                            SOLR4820
      END                                                               SOLR4830


      SUBROUTINE ROCLIQ (IPER,  FREQD, XISP, WDXT, KFAIL)               ROCL0010
C     PGM=NUK.CMCGSM     GGJ/RKM     FIV/EBCD     9/10/73               ROCL0020
      COMMON /SOLMIS/ SOL9(9), WSECT                                    ROCL0030
      COMMON /COMVLS/ COM(51)                                           ROCL0040
      EQUIVALENCE(COM(24), WT),                                         ROCL0050
     1  (COM(25),WFX),                                                 ROCL0060
     2  (COM(26),FMAX),                                                ROCL0070
     2  (COM(40),WTC),                                                 ROCL0080
     3  (COM(41),WTPX),                                                ROCL0090
     4  (COM(42),WGG),                                                 ROCL0100
     5  (COM(43),WSC),                                                 ROCL0110
     6  (COM(44),WLV),                                                 ROCL0120
     7  (COM(45),VGT),                                                 ROCL0130
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     8  (COM(46),WO ),                                                        ROCL0140
     S  (COM(47),WPX),                                                        ROCL0150
     A  (COM(50),METALX)                                                      ROCL0160
      DIMENSION X(3), NINV(3)                                                 ROCL0170
      COMMON/MODL/ OD(30)                                                     ROCL0180
      EQUIVALENCE  (TSKINI,OD(1)), (TCWI, OD(2)), (TFRAC,CD(3)),              ROCL0190
     1 (SAFAC, OD(4)), (IWTANK,OD(5)), (WSKNPL, OD(6)),                       ROCL0200
     2 (WPAYL, OD(7)), (IWTPL,OD(8)), (WSINPU, OD(9)), (WOVAST, CD(10)),      ROCL0210
     3 (DBT, OD(11))                                                          ROCL0220
      EQUIVALENCE ( OD(12), ITANK )                                           ROCL0230
      COMMON/CODEXX/ ZQ(2), ISIZ, ZAP(13)                                     ROCL0240
      COMMON /LIQOUT/ XLTP, WTP, WOXTNK, WFTANK,                              ROCL0250
     1      XLTOX,WOX, XLTF,WF,XXLPS, WPROPI, WNOZ                           ROCL0260
      COMMON/PRINTR/ IPSM,I76(6)                                              ROCL0270
      COMMON/ROCKET/ XISPTH, XMRT, ETAISP, PCHAMB, FENG,ETACF,PBELL,          ROCL0280
     1C1,C2,C3,C4,C5,C6,C7,C8,XLSTAR,ZT,WOVAC2,EXS1,WOVAC1,DCASE,             ROCL0290
     2WOVAN1,WOVAN2,RHOOX,PVOX,REH,METAL,XLVEH,STGW,XLPAYI,WASURF,WPL,        ROCL0300
     3WMISCL,RHOF,ITHR,TOWDFS,TRATIO,FDES,XOLMIS                              ROCL0310
      COMMON/ROCL/                TABISP(631)                                 ROCL0320
      COMMON/ROCLX/ TABEXR(817)                                               ROCL0330
      COMMON/SAVL/ FLOS,FHIS,PCHAMS,EPSS,SISPLO, SISPHI, DEXITS               ROCL0340
      COMMON/TABSEX/ NPC,NMR,NISP,NPCP,NMRP,NEXR                              ROCL0350
      COMMON/TOVPER/GRX(4),WP,SEXIT,XXX(66)                                   ROCL0360
      EQUIVALENCE (XXX(66),XLPS), (XXX(64), BTLQ),(XXX(2),WVEH)               ROCL0370
C                                                                             ROCL0380
C                                                                             ROCL0390
      NAMELIST/TCHAMB/XK3, WDOTE, WDOTPT, FTHR, CSTAR, CFTT, CFDEL,           ROCL0400
     1 ATHRT, DTHRT, EPS, DET, XK2T, DCT, XLJT, XLC1T, XLC2T, XLNT,           ROCL0410
     2 XLTHR,WINJ, WC1T, WC2T, WN1T, WN2T, WTC,EPSR,AREFN,SEXIT               ROCL0420
      NAMELIST/TPUMP/ WDOTOT, WDOTFT, WDOTGG, WDOTCG, WDOTOE, WDOTFG,         ROCL0430
     1 WDOTFE, WPEST, WOX, VTOX, XNPSHO, PNPSHO, PTOX, QCX, QF, DPJ,          ROCL0440
     2 DPVP, PPOX, DELHOX, DELHFP, PTMAN, D1T, XNF, D2T, TTURBH, DTURB,       ROCL0450
     3 W1T, W2T, W3T, W4T, WTURB, XLTURB                                      ROCL0460
      NAMELIST/OXPUMP/ DIPOX, DTPOX, XL1POX, XL2POX, D3POX, TPOXH,           ROCL0470
     1 XL5POX, W1POX, TERMA, TERMB, TERMC, TERMD, W2POX, W3POX,              ROCL0480
     2 W4POX, W5POX, W6POX, D6POX, W7POX, W8POX, DIPF, W9POX,                ROCL0490
     3 WPOX, XLPOX                                                           ROCL0500
      NAMELIST/FULPMP/ DTPF, DIPF, XL1PF, XL2PF, D3PF, TPF, TERME,            ROCL0510
     1 TERMF, XL5PF, W1PF, TERMG, TERMH, W2PF, W3PF, W4PF, W5PF,              ROCL0520
     2 W6PF, W7PF, W8PF, W9PF, WPF, XLPF, XLTP, DDTE, TDTE, WDTE,            ROCL0530
     3 WGG, WSC, WTP                                                         ROCL0540
      NAMELIST/VANDL/ DLOM, TLOM, WFUEL, VOLFT, XLCFT, XLLOM, ALOM,           ROCL0550
     1 WLOM, DLFM, DLOL, TLOL, ALOL, WLOL, DLFL, TLFL, ALFL, WLFL,           ROCL0560
     2 DLOH, TLOH, ALOH, WLOH, DLFH, TLFH,ALFH, WLFH, DLOGG, ALOGG,          ROCL0570
     3 WLOGG, DLFGG, ALFGG, WLFGG, WVIO, WVIF, WVTO, WVTF, PCTERM,           ROCL0580
     4 WVO, WVF, WVGGO, WVGGF, WLV                                           ROCL0590
      NAMELIST/TANKW1/ TC, THEAD, TERMJ,TERMK, SH, WSH, TERML, TERMM,         ROCL0600
     1 VOLHD, RHOP, WDOTG, DGL, WREG, WSV, WRV, WPSME, XLFS, AFS, WFS,        ROCL0610
     2 XLAS, AAS, WAS, WSTR, WMISC, WSUM, FGGT, RTI, XLC, WVFH, VC,          ROCL0620
     3 VT, WSC, WB, WTANK,XLTANK,XTOTAL,  WGAS, DGT, XLTP, DTURB             ROCL0630
      NAMELIST/TANKW2/ XLTAPP, XLH, RTI, VOLHD, XLC, VT, WGAS, VGT,           ROCL0640
     1 DGT, XLTANK, WSH, WSC, WB,      XLFS, AFS, WFS, XLAS, AAS, WAS,       ROCL0650
     2 VP, WP, WGAS, VGT, DGT, WGT, WDOTG, DGL, WREG, WSV, WRV, WPSME,       ROCL0660
     3 WPS,WTANK,WPROPI, WPRCPS , WVEH, WPOVWO, PMF, XIMF,TCTIMH,TBURNH      ROCL0670
      NAMELIST/TCTPCG/ XLPS, RT, ZBARN2, DEP1, ZBARN1, XLN1, XLN2,            ROCL0680
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     1 ZBARC2, ZBARC1, ZBARJ, ZBARTC, ZBARTP,WOX, WF, XLCOX, XLTOX,      ROCL0690
     2 XLTF, ZPAROS, ZBARMH, WTOS, ZBART, ZBARPS, ZBAROX, ZBARF,        ROCL0700
     3 WOXTNK,WFTANK                                                    ROCL0710
      NAMELIST/VLCG/ ZLOM, ZLOL, ZLFL, ZLOH, ZLFH, ZLOGG, ZLFGG,       ROCL0720
     1 ZLM, ZVFO, ZVFF, ZVIO, ZVIF, ZVTO, ZVTF, ZVO, ZVF, ZVGGO,       ROCL0730
     2 ZVGGF,XMOME,XCGE,XCGF                                           ROCL0740
      NAMELIST/BUG/ XLVEH, XLPAYI, XLTHR, XLTP, XLH, RTI, TC, VOLHD,   ROCL0750
     1 XLC, SH, VT, WGAS, VGT, DGT, XLTANK, XLTAPP,KOUNT,XLTAPR        ROCL0760
      NAMELIST/TOWPR/ TOWDES,TOW,TCWERR,KCNT   ,  FHI,  WVEH           ROCL0770
      NAMELIST/BUG1/ KBUG,IPERF,XISPLO,XISPHI,SISPLO,SISPHI,FLO,FHI,   ROCL0780
     1 FHIS,WDOT,EPSS,EPSR,PCHAMS,PCHLO,PCHX,XISPL,XMRT,EPS,ENGISP     ROCL0790
      NAMELIST/TANK3/ IWTANK, TC,VOLHD,RHOOX,RHOF,TERAC,WSKINP,        ROCL0800
     1 WSKINM,XLMS,WMS,WSUM,FGGT,C1,C2,C3,XLCF, XLCO,VCO,VCF,VTO,VTF,  ROCL0810
     2 WSCF,WBF,WBO,WTO,WTF,WTANK,XLTO,XLTF,XLTANK                     ROCL0820
      NAMELIST/INPUT/XISPTH,XMRT,ETAISP,PCHAMB,FENG,ETACF,PBELL,ISIZ,  ROCL0830
     1C1,C2,C3,C4,C5,C6,C7,C8,XLSTAR,ZT,    WOVAC2,EXS1,WOVAC1,DCASE,  ROCL0840
     2WOVAN1,WOVAN2,RHOOX,PVOX,REH,METAL,        XLVEH,STGW,XLPAYI     ROCL0850
     3,WASURF,WPL,WMISCL,RHOF,ITHR,TOWDES,TRATIO,FDES,FREQ,XOLMIS       ROCL0860
C                                                                       ROCL0870
C                                                                       ROCL0880
      WMS = 0.                                                          ROCL0890
      IF ( IPSM .GT. 0 ) WRITE ( 6, INPUT )                             ROCL0900
C****THRUST CHAMBER COMPUTATIONS***                                     ROCL0910
      IF (TERAC .GT. 1.) TERAC = 1.                                     ROCL0920
      RHZX = RHOOX                                                      ROCL0930
      RHZF = RHOF                                                       ROCL0940
      XXX(65)=XLPAYI                                                    ROCL0950
      IPERF=IPER                                                        ROCL0960
      WDOT=WDXT                                                         ROCL0970
      FREQ=FREQD                                                        ROCL0980
      IF(IPERF.EQ.1) GO TO 12                                           ROCL0990
      PI=3.14159                                                        ROCL1000
      WVEH=STGW                                                         ROCL1010
      XISPTT=XISPTH                                                     ROCL1020
   11 DISPT=ETAISP*XISPTT                                               ROCL1030
      KBUG=6                                                            ROCL1040
      IF(IPSM.GT.0) WRITE(6,BUG1)                                       ROCL1050
      IF(PCHAMB.GT.2000.) PCHAMB=2000.                                  ROCL1060
      IF(PCHAMB.LT.20.) PCHAMB=20.                                      ROCL1070
      XK3=1.0-1.523E-5*PCHAMB                                           ROCL1080
      ENGISP=XK3*DISPT                                                  ROCL1090
      WEST=0.32725*DCASE**3                                             ROCL1100
C*******SET MAXIMUM THRUST*****                                         ROCL1110
      FHI=TOWDES*WEST                                                   ROCL1120
      IF(ITHR.EQ.0) FHI=FDES                                            ROCL1130
      FENG=FHI                                                          ROCL1140
C******SET MINIMUM THRUST******                                         ROCL1150
      FLO=FHI/TRATIO                                                    ROCL1160
      KCNT=0                                                            ROCL1170
   12 CONTINUE                                                          ROCL1180
      IF(IPERF.EQ.0) GO TO 13                                           ROCL1190
      IF(FREQ.LE.FLOS) GO TO 131                                        ROCL1200
      IF(FREQ.GE.FHIS) GO TO 132                                        ROCL1210
      FLO=FREQ                                                          ROCL1220
      FHI=FHIS                                                          ROCL1230
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      PCHAMB=PCHAMS                                                    ROCL1240
      DEXIT=DEXITS                                                     ROCL1250
      PRATIO=FHI/FREQ                                                  ROCL1260
      PCHX=PCHAMS/PRATIO                                               ROCL1270
      FENG=FREQ                                                        ROCL1280
      EPSR=EPSS                                                        ROCL1290
      IF(IPERF.EQ.1) X(1)=PCHX                                         ROCL1300
      X(2)=XMRT                                                        ROCL1310
      X(3)=EPSR                                                        ROCL1320
      NINV(1)=NPCP                                                     ROCL1330
      NINV(2)=NMRP                                                     ROCL1340
      NINV(3)=NEXR                                                     ROCL1350
      CALL FASTS(NVAR,NINV,TABISP(1), X, XISPLO)                       ROCL1360
      DISPLO=ETAISP*XISPLO                                             ROCL1370
      IF(PCHX.LT.20.) PCHX=20.                                         ROCL1380
      XISP = XK3 * DISPLO                                              ROCL1390
      WDOTCR=FREQ/ XISP                                                ROCL1400
      WDOT=WDOTCR                                                      ROCL1410
      KBUG=1                                                           ROCL1420
      IF(IPSM.GT.0) WRITE(6,BUG1)                                      ROCL1430
      RETURN                                                           ROCL1440
  131 FLO=FLOS                                                         ROCL1450
      XISPLO=SISPLO                                                    ROCL1460
      KBUG=2                                                           ROCL1470
      IF(IPSM.GT.0) WRITE(6,BUG1)                                      ROCL1480
      GO TO 985                                                        ROCL1490
  132 FHI=FHIS                                                         ROCL1500
      XISPHI=SISPHI                                                    ROCL1510
      KBUG=3                                                           ROCL1520
      IF(IPSM.GT.0) WRITE(6,BUG1)                                      ROCL1530
      GO TO 986                                                        ROCL1540
   13 CONTINUE                                                         ROCL1550
      KBUG=4                                                           ROCL1560
      IF(IPSM.GT.0) WRITE(6,BUG1)                                      ROCL1570
      FENG=FHI                                                         ROCL1580
      WDOTE=FENG/ENGISP                                                ROCL1590
      WDOTPT=(FENG-WDOTE*61.8)/(DISPT-61.8)                            ROCL1600
      FTHR=WDOTPT*DISPT                                                ROCL1610
      IF(DET.EQ.(DCASE-1.)) GO TO 990                                  ROCL1620
      CSTAR=C1*PCHAMB**C2 - C3*PCHAMB**C4*(ABS(C5*PCHAMB**C6 - XMRT))  ROCL1630
     1**(C7 + PCHAMB*C8)                                               ROCL1640
      CFTT=XISPTT*32.17/CSTAR                                          ROCL1650
      CFDEL=ETACF*CFTT                                                 ROCL1660
      ATHRT=FTHR/(CFDEL*PCHAMB)                                        ROCL1670
      DTHRT=2.0*SQRT(ATHRT/3.14159)                                    ROCL1680
      X(1)=PCHAMB                                                      ROCL1690
      X(2)=XMRT                                                        ROCL1700
      X(3)=XISPTT                                                      ROCL1710
      NVAR=3                                                           ROCL1720
      NINV(1)=NPC                                                      ROCL1730
      NINV(2)=NMR                                                      ROCL1740
      NINV(3)=NISP                                                     ROCL1750
C                                                                      ROCL1760
C     LOCK UP EXPANSION RATIO FOR GIVEN CHAMBER PRESSURE, MIXTURE      ROCL1770
C     RATIO, AND THEORETICAL SPECIFIC IMPULSE                          ROCL1780
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C                                                                       ROCL1790
      CALL FASTS(NVAR,NINV,TABEXR(1),X,EPS)                             ROCL1800
      DET=DTHRT*SQRT(EPS)                                               ROCL1810
      SEXIT=0.25*PI*DET**2                                              ROCL1820
C*******TEST NOZZLE DIA. VS. MISSILE DIA.                               ROCL1830
C******** IF NOZZLE EXIT DIA. IS GREATER THAN MISSILE DIA. SET EXIT     ROCL1840
C         AREA AND FIND THEORETICAL ISP FOR NEW EXPANSION RATIO         ROCL1850
      IF(DET-(DCASE-1.). GT.0.1) GO TO 99                               ROCL1860
      GO TO 990                                                         ROCL1870
   99 DET=DCASE-1.                                                      ROCL1880
      AREEN=0.25*PI*(DCASE-1.)**2                                       ROCL1890
      SEXIT=AREEN                                                       ROCL1900
      EPSR=AREEN/ATHRT                                                  ROCL1910
      X(1)=PCHAMB                                                       ROCL1920
      X(2)=XMRT                                                         ROCL1930
      X(3)=EPSR                                                         ROCL1940
      NVAR=3                                                            ROCL1950
      NINV(1)=NPCP                                                      ROCL1960
      NINV(2)=NMRP                                                      ROCL1970
      NINV(3)=NEXR                                                      ROCL1980
      CALL FASTS(NVAR,NINV,TABISP(1),X,XISPTT)                          ROCL1990
      IF(IPERF.EQ.0) GO TO 11                                           ROCL2000
  990 CONTINUE                                                          ROCL2010
      PCHLO=PCHAMB/TRATIO                                               ROCL2020
      X(1)=PCHLO                                                        ROCL2030
      X(2)=XMRT                                                         ROCL2040
      X(3)=EPS                                                          ROCL2050
      IF(DET.EQ.(DCASE-1.)) X(3)=EPSR                                   ROCL2060
      NINV(1)=NPCP                                                      ROCL2070
      NINV(2)=NMRP                                                      ROCL2080
      NINV(3)=NEXR                                                      ROCL2090
C       LOOK UP LOW THRUST ISP AT MINIMUM CHAMBER PRESSURE AND SELECTED ROCL2100
C       MIXTURE RATIO                                                   ROCL2110
C                                                                       ROCL2120
      CALL FASTS(NVAR,NINV,TABISP(1),X,XISPL)                           ROCL2130
      DISPLO=FTAISP*XISPL                                               ROCL2140
      XISPLO = XK3 * DISPLO                                             ROCL2150
C       SPECIFIC IMPULSE AT MINIMUM THRUST                              ROCL2160
C                                                                       ROCL2170
      WDOTLO=FLO/XISPLO                                                 ROCL2180
      IF(IPERF.EQ.1) GO TO 985                                          ROCL2190
C       SAVE VALUES FOR PERFORMANCE ESTIMATES FOR NEXT PASS(IPERF=1)    ROCL2200
      FLOS=FLO                                                          ROCL2210
      FHIS=FHI                                                          ROCL2220
      PCHAMS=PCHAMB                                                     ROCL2230
      SISPLO=XISPLO                                                     ROCL2240
      SISPHI=ENGISP                                                     ROCL2250
      EPSS=EPS                                                          ROCL2260
      IF(DET.EQ.(DCASE-1.)) EPSS=EPSR                                   ROCL2270
      DEXITS=DET                                                        ROCL2280
      GO TO 104                                                         ROCL2290
  985 CONTINUE                                                          ROCL2300
      WDOT=FLO/XISPLO                                                   ROCL2310
      XISP = XISPLO                                                     ROCL2320
      IF(IPSM.GT.0) WRITE(6,BUG1)                                       ROCL2330
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      RETURN                                                                RDCL2340
  986 CONTINUE                                                              RDCL2350
      WDOT=FHT/XISPHI                                                       RDCL2360
      XISP = XISPHI                                                         RDCL2370
      IF(IPSM.GT.0) WRITE(6,BUG1)                                           RDCL2380
      RETURN                                                                RDCL2390
  987 WDOT=FREQ/XISPLO                                                      RDCL2400
      XISP = XISPLO                                                         RDCL2410
      IF(IPSM.GT.0) WRITE(6,BUG1)                                           RDCL2420
      RETURN                                                                RDCL2430
  104 CONTINUE                                                              RDCL2440
      KBUG=5                                                                RDCL2450
      IF(IPSM.GT.0) WRITE(6,BUG1)                                           RDCL2460
      DTX=DTHRT                                                             RDCL2470
      XK2T=((XLSTAR/DTX+ 0.26061)/(ZT + 0.26061))**0.6667                   RDCL2480
      DCT=DTHRT*SQRT(XK2T)                                                  RDCL2490
      XLJT=0.635*DCT                                                        RDCL2500
      XLC1T=ZT*DCT                                                          RDCL2510
      XLC2T=DTHRT*(SQRT(XK2T)-1.)/1.279                                     RDCL2520
      XLNT=DTHRT*PBELL*(SQRT(EPS)-1.)/53.6                                  RDCL2530
      XLTHR=XLJT + XLC1T + XLC2T + XLNT                                     RDCL2540
      WINJ=0.0136*DCT**3.326                                                RDCL2550
      WC1T=3.14159*DCT*XLC1T*WOVAC1                                         RDCL2560
      WC2T=1.375*WOVAC2*(XK2T-1.)*DTHRT**2                                  RDCL2570
      EPS1=EXS1                                                             RDCL2580
      IF(EPS .LT.15.) EPS1=EPS                                              RDCL2590
      WN1T=2.4734*WOVAN1*(EPS1-1.)*ATHRT                                    RDCL2600
      WN2T=3.14159*WOVAN2*ATHRT*(EPS -EPS1) + 3.1E-9*SQRT(XK2T)*DTHRT       RDCL2610
     1**3*PCHAMB**2.08                                                      RDCL2620
      WTC=WINJ + WC1T + WC2T + WN1T + WN2T                                  RDCL2630
      WNOZ = WC2T + WN1T + WN2T                                             RDCL2640
      IF(IPSM.GT.0) WRITE(6,TCHAMB)                                         RDCL2650
C**** THRUSTER WEIGHT IN LBS. ***                                           RDCL2660
      WDOTOT= WDOTPT*XMRT/(1.0 + XMRT)                                      RDCL2670
      WDOTFT= WDOTPT/(1.0 + XMRT)                                           RDCL2680
      WDOTGG= WDOTE - WDOTPT                                                RDCL2690
      WDOTOG= 0.1*WDOTGG                                                    RDCL2700
      WDOTOE= WDOTOT + WDOTOG                                               RDCL2710
      WDOTFG=0.9*WDOTGG                                                     RDCL2720
      WDOTFE=WDOTFT + WDOTFG                                                RDCL2730
C***ESTIMATE PROPELLANT WEIGHTS FOR OXIDIZER  TANK  CALCULATIONS            RDCL2740
      WPEST= 0.131*DCASE**3                                                 RDCL2750
      WOX=WPEST*XMRT/(1. + XMRT)                                            RDCL2760
      VTOX=WOX/(0.95*RHOOX)                                                 RDCL2770
      XKNPSH=27.0                                                           RDCL2780
      XNPSHO=(VTOX**0.2*XKNPSH/RHOOX**0.526)**1.3333                        RDCL2790
      PNPSHO=XNPSHO*RHOOX/144.                                              RDCL2800
      PVOX=17.2                                                             RDCL2810
      PTOX=PNPSHO + PVOX                                                    RDCL2820
      QOX=WDOTOE/RHOOX                                                      RDCL2830
      PTF=PTOX                                                              RDCL2840
      QF=WDOTFE/RHOF                                                        RDCL2850
      DPJ= 1.05*PCHAMB**0.8  +30.*(FTHR**0.102 - 1.6)                       RDCL2860
      DPVP=42.5/FTHR**0.226                                                 RDCL2870
      DPVEN=100.                                                            RDCL2880
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      PPOX=PCHAMB + DPJ + DPVP + DPVEN + 100.                          ROCL2890
      PPFP=PPOX                                                        ROCL2900
      DELHOX=(PPOX-PTOX)*144./RHOOX                                    ROCL2910
      DELHFP=(PPFP-PTF)*144./RHOF                                      ROCL2920
      PTMAN=PCHAMB-100.                                                ROCL2930
      D1T= 19.141*SQRT(WDOTGG)/SQRT(PTMAN)                             ROCL2940
      XNSF=1300.                                                       ROCL2950
      XNF=(XNSF*DELHFP**0.75)/(21.2*SQRT(QF))                          ROCL2960
      IF(XNF.GT.4E4) XNF=4E4                                           ROCL2970
      UTURBT=1400.                                                     ROCL2980
      D2T=(720.*UTURBT)/(3.14159*XNF)                                  ROCL2990
      TTURBH= PTMAN*D1T*(2.0 + D1T/(D2T- D1T))/1.6E5                   ROCL3000
      IF(TTURBH.LT.0.02) TTURBH=0.02                                   ROCL3010
      DTURB= 0.5*D1T + TTURBH  + D2T                                   ROCL3020
      RHOMTU=0.29                                                      ROCL3030
      W1T=( 86627.* UTURBT* TTURBH*RHOMTU)/(XNF*SQRT(PTMAN))           ROCL3040
      W1T = W1T * SQRT ( WDOTGG )                                      ROCL3050
      W2T= 537410.*UTURBT**2.667*RHOMTU/XNF**2.667                     ROCL3060
      W3T= 165020.*UTURBT*UTURBT*TTURBH*RHOMTU/XNF**2                  ROCL3070
      W4T= 82512.*UTURBT*UTURBT*TTURBH*RHOMTU/XNF**2                   ROCL3080
      WTURB=W1T + W2T + W3T + W4T                                      ROCL3090
      XLTURB= D1T + 0.5*D2T + 3.*TTURBH                                ROCL3100
      IF(IPSM.GT.0) WRITE(6,TPUMP)                                     ROCL3110
      DIPOX=82.42*QOX**0.333/XNF**0.333                                ROCL3120
      DTPOX= 22062.0*SQRT((PPOX-PTOX)/RHOOX)/XNF                       ROCL3130
      IF(DIPOX.GT.0.85*DTPOX) DIPOX=0.85*DTPOX                         ROCL3140
      XL1POX= DIPOX/2.0                                                ROCL3150
      XL2POX= DTPOX/3.0                                                ROCL3160
      D3POX= 529.25*SQRT(QOX/(XNF*DTPOX))                              ROCL3170
      TPOXH= PPOX*D3POX*(2.0 + D3POX/DTPOX)/60000.                     ROCL3180
      TERMA= DTPOX -0.5*DIPOX                                          ROCL3190
      TERMB= DTPOX/3. - (1C8864. * QOX/(XNF * DTPOX**2))               ROCL3200
      XL5POX= SQRT( TERMA*TERMA + TERMB*TERMB)                         ROCL3210
      RHOMP=0.1                                                        ROCL3220
      W1POX=0.2702*RHOMTU*DIPOX *2.667                                 ROCL3230
      TERMC=DTPOX/9. - 21.*QOX/(XNF*DTPOX**2)                          ROCL3240
      TERMD= DTPOX**2 + DTPOX*DIPOX + DIPOX**2                         ROCL3250
      W2POX= 0.4252*PI *                    RHOMTU *(63.* QOX/XNF +    ROCL3260
     1TERMC*TERMD)/DTPOX**0.333                                        ROCL3270
      W3POX= 2.* PI**2*RHOMP*TPOXH*D3POX*(0.5*DTPOX + D3POX/3.)       ROCL3280
      W4POX= 0.5*PI*RHOMP*TPOXH*DTPOX**2                               ROCL3290
      W5POX=PI*TPOXH*RHOMP*(DIPOX**2 + XL5POX*(DIPOX + DTPOX))         ROCL3300
      W6POX= 42.336*PPOX * QOX * RHOMTU / XNF                          ROCL3310
      D6POX=12.*((PPOX*QOX + PPFP*QF)/(600.0*XNF))**0.333              ROCL3320
      W7POX=0.6*PI*RHOMP*DIPOX*DIPOX                                   ROCL3330
      W8POX= 0.5685*PI*RHOMP*DIPOX*DIPOX                               ROCL3340
      DIPF= 82.42*(QF/XNF)**0.333                                      ROCL3350
      W9POX=3.0*PI*DIPF*RHOMP*D6POX*D6POX/16. + 42.34*PPOX * QOX       ROCL3360
     1*RHOMP/XNF                                                       ROCL3370
      WPOX= W1POX + W2POX + W3POX + W4POX + W5POX + W6POX + W7POX      ROCL3380
     1+ W8POX + W9POX                                                  ROCL3390
C                                                                      ROCL3400
C***  OXIDIZER PUMP WEIGHT                                             ROCL3410
C                                                                      ROCL3420
      XLPOX= XL1POX + XL2POX + 3.0*D6POX + TPOXH                       ROCL3430
```

```
      IF(IPSM.GT.0) WRITE(6,OXPUMP)                                     ROCL3440
C                                                                       ROCL3450
C***  OXIDIZER  PUMP LENGTH                                             ROCL3460
C                                                                       ROCL3470
      DTPF= 22062.*SQRT((PPFP - PTMAN)/RHOF)/XNF                        ROCL3480
      XL1PF=0.5*DIPF                                                    ROCL3490
      XL2PF=DTPF/3.                                                     ROCL3500
      D3PF= 529.25*SQRT(QF/(XNF*DTPF))                                  ROCL3510
      TPF= PPFP*D3PF*(2.0 + D3PF/DTPF)/6.E4                             ROCL3520
      TERME= DTPF - DIPF/2.                                             ROCL3530
      TERMF= DTPF/3. - 108864.*QF/(XNF*DTPF*DTPF)                       ROCL3540
      XL5PF=SQRT(TERME**2 + TERMF**2)                                   ROCL3550
      W1PF=0.2702*RHOMTU*DIPF**2.667                                    ROCL3560
      TERMG= DTPF/9. - 21.*QF/(XNF*DTPF)                                ROCL3570
      TERMH=DTPF**2 + DTPF*DIPF + DIPF**2                               ROCL3580
      W2PF=0.4292*PI*                RHOMTU*(0.103*DTPF**2 + TERMG*TERMH)  ROCL3590
     1/DIPF**0.333                                                      ROCL3600
      W3PF=2.0*PI**2*RHOMP*TPF*D3PF*(0.5*DTPF + D3PF/3.)                ROCL3610
      W4PF=0.5*PI*RHOMP*DTPF*DTPF                                       ROCL3620
      W5PF=PI*TPF*RHOMP*((DIPF + DTPF)* XL5PF + DIPF**2)                ROCL3630
      W6PF=42.336*PPFP*QF*RHOMTU/XNF                                    ROCL3640
      W7PF=0.6*PI*RHOMP*DIPF**2                                         ROCL3650
      W8PF=0.5685*PI*RHOMP*DIPF**2                                      ROCL3660
      D6PF=D6POX                                                        ROCL3670
      W9PF=3.*PI*DIPF*RHOMP*D6PF*D6PF + 42.34*PPFP*QF*RHOMP/XNF         ROCL3680
      WPF= W1PF + W2PF + W3PF + W4PF + W5PF + W6PF + W7PF + W8PF + W9PF ROCL3690
C                                                                       ROCL3700
C***  FUEL PUMP WEIGHT                                                  ROCL3710
C                                                                       ROCL3720
      XLPF= XL1PF + XL2PF + 3.*D6POX + TPF                              ROCL3730
      XLTP=1.1*(XLTURB  + XLPOX + XLPF)                                 ROCL3740
C                                                                       ROCL3750
C***  TURBOPUMP LENGTH - IN.                                            ROCL3760
C                                                                       ROCL3770
      DDTE= 1.314*WDOTGG**0.3782                                        ROCL3780
      TDTE=0.020                                                        ROCL3790
      WDTE=0.0058*PI*DDTE*XLTHR                                         ROCL3800
      WGG= 5.55E-4*WDOTE**0.523*PCHAMB**1.27                            ROCL3810
      WSC=3.*WDOTGG                                                     ROCL3820
      WTP= WTURB + WPOX + WPF + WDTE + WGG + WSC                        ROCL3830
C                                                                       ROCL3840
C***  TURBO-PUMP WEIGHT                                                 ROCL3850
      IF(IPSM.GT.0) WRITE(6,FULPMP)                                     ROCL3860
C                                                                       ROCL3870
      DLOM=0.370*WDOTOE**0.3907                                         ROCL3880
      TLOM=DLOM*PTOX/8.E4                                               ROCL3890
      IF(TLOM.LT.0.02)TLOM=0.02                                         ROCL3900
      WFUEL=WPEST-WOX                                                   ROCL3910
      VOLFT=1.05*WFUEL*1728./RHOF                                       ROCL3920
      XLCFT=4.0*VOLFT/(PI*DCASE**2)                                     ROCL3930
      XLLOM=XLCFT                                                       ROCL3940
      ALOM=PI*DLOM                                                      ROCL3950
      WLOM=0.283*TLOM*XLLOM*ALOM                                        ROCL3960
      DLFM=0.4499*WDOTFE**0.375                                         ROCL3970
      DLOM=0.370*WDOTOE**0.3907                                         ROCL3980
```

```
      TLOL=PTOX*DLOL/8.E4                                                    ROCL3990
      IF(TLOL.LT.02) TLOL=0.02                                               ROCL4000
      XLLOL=24.                                                              ROCL4010
      ALOL=PI*DLOL                                                           ROCL4020
      WLOL=0.283*TLOL*XLLOL*ALOL                                             ROCL4030
      DLFL=0.4499*WDOTFE**0.375                                              ROCL4040
      TLFL=DLFL*PTF/8E4                                                      ROCL4050
      IF(TLFL.LT.0.02) TLFL=C.C2                                             ROCL4060
      XLFL=24.                                                               ROCL4070
      ALFL=PI*DLFL                                                           ROCL4080
      WLFL=0.283*TLFL*XLFL*ALFL                                              ROCL4090
      DLOH=0.370*WDOTOE**C.3907                                              ROCL4100
      TLOH=DLOH*PPOX/8E4                                                     ROCL4110
      IF(TLOH.LT.0.02)TLOH=0.02                                              ROCL4120
      XLLOH=24.                                                              ROCL4130
      ALOH=PI*DLOH                                                           ROCL4140
      WLOH=0.283*TLOH*XLLOH*ALOH                                             ROCL4150
      DLFH=0.4499*WDOTFE**0.375                                              ROCL4160
      TLFH=DLFH*PPFP/8E4                                                     ROCL4170
      IF(TLFH.LT.0.02) TLFH=C.C2                                             ROCL4180
      XLLFH=24.                                                              ROCL4190
      ALFH=PI*DLFH                                                           ROCL4200
      WLFH=0.283*TLFH*XLLFH*ALFH                                             ROCL4210
      DLOGG=0.370*WDOTOG**0.397                                              ROCL4220
      TLOGG=TLOH                                                             ROCL4230
      ALOGG=PI*DLOGG                                                         ROCL4240
      XLLOGG=12.                                                             ROCL4250
      WLOGG=0.283* TLOGG * ALOGG * XLLOGG                                    ROCL4260
      DLFGG=0.4499* WDOTFG**0.397                                            ROCL4270
      TLFGG=TLOGG                                                            ROCL4280
      ALFGG=PI*DLFGG                                                         ROCL4290
      XLFGG=12.                                                              ROCL4300
      WLFGG=0.283*TLFGG *  XLFGG * ALFGG                                     ROCL4310
      WLM=10.                                                                ROCL4320
      WVFO=0.282                                                             ROCL4330
      WVFF=0.230                                                             ROCL4340
      WVIO=0.44*DLOM**1.5                                                    ROCL4350
      WVIF=0.36*DLFM**1.5                                                    ROCL4360
      WVTO=1.408 * (PCHAMB/100.)**0.655 * DLOH**1.6                          ROCL4370
      WVTF=1.152 * (PCHAMB/100.)**0.655 * DLFH**1.6                          ROCL4380
      PCTERM=(PCHAMB/100.)**0.655                                            ROCL4390
      WVO=1.76 * PCTERM * DLOH**1.6                                          ROCL4400
      WVF=1.44 * PCTERM * DLFH**1.6                                          ROCL4410
      WVGGO= 1.408 * PCTERM * DLOGG**1.6                                     ROCL4420
      WVGGF= 1.152 * PCTERM * DLFGG**1.6                                     ROCL4430
      WLV = WLOM + WLOL + WLFL + WLOH + WLFH  + WLOGG + WLFGG + WLM          ROCL4440
     1 + WVFO + WVFF + WVIO + WVIF + WVTO + WVTF + WVO  + WVF + WVGGO        ROCL4450
     2 + WVGGF                                                               ROCL4460
      IF(IPSM.GT.0) WRITE(6,VANDL)                                           ROCL4470
C**** COMPUTE TANK WEIGHT---(INPUT WEIGHT OPTION)                            ROCL4480
      DTANK = DCASE * TFRAC                                                  ROCL4490
C****METAL=1, ALUMINUM, SIGMTL=68000 PSI, RHOMTL=0.1 LB/IN3                  ROCL4500
C****METAL=2, TITANIUM, SIGMTL=160000 PSI, RHOMTL=0.167 LB/IN3               ROCL4510
C****METAL=3, STEEL   , SIGMTL=220000 PSI, RHOMTL=0.290 LB/IN3               ROCL4520
      GO TO (40, 50, 60),METAL                                               ROCL4530
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```
   40 SIGMTL=68000.                                                        ROCL4540
      RHOMTL=0.1                                                           ROCL4550
      E=10.47E6                                                            ROCL4560
      GO TO 70                                                             ROCL4570
   50 SIGMTL=160000.                                                       ROCL4580
      RHOMTL=0.167                                                         ROCL4590
      E=15.89E6                                                            ROCL4600
      GO TO 70                                                             ROCL4610
   60 SIGMTL=220000.                                                       ROCL4620
      RHOMTL=0.29                                                          ROCL4630
      E=28.86E6                                                            ROCL4640
   70 TC=2.725*DTANK/E**0.4                                                ROCL4650
      IF (IWTANK .LT. 0) TC = TCWI                                         ROCL4660
      IF (IWTANK .GT. 0) TC = PTOX * 0.5 * DTANK * SAFAC / SIGMTL          ROCL4670
      IF(TC.LT.0.03) TC=0.03                                               ROCL4680
      REH2=REH*REH                                                         ROCL4690
      TERMJ=(REH + SQRT(REH2-1.))/(REH- SQRT(REH2 -1.))                    ROCL4700
      TERMK=0.3925/(REH*SQRT(REH2-1.))                                     ROCL4710
      SH= DTANK**2*( 0.7854 + TERMK*ALOG(TERMJ))                           ROCL4720
      WSH=SH*TC    *RHOMTL                                                 ROCL4730
      TERML=(0.5*DTANK -TC     -0.03)**2                                   ROCL4740
      TERMM=(0.5*DTANK/REH -TC     -0.03)*PI*0.667                         ROCL4750
      XLH=DTANK*0.5/REH                                                    ROCL4760
      VOLHD=TERML*TERMM                                                    ROCL4770
      RHOP=         (1.0 + XMRT)/(XMRT/RHOOX + 1.0/RHOF)/1728.             ROCL4780
      RTI = 0.5 * DTANK - TC - 0.03                                        ROCL4790
      ATI = PI * RTI**2                                                    ROCL4800
      XR = XMRT * RHOF / RHOOX                                             ROCL4810
      VOLHD2 = 2. * VOLHD                                                  ROCL4820
      RHOOX = RHZX / 1728.                                                 ROCL4830
      RHOF = RHZF / 1728.                                                  ROCL4840
      IF (TFRAC .LT.1.) GO TO 4000                                         ROCL4850
      DMISS = DTANK                                                        ROCL4860
      TMISS = TC                                                           ROCL4870
      WSKINP = 0.                                                          ROCL4880
      GO TO 4010                                                           ROCL4890
 4000 DMISS = DCASE                                                        ROCL4900
      TMISS = TSKINI                                                       ROCL4910
      WSKINP = DCASE * PI * TSKINI * RHOMTL                                ROCL4920
 4010 IF(ISIZ.EQ.1) GO TO 5000                                             ROCL4930
      WDOTG=  3.99E-6* PTOX *(3500.0/(3500.0 - PTOX)) * WDCTE/RHOP         ROCL4940
      DGL= 1.236 * WDOTG**0.414                                            ROCL4950
      WREG= 1.5  * DGL**2                                                  ROCL4960
      WFV= 0.5                                                             ROCL4970
      WSV= 0.4 * DGL**1.5                                                  ROCL4980
      WCV= 0.5                                                             ROCL4990
      WRV= 1.5 * DGL**1.6                                                  ROCL5000
      WGL= 1.0                                                             ROCL5010
      WPSMF= WREG + WFV + WSV + 2.0*WCV + 2.0*WRV + WGL                    ROCL5020
C*** PRESSURIZATION SYSTEM MISCELLANEOUS EQUIPMENT WEIGHT***               ROCL5030
      XLFS = 0.5 * DMISS / REH                                             ROCL5040
      AFS = DMISS * PI * XLFS                                              ROCL5050
      WFS = AFS * TMISS * RHOMTL                                           ROCL5060
      XLAS = XLFS + DMISS + 9.                                             ROCL5070
      AAS = PI * DMISS * XLAS                                              ROCL5080
```

```
      WAS = AAS * TMISS * RHOMTL                                        ROCL5090
      WSKINM = PI * DMISS * TMISS * XOLMIS * RHOMTL                     ROCL5100
      WSUM= WPL +WASURF+ WMISCL + WTC + WTP + WLV + WPSMF + WFS + WAS   ROCL5110
      WSUM = WSUM + WSKINM                                              ROCL5120
      IF (ITANK .EQ. 2) GO TO 4020                                      ROCL5130
      FGGT= 3.99E-6*PTOX *(3500.0/(3500.0-PTOX)) * (1.0 + 1.189E6       ROCL5140
     1* RHOMTL/ SIGMTL)                                                 ROCL5150
      XLC=(WVEH - WSUM - 3.0*WSH -(2.0*VOLHD - SH*TC    )*              ROCL5160
     1 (0.952* RHOP + FGGT) - 3.14E-3*SH)/ (PI * RTI**2*                ROCL5170
     2 (0.952* RHOP + FGGT) +1.57E-3*PI*(DTANK - 2.0*TC)                ROCL5180
     3 + 1.05*PI*TC*DTANK*RHOMTL)                                       ROCL5190
      IF(XLC.LE.0.0) GO TO 958                                          ROCL5200
      VC= RTI**2 *PI * XLC                                              ROCL5210
      VT= VC + 2.0*VOLHD -SH*TC                                         ROCL5220
      WSC= 1.05 * PI * TC * DTANK * RHOMTL * XLC                        ROCL5230
      WB= 3.14E-3*SH  + 1.57E-3*(DTANK -2.0*TC)*PI*XLC                  ROCL5240
      WTANK= 3.0*WSH + WSC + WB                                         ROCL5250
      XLTANK=XLC + 2.*XLH                                               ROCL5260
      GO TO 6000                                                        ROCL5270
4020  XLMS = 2. * XLFS + DBT                                            ROCL5280
      AMS = PI * DMISS * XLMS                                           ROCL5290
      WMS = AMS * TMISS * RHOMTL                                        ROCL5300
      WSUM = WSUM + WMS                                                 ROCL5310
      FGGT =3.99E-6*PTOX*3500./(3500.-PTOX)*(1.+1.118E6*RHOMTL/SIGMTL)  ROCL5320
      ZC1 = C1                                                          ROCL5330
      ZC2 = C2                                                          ROCL5340
      ZC3 = C3                                                          ROCL5350
      C2 =  .00075*(DTANK-2.*TC) + 1.05*PI*TC*DTANK*RHOMTL + WSKINP     ROCL5360
      C1 = ATI * (.952 * RHOOX + FGGT) + C2                             ROCL5370
      C2 = ATI * (.952 * RHOF  + FGGT) + C2                             ROCL5380
      C3 = WVEH-WSUM-4.*WSH-VOLHD2*(.952*(RHOOX+RHOF)+2.*FGGT)-.003*SH  ROCL5390
      XLCF =(C3 - C1/ATI * VOLHD2 *(XR-1.))/(C1*XR + C2)                ROCL5400
      XLCO = ((XLCF*ATI + VOLHD2)*XR - VOLHD2) / ATI                    ROCL5410
      XLCOX = XLCO                                                      ROCL5420
      VCO = ATI * XLCO                                                  ROCL5430
      VCF = ATI * XLCF                                                  ROCL5440
      VTO = VCO + VOLHD2                                                ROCL5450
      VTF = VCF + VOLHD2                                                ROCL5460
      VT = VTO + VTF                                                    ROCL5470
      WSCF = 1.05 * PI * TC * DTANK * RHOMTL                            ROCL5480
      WSCO = WSCF * XLCO                                                ROCL5490
      WSCF = WSCF * XLCF                                                ROCL5500
      WBF = .00075*(DTANK - 2.*TC)*PI                                   ROCL5510
      WBO = .0015 * SH + WBF * XLCO                                     ROCL5520
      WBF = .0015 * SH + WBF * XLCF                                     ROCL5530
      WTO = 2. * WSH + WSCO + WBO                                       ROCL5540
      WTF = 2. * WSH + WSCF + WBF                                       ROCL5550
      WTANK = WTO + WTF                                                 ROCL5560
      XLTO = XLCO + 2. * XLH                                            ROCL5570
      XLTF = XLCF + 2. * XLH                                            ROCL5580
      XLTANK = XLTO + XLTF                                              ROCL5590
      IF ( IPSM  .GT.  0  )  WRITE ( 6, TANK3 )                         ROCL5600
      C1 = ZC1                                                          ROCL5610
      C2 = ZC2                                                          ROCL5620
      C3 = ZC3                                                          ROCL5630
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      GO TO 6000                                                        ROCL5640
 5000 CONTINUE                                                          ROCL5650
C*** TANK WEIGHT--LENGTH INPUT OPTION***                                ROCL5660
      XLTAPP=XLVEH          - XLTHR -DTURB -11.0    -  XOLMIS           ROCL5670
      XLH= DTANK*0.5/REH                                                ROCL5680
      VOLHD = 0.6667 * ATI * (XLH - TC - .03)                           ROCL5690
      VOLHD2 = 2.*VOLHD                                                 ROCL5700
      KOUNT=0                                                           ROCL5710
      WSKINM=PI*DMISS*TMISS*XOLMIS*RHOMTL                               ROCL5720
      IF (ITANK .EQ. 1) GO TO 8888                                      ROCL5730
      XLCOX= (((XLTAPP-4.*XLH)*ATI+VOLHD2)*XR - VOLHD2) / (ATI*(1.+XR)) ROCL5740
      XLCF = XLTAPP - XLCOX- 4. * XLH                                   ROCL5750
      HN = 4.                                                           ROCL5760
      XLMS = 2. * XLH + DBT                                             ROCL5770
      AMS = PI * DMISS * XLMS                                           ROCL5780
      WMS = AMS * TMISS * RHOMTL                                        ROCL5790
      WSKINM = PI * DMISS * TMISS * XOLMIS * RHOMTL                     ROCL5800
 5010 XLC = XLCOX+ XLCF                                                 ROCL5810
       VTO = VOLHD2 + ATI * XLCOX                                       ROCL5820
      VTF = VOLHD2 + ATI * XLCF                                         ROCL5830
      VT=VTO + VTF                                                      ROCL5840
      GO TO 5020                                                        ROCL5850
 5015 IF (ITANK .EQ. 1) GO TO 8789                                      ROCL5860
      XLCOX= (((XLTANK-4.*XLH)*ATI+VOLHD2)*XR - VOLHD2) / (ATI*(1.+XR)) ROCL5870
      XLCF = XLTANK - XLCOX- 4. * XLH                                   ROCL5880
      GO TO 5010                                                        ROCL5890
 8888 XLC= XLTAPP - 2.0*XLH                                             ROCL5900
      HN = 3.                                                           ROCL5910
      GO TO 8889                                                        ROCL5920
 8789 XLC=XLTANK-2.*XLH                                                 ROCL5930
      IF(XLC.LE.0.0) GO TO 998                                          ROCL5940
 8889 VT= 2.0*VOLHD + RTI**2 * PI * XLC - SH*TC                         ROCL5950
 5020 WGAS= 3.99E-6 * PTOX * (3500.0/(3500.0 -PTOX))*VT                 ROCL5960
      VGT= 100.0 * WGAS                                                 ROCL5970
      DGT= ( 6.0 * VGT/PI)**0.333                                       ROCL5980
      IF(KOUNT.GT.0) GO TO 8890                                         ROCL5990
      XLTANK=  XLTAPP - DGT                                             ROCL6000
      GO TO 8891                                                        ROCL6010
 8890 XLTANK=XLTAPR-DGT                                                 ROCL6020
 8891 IF(KOUNT.GT.10) GO TO 998                                         ROCL6030
      XLTAPR=XLC + 2.*XLH + DGT                                         ROCL6040
      IF(ITANK.EQ.2) XLTAPR=XLC + 4.*XLH + DGT                          ROCL6050
      IF(IPSM.GT.0) WRITE(6,BUG)                                        ROCL6060
      KOUNT=KOUNT + 1                                                   ROCL6070
      IF(ABS(XLTAPR - XLTAPP).GT.0.5)GO TO 5015                         ROCL6080
      XLTANK=XLTAPP-DGT                                                 ROCL6090
   89 CONTINUE                                                          ROCL6100
      WSH= 1.05 * RHOMTL * TC     * SH                                  ROCL6110
      WSC= 1.05 * PI * TC * DTANK * RHOMTL * XLC                        ROCL6120
      WB= 3.14E-3*SH + 1.57E-3*(DTANK -2.0*TC) *PI * XLC                ROCL6130
      WTANK = HN * WSH + WSC + WB                                       ROCL6140
      XLFS= XLH                                                         ROCL6150
      AFS = PI * DMISS * XLFS                                           ROCL6160
      WFS = AFS * TMISS * RHOMTL                                        ROCL6170
      XLAS = XLFS + DMISS + 9.                                          ROCL6180
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      AAS = PI * DMISS * XLAS                                          ROCL6190
      WAS = AAS * TMISS * RHOMTL                                       ROCL6200
 6000 CONTINUE                                                         ROCL6210
      WGAS= 3.99E-6 * VT * PTOX *(3500.0/(3500.0-PTOX))                ROCL6220
      VGT= 100.0 * WGAS                                                ROCL6230
      DGT=(6.0*VGT/PI)**0.333                                          ROCL6240
      WGT= 1.188E6 * RHOMTL * WGAS/SIGMTL                              ROCL6250
      WDOTG= 3.99E-6 * PTOX *(3500.0/(3500.0 -PTOX))*WDOTE/RHOP        ROCL6260
      DGL= 1.236 * WDOTG**0.414                                        ROCL6270
      WREG=1.5* DGL**2                                                 ROCL6280
      WFV=0.5                                                          ROCL6290
      WSV=0.4 * DGL**1.5                                               ROCL6300
      WCV=0.5                                                          ROCL6310
      WRV= 1.5 * DGL**1.6                                              ROCL6320
      WGL=1.0                                                          ROCL6330
      WPSME= WREG + WFV + WSV + 2.0*WCV + 2.0*WRV + WGL                ROCL6340
      WPS=WGAS + WGT + WPSME                                           ROCL6350
      IF (ITANK .EQ. 2) GO TO 5050                                     ROCL6360
      VP= 0.952 * VT                                                   ROCL6370
      WP=  VP * RHOP                                                   ROCL6380
      WOX= XMRT* WP/(XMRT + 1.)                                        ROCL6390
      GO TO 5055                                                       ROCL6400
 5050 WOX= .952 * VTO * RHOOX                                          ROCL6410
      WF = .952 * VTF * RHOF                                           ROCL6420
      WP = WOX+ WF                                                     ROCL6430
 5055 WPROPI=WTC + WTP + WLV + WTANK + WPS + WAS + WFS + WMISCL        ROCL6440
      WPROPI = WPROPI + WSKINM  + WMS                                  ROCL6450
      WPROPS=WPROPI + WP                                               ROCL6460
      WVEH=WPL + WASURF + WPROPS                                       ROCL6470
      IF(ITHR.EQ.1) GO TO 5060                                         ROCL6480
      TOW=FHI/WVEH                                                     ROCL6490
      GO TO 5065                                                       ROCL6500
 5060 TOW=FHI/WVEH                                                     ROCL6510
      TOWERR=TOWDES-TOW                                                ROCL6520
      IF(ABS(TOWERR).LE.0.1) GO TO 5065                                ROCL6530
 5075 FHI=TOWDES*WVEH                                                  ROCL6540
      FLO=FHI/TRATIO                                                   ROCL6550
      IF(IPSM.GT.0) WRITE(6,TOWPR)                                     ROCL6560
      KCNT=KCNT + 1                                                    ROCL6570
      IF(KCNT.GT.10) GO TO 998                                         ROCL6580
      GO TO 12                                                         ROCL6590
 5065 CONTINUE                                                         ROCL6600
      IF(IPSM.GT.0) WRITE(6,TOWPR)                                     ROCL6610
      WPOVWO = WP/WVEH                                                 ROCL6620
      PMF= WP/ WPROPS                                                  ROCL6630
      XIMF= WPROPI/WPROPS                                              ROCL6640
      TOTIMH=WP*ENGISP                                                 ROCL6650
      TBURNH=TOTIMH/FHI                                                ROCL6660
      TOTIML=WP*XISPLO                                                 ROCL6670
      TBURNL=TOTIML/FLO                                                ROCL6680
      IF(IPSM.GT.0) WRITE(6,TANKW2)                                    ROCL6690
      IF(IPSM.GT.0) WRITE(6,TANKW1)                                    ROCL6700
      IF(IPSM.GT.0) WRITE(6,TANK3)                                     ROCL6710
C*** THRUST CHAMBER  AND TURBOPUMP CENTER OF GRAVITY***                ROCL6720
      IF (ITANK .EQ. 2) GO TO 5031                                     ROCL6730
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      DBTX = 0.                                                          ROCL6740
      GO TO 5032                                                         ROCL6750
 5031 DBTX = DBT                                                         ROCL6760
 5032 XLPS=DGT + XLTANK + DTURB + XLTHR + 11. + DBTX                     ROCL6770
      XLPS = XLPS + XOLMIS                                               ROCL6780
      BTLQ = XLTHR + XLH + DTURB + 9.                                    ROCL6790
      IF(XLTP.GT.DCASE) XLPS=DGT + XLTANK + XLTHR  + XLTP + 11.          ROCL6800
     1      +     XOLMIS + DBTX                                          ROCL6810
      XTOTAL=XLPAYI + XLPS                                               ROCL6820
      RT=0.5*DTHRT                                                       ROCL6830
      XLN1=DTHRT * PBELL *(SQRT(EPS1)-1.)/53.6                           ROCL6840
      DEXIT=DET                                                          ROCL6850
      XLN2=XLNT - XLN1                                                   ROCL6860
      ZBARN2 = XLPS -(XLN2/3.0)*((3.8148*RT + DEXIT)/(1.9074*RT +DEXIT))ROCL6870
      DEP1= SQRT(EPS1)*DTHRT                                             ROCL6880
      ZBARN1=  XLPS - XLN2 -(XLN1/3.)*(( 3.8148*RT  + DEP1)/(1.9074      ROCL6890
     1*RT + DEP1))                                                       ROCL6900
      ZBARC2= XLPS- XLN2 - XLN1 - XLC2T*( 1.0 - 0.3333* (3.37*RT + DCT) ROCL6910
     1 /(1.685*RT + DCT))                                                ROCL6920
      ZBARC1= XLPS - XLN2 - XLN1 - XLC2T - 0.5*XLC1T                     ROCL6930
      ZBARJ= DGT + XLTANK + DTURB  + XLJT*0.5 + 11.                      ROCL6940
      UMTY = ZBARC1 * WC1T                                               ROCL6950
      ZBARTC = (ZBARN2*WN2T + ZBARN1*WN1T + ZBARC2*WC2T    + UMTY        ROCL6960
     1 + ZBARJ*WINJ)/WTC                                                 ROCL6970
      ZBARTP= 0.5*DTURB + XLTANK + DGT + 7.                              ROCL6980
      WF=   WP- WOX                                                      ROCL6990
      IF (ITANK .EQ. 2) GO TO 5030                                       ROCL7000
      XLCOX=(       WOX/(0.95*RHOOX) - 2.*VOLHD)/(PI*RTI**2)             ROCL7010
      XLTOX= XLCOX + XLH                                                 ROCL7020
      XLTF= XLTANK - XLTOX                                               ROCL7030
      GO TO 5035                                                         ROCL7040
 5030 XLTF = XLCF + 2. * XLH                                             ROCL7050
      XLTOX = XLCOX + 2. * XLH                                           ROCL7060
 5035 ZBAROS= 0.5*XLTANK +DGT + 2.                                       ROCL7070
      ZBARMH= 0.25*DTANK/REH - 0.25*TC     + XLTOX  + DGT + 2.           ROCL7080
      WTOS=WTANK-WSH                                                     ROCL7090
      ZBART=(WTOS*ZBAROS  + WSH* ZBARMH)/WTANK                           ROCL7100
      ZBARPS= 0.5*DGT                                                    ROCL7110
      ZBAROX= 0.5*XLTOX + DGT + 2.                                       ROCL7120
      ZBARF = 0.5*XLTF + 0.25*DTANK/REH + XLTOX + DGT + 2. + DBTX        ROCL7130
      WOXTNK=1.05*PI*DTANK*RHOMTL*XLCOX*TC + 2.*WSH                      ROCL7140
      WFTANK=WTANK-WOXTNK                                                ROCL7150
      IF ( IPSM  .GT.  0  )  WRITE ( 6, TCTPCG )                         ROCL7160
      ZLOM=DGT + 2. + XLTOX + 0.5*XLTF                                   ROCL7170
      ZLOL=XLPS - XLTHR -4.0 - DTURB                                     ROCL7180
      ZLFL= ZLOL                                                         ROCL7190
      ZLOH= XLPS - 0.5*(XLTHR-6.)                                        ROCL7200
      ZLFH=XLPS -XLTHR -4.                                               ROCL7210
      ZLOGG = ZLFH                                                       ROCL7220
      ZLFGG=ZLOGG                                                        ROCL7230
      ZLM=ZLOGG                                                          ROCL7240
      ZVFO= XLPS - XLTHR - DTURB -2.                                     ROCL7250
      ZVFF=ZVFO                                                          ROCL7260
      ZVIO=XLPS - XLTHR - XLTURB -8.                                     ROCL7270
      ZVIF=ZVIO                                                          ROCL7280
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      ZVTO=XLPS - XLTHP                                                    RDCL7290
      ZVTF= ZVTO                                                           RDCL7300
      ZVO=XLPS - XLTHP -2.                                                 RDCL7310
      ZVF=ZVO                                                              RDCL7320
      ZVGGO=XLPS - XLTHP -2.                                               RDCL7330
      ZVGGF= ZVGGO                                                         RDCL7340
      ZBARMS = DGT + 2. + XLTANK + .5 * XOLMIS                             RDCL7350
      XMOME=ZBARTC*WTC + ZBARTP*WTP + ZBART*WTANK + ZBARPS*WPS             RDCL7360
     1 + ZLCM*WLCM + ZLCL*WLCL + ZLFL*WLFL + ZLCH*WLCH + ZLFH*WLFH         RDCL7370
     2 + ZLCGG*WLCGG + ZLFGG*WLFGG + ZLM*WLM + ZVFO*WVFO +                 RDCL7380
     3 ZVFF*WVFF + ZVIO*WVIO + ZVIF*WVIF + ZVTO*WVTO + ZVTF*WVTF           RDCL7390
     4 + ZVO*WVO + ZVF*WVF + ZVGGO*WVGGO + ZVGGF*WVGGF                     RDCL7400
     5 + ZBARMS*WMISCL              + ZBARMS * WSKINM                     RDCL7410
      XMOMLV=XMOME-(ZBARTC*WTC + ZBARTP*WTP + ZBART*WTANK + ZBARPS*WPS)    RDCL7420
      XCGLV=XMOMLV/WLV                                                     RDCL7430
      XCGF=XMOME/WPROPI                                                    RDCL7440
      XCGF=(XMOME + ZBAROX*WOX + ZBARF*WF)/WPROPS                          RDCL7450
      XXLPS = XLPS                                                         RDCL7460
      IF ( IPSM  .EQ.  0  ) GO TO 999                                      RDCL7470
      IF(IPSM.GT.0) WRITE(6,VLCG)                                          RDCL7480
      CALL PAGE                                                            RDCL7490
      WRITE(6,6110)                                                        RDCL7500
 6110 FORMAT(//10X,31HLIQUID ROCKET DESIGN PARAMETERS  )                   RDCL7510
      IF(ISIZ.LE.1) GO TO 6001                                             RDCL7520
 5900 FORMAT(/9X,14HTANK DIAMETER=,F5.2,4H IN.,4X,19HWEIGHT INPUT OPTION RDCL7530
     1,3X,15HVEHICLE WEIGHT=,F10.3,4H LB. )                                RDCL7540
      GO TO 6022                                                           RDCL7550
 6001 CONTINUE                                                             RDCL7560
 5800 FORMAT(/9X,14HTANK DIAMETER=,F5.2,4H IN.,4X,19HLENGTH INPUT OPTION RDCL7570
     1,3X,15HVEHICLE LENGTH=,F10.3,4H IN. )                                RDCL7580
 6022 IF(ITHR.NE.0) GO TO 6050                                             RDCL7590
 6080 FORMAT(/9X,20HDESIGN THRUST TO WEIGHT RATIO=,F6.2,5X,15HTHROTTLE RRDCL7600
     1ATIO=,F6.2)                                                          RDCL7610
      GO TO 6002                                                           RDCL7620
 6050 WRITE(6,6090)FDES,TOW                                                RDCL7630
 6090 FORMAT(/9X,14HDESIGN THRUST=,F10.2,4H LBF,4X,23HTHRUST TO WEIGHT RRDCL7640
     1ATIO=,F6.2)                                                          RDCL7650
 6002 WRITE(6,6100)                                                        RDCL7660
 6100 FORMAT(/3X,51HCOMPONENT  DIA-IN.  LT-IN.     WT-LB.      CG LOC-IN.)RDCL7670
      WRITE(6,6200)DGT,XLCLT,WCLT,ZBARCL                                   RDCL7680
 6200 FORMAT(/3X,10HTHR CYL.  ,F6.2,4X,F6.2,3X,F8.2,5X,F6.2)               RDCL7690
      WRITE(6,6300)DCT,XLTHP,WTC,ZBARTC                                    RDCL7700
 6300 FORMAT(/     4X,9HTHRUSTER ,F6.2,4X,F6.2,3X,F8.2,5X,F6.2)           RDCL7710
      WRITE(6,6400)DTURP,XLTP,WTP,ZBARTP                                   RDCL7720
 6400 FORMAT(/4X,9HTURBO-PP ,F6.2,4X,F6.2,3X,F8.2,5X,F6.2)                 RDCL7730
      WRITE(6,6500)WLV,XCGLV                                               RDCL7740
 6500 FORMAT(/4X,9HPLUMBING ,19X,F8.2,5X,F6.2)                             RDCL7750
      WRITE(6,6600)DTANK,XLTANK,WTANK,ZBART                                RDCL7760
 6600 FORMAT(/4X,9HTANKAGE  ,F6.2,4X,F6.2,3X,F8.2,5X,F6.2)                 RDCL7770
      WRITE(6,6700)DGT,DGT,WPS,ZBARPS                                      RDCL7780
 6700 FORMAT(/4X,9HPRESS SY ,F6.2,4X,F6.2,3X,F8.2,5X,F6.2)                 RDCL7790
      WRITE(6,6800)DTANK,XLTOX,WOXTNK,ZBAROX                               RDCL7800
 6800 FORMAT(/4X,9HOX TANK  ,F6.2,4X,F6.2,3X,F8.2,5X,F6.2)                 RDCL7810
      WRITE(6,6900)DTANK,XLTF,WFTANK,ZBARF                                 RDCL7820
 6900 FORMAT(/4X,9HFUEL TANK,F6.2,4X,F6.2,3X,F8.2,5X,F6.2)                 RDCL7830
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      WRITE(6,7000)DTANK,XLTOX,WOX,ZBARCX                                ROCL7840
 7000 FORMAT(/4X,9HOXIDIZER ,F6.2,4X,F6.2,3X,F8.2,5X,F6.2)               ROCL7850
      WRITE(6,7100)DTANK,XLTF,WF,ZBARF                                   ROCL7860
 7100 FORMAT(/4X,9HFUEL     ,F6.2,4X,F6.2,3X,F8.2,5X,F6.2)               ROCL7870
      WRITE(6,7200) DCASE,XOLMIS,WMISCL,ZBARMS                           ROCL7880
 7200 FORMAT(/4X,9HMISC     ,F6.2,F10.2,2F11.2)                          ROCL7890
      WRITE(6,7300)DCASE,XLPS,WPROPI,XCGE                                ROCL7900
 7300 FORMAT(/4X,9HENGINE   ,F6.2,4X,F6.2,3X,F8.2,5X,F6.2)               ROCL7910
      WRITE(6,7400)DCASE,XTOTAL,WVEH                                     ROCL7920
 7400 FORMAT(/4X,9HVEHICLE  ,F6.2,4X,F6.2,3X,F8.2)                       ROCL7930
      WRITE(6,7600)                                                      ROCL7940
 7600 FORMAT(//40X,36HLIQUID ROCKET PERFORMANCE PARAMETERS  )            ROCL7950
      WRITE(6,7700)                                                      ROCL7960
 7700 FORMAT(/3X,89HMAX THR   MIN THR   ISPMAX   ISPMIN   PCMAX   PCMIN ROCL7970
     1  ITOTMAX    ITOTMIN   TBMAX   TBMIN   )                           ROCL7980
      WRITE(6,7800)FHI,FLO,ENGISP,XISPLO,PCHAMB,PCHLO,TOTIMH,TOTIML,     ROCL7990
     1TBURNH,TBURNL                                                      ROCL8000
 7800 FORMAT(2X,F8.2,2X,F8.2,3X,F6.2,3X,F6.2,2X,F7.2,1X,F7.2,1X,F10.2,   ROCL8010
     1  2XF10.2, 2X,F6.2, 2X,F8.2 )                                     ROCL8020
      GO TO 999                                                          ROCL8030
  998 KFAIL=1                                                            ROCL8040
      WRITE(6,7500)                                                      ROCL8050
 7500 FORMAT(//40X,42HCYLINDER LENGTH EQUAL TO OR LESS THAN ZERO    )    ROCL8060
  999 CONTINUE                                                           ROCL8070
      WFX=WF                                                             ROCL8080
      WPX=WP                                                             ROCL8090
      WTPX=WTP                                                           ROCL8100
      METALX=METAL                                                       ROCL8110
      FMAX=FHI                                                           ROCL8120
      WT=WOXTNK + WFTANK                                                 ROCL8130
      WO = WOX                                                           ROCL8140
      WSC = 3. * WDOTGG                                                  ROCL8150
      WSECT = WSKINP * XLTANK                                            ROCL8160
      FHIS=FHI                                                           ROCL8170
      RHOOX = RHZX                                                       ROCL8180
      RHOF = RHZF                                                        ROCL8190
      RETURN                                                             ROCL8200
      END                                                                ROCL8210


      SUBROUTINE EXBOO(APE2,PL,MP,MPMF,LT,SGWT,KFAIL)                    EXB00010
C     COMPUTE EXTERNAL BOOSTERS FOR LIQ/SOL/TJ.....WT OPTION ONLY.....   EXB00020
      REAL NOZWTX,MPX                                                    EXB00030
      COMMON /COMVLS/ COM(51)                                            EXB00040
      EQUIVALENCE (COM(16),WMC),                                         EXB00050
     1 (COM(17),VBI),                                                    EXB00060
     2 (COM(18),DTHRT),                                                  EXB00070
     3 (COM(19),RNOZI),                                                  EXB00080
     4 (COM(20),NOZWTX),                                                 EXB00090
     5 (COM(21),MPX    ),                                                EXB00100
     6 (COM(22),CASEMX),                                                 EXB00110
     7 (COM(32),WM)                                                      EXB00120
C                                                                        EXB00130
      COMMON /BESYET/ FACTOR, BES14(14)                                  EXB00140
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      COMMON /PRINTR/ IPSM, IPOL6(6)                                    EXB00150
      EQUIVALENCE ( IPSM, IPRINP, NOUT )                                EXB00160
      COMMON /TOVPER/ BCOWP,BISPV,BTHVAC,BEXIT,SUSWP,SEXIT,BCANTA,      EXB00170
     1    WTINIT,DROPST,DROPEB,KIZ,ZA4(4),EXTRA(57)                     EXB00180
      COMMON /MATTYP/ IB(3)                                             EXB00190
      COMMON/ARRAY/ F,PC,PAP,CF,CFB,ISP,TB                              EXB00200
      COMMON /GOBOL/ WARD (78)                                          EXB00210
      COMMON  /CODEBT/ IFIRST,JRJ,J                                     EXB00220
      COMMON  /INSERT/ WG,WA,WTB,WC,WTI,DELA,PE,X1,XG,XI,WRN,EPSC,      EXB00230
     1          A6A3,A5A3,Y1,RC,     AT,XRN,TIEC,RE,RECHK,PI,CFVA,     TTH,EXB00240
     1 THED,ICG,X3,Z1,XA,LN,TAH,NOZWT,ISPV                              EXB00250
       REAL   ISP,N1,N2,N3,N4,          N9,N10,N11,N13,          N21,N22,N23EXB00260
     1       ,N24,                  N30,N33,N34,N35,N36,N37,N38,N39,N40,  EXB00270
     2       N77,N78,N79,N80,N81,N82,N83,N84,N85,N114,N115,N117,        EXB00280
     3       N119,N120,N121,LN,LT,   LCYL,MPEH,MPAH,MPCYL,MP,MPA,MEMSTR,EXB00290
     4       INSUL,LINER,IBOSS,NBOSS,ML,IGNITR,MEMSTC,MEMSTA,INSULA,    EXB00300
     5       INSRRG,NOZWT, ME, MB, MOC, MMF,MPMF,ITOT, IMPWT,ISPV       EXB00310
      COMMON  /NOZMP/ DZ1(28),ZNOZ,XINOZ                                EXB00320
      EQUIVALENCE                                                       EXB00330
     1(WARD( 1),D      ),(WARD( 3),FJ     ),(WARD( 4),PA     ),        EXB00340
     2(WARD( 5),F1     ),(WARD( 6),PBELL  ),(WARD( 7),PHI    ),        EXB00350
     3(WARD( 8),GAM    ),(WARD( 9),RHOP   ),(WARD(11),CSTAR  ),        EXB00360
     4(WARD(12),PCM    ),(WARD(13),FSYLD  ),(WARD(14),FSULT  ),        EXB00370
     5(WARD(15),TMIN   ),(WARD(16),TCASEF),(WARD(17),BEXX   ),        EXB00380
     6(WARD(18),CASEM  ),(WARD(19),DM     ),(WARD(20),FTAX   ),        EXB00390
     7(WARD(21),DLFS   ),(WARD(23),N1     ),(WARD(24),N2     ),        EXB00400
     8(WARD(25),N3     ),(WARD(26),N4     ),(WARD(27),N114   ),        EXB00410
     9(WARD(28),NS     ),(WARD(29),N10    ),(WARD(30),N11    ),        EXB00420
     X(WARD(31),N13    ),(WARD(32),VREH   ),(WARD(33),N34    )         EXB00430
      EQUIVALENCE                                                       EXB00440
     1(WARD(34),N35    ),(WARD(35),N36    ),(WARD(36),N37    ),        EXB00450
     2(WARD(37),N38    ),(WARD(38),N39    ),(WARD(39),N40    ),        EXB00460
     3(WARD(40),GMAX   ),(WARD(41),N22    ),(WARD(42),N23    ),        EXB00470
     4(WARD(43),N24    ),(WARD(44),N33    ),(WARD(45),N115   ),        EXB00480
     5(WARD(46),N117   ),(WARD(47),EMPAH  ),(WARD(48),N30    ),        EXB00490
     6(WARD(49),N21    ),(WARD(50),N77    ),(WARD(51),N78    ),        EXB00500
     7(WARD(52),N79    ),(WARD(53),N80    ),(WARD(54),N81    ),        EXB00510
     8(WARD(55),N82    ),(WARD(56),N83    ),(WARD(57),N84    ),        EXB00520
     9(WARD(58),N85    ),(WARD(59),N121   ),(WARD(61),EPI    ),        EXB00530
     X(WARD(62),PSUB   ),(WARD(63),RHC    )                           EXB00540
      NAMELIST /BADRUN/ A5A3,A6A3,     MOC,    ME,MPCYL,MPAH,MPEH,ISPV,  EXB00550
     1NOZWT,FIMOC,FIMO,DELVR,SDVI,LCYL,AT,LOOP1,LOOP2                   EXB00560
      NAMELIST /BUGBOO/ FACTOR,A,B, WARD                                EXB00570
   12  FORMAT (///10X17HPROBLEM STOP NO.  I2,15H HAS OCCURRED.    )     EXB00580
      AEAT = WARD(10)                                                   EXB00590
      TTH= WARD(22)*.0174532 9                                          EXB00600
C                                                                       EXB00610
      PI = 3.141593                                                     EXB00620
      TIEC = 0.                                                         EXB00630
      IEX = 1                                                           EXB00640
      J = -1                                                            EXB00650
      IFIRST = 1                                                        EXB00660
      BETA = BEXX * .01745329                                           EXB00670
      ML=PL/FACTOR                                                      EXB00680
      EXTWT = 0.                                                        EXB00690
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      TR = 5.                                                          EXB00700
      IF(IFIRST.LT.1) GO TO 660                                        EXB00710
      PSUB = 1.0                                                       EXB00720
      IF ( IPRINP .LE. 1 ) GO TO 660                                   EXB00730
      IF(IEX.GT.0)WRITE(6,301)                                         EXB00740
  301 FORMAT(17H EXTERNAL BOOSTER)                                     EXB00750
      WRITE(6,652)          APE2,ML,A6Z3,A5Z3,PA                       EXB00760
  652 FORMAT(//35H          VALUES OF BOOST CALL LIST    / 3X,         EXB00770
     1                     61H  DELTA V     PAYLOAD     A6A3      A5A3 EXB00780
     1P AMB                                                            EXB00790
     2         /  3X,         2F10.3,3F10.5,F10.2/)                    EXB00800
      IF(J) 653,654,653                                                EXB00810
  653 WRITE (6,655)                                                    EXB00820
  655 FORMAT(10X23H THRUST TO WEIGHT INPUT /)                          EXB00830
      GO TO 660                                                        EXB00840
  654 WRITE (6,657)                                                    EXB00850
  657 FORMAT(10X13H THRUST INPUT  /)                                   EXB00860
  660 IND=0                                                            EXB00870
      PC = WARD(2)                                                     EXB00880
      DELVR = APE2                                                     EXB00890
      PAP = PA                                                         EXB00900
      IF(PAP .LE. 0) PAP = .0001                                       EXB00910
 6001 PI=3.141593                                                      EXB00920
      ISP = CSTAR*1.5/32.174                                           EXB00930
       WRATL =DELVR/ISP   /32.174                                      EXB00940
        WRAT= 2.71828**WRATL                                           EXB00950
       MP=(WRAT*ML-ML)/(1.2-.2*WRAT)                                   EXB00960
       IF (J) 2200,2202,2200                                           EXB00970
 2202 F = F1                                                           EXB00980
       GO TO 2201                                                      EXB00990
 2200 F = (1.2 * MP+ML)*F1                                             EXB01000
 2201 TR = MP*ISP/F                                                    EXB01010
       IF ( GAM -1.0) 30, 30, 35                                       EXB01020
   30  IND = 2                                                         EXB01030
      IF ( IPRINP .GT. 0 ) WRITE ( 6,9002) GAM                         EXB01040
 9002 FORMAT(42H GAMMA LESS THAN 1 NOT PERMITTED. GAMMA = ,E16.6)      EXB01050
       GO TO 22                                                        EXB01060
C      TEST  TO  DETERMINE IF F    IS INPUT OR TO BE FOUND BY ITERATION EXB01070
   35  IF  (J)  100,95,100                                            EXB01080
   95 F = F1                                                          EXB01090
       GO TO 103                                                       EXB01100
  100  FIMO = F1                                                       EXB01110
  103  LOOP2 = 1                                                       EXB01120
       KKK=0                                                           EXB01130
      ICG = 0                                                          EXB01140
      FLAMBD=.5*(1.+COS(PHI))                                          EXB01150
      TKEXIT = .25                                                     EXB01160
      DI =DM-2.*TKEXIT                                                 EXB01170
       EPSC = N23                                                      EXB01180
      AMAX =(DI/2.)**2*PI                                              EXB01190
      PP= PC*FSYLD                                                     EXB01200
      MCASE= IFIX(CASEM+.1)                                            EXB01210
      CALL MATLS(MCASE,TCASEF,RHO,FTU,FTY,IND)                         EXB01220
      IF(IND .NE. 0 ) GO TO 135                                        EXB01230
      TCYLU =FSULT*PC *D /(FTU*2.)                                     EXB01240
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C                                                                       EXB01250
      TCYLY =FSYLD*PC *D /(FTY*2.)                                      EXB01260
      TCYLT =AMAX1(TCYLU,TCYLY)                                         EXB01270
      TC    = AMAX1(TCYLT,TMIN )                                        EXB01280
      A=PI*( D/2. - TC - N117 ) **2                                     EXB01281
      TAHU  =FSULT*PC *N23*D/FTU/4.                                     EXB01290
      TAHY  =FSYLD*PC *N23*D/FTY/4.                                     EXB01300
      TAHT  =AMAX1(TAHU,TAHY)                                           EXB01310
      TAH   =AMAX1(TAHT,TMIN )                                          EXB01320
      IF (N2.EQ. N23) GO TO 136                                         EXB01330
      TEHU  =FSULT*PC *N2 *D/FTU/4.                                     EXB01340
      TEHY  =FSYLD*PC *N2 *D/FTY/4.                                     EXB01350
      TEHT  =AMAX1(TEHU,TEHY)                                           EXB01360
      TEH   =AMAX1(TEHT,TMIN )                                          EXB01370
      GO TO 142                                                         EXB01380
  136 TEH = TAH                                                         EXB01390
  142  LOOP1 = 1                                                        EXB01400
 1427 CONTINUE                                                          EXB01410
      PEPC = PA/PC                                                      EXB01420
      EPS=((GAM+1.)/2.)**(1./(GAM-1.))*(PEPC )**(1./GAM) *             EXB01430
     1 SQRT ((GAM+1.)/(GAM-1.)*(1. - (PEPC )**((GAM-1.)/GAM)))          EXB01440
      EPI = 1./EPS                                                      EXB01450
      CFV = FLAMBD * SQRT(2.*GAM**2/(GAM-1.)*(2./(GAM+1.))**((GAM+1.)/  EXB01460
     1(GAM-1.)) * (1.-PEPC**((GAM-1.)/GAM))) +PEPC*EPI                  EXB01470
      JK = 0                                                            EXB01480
      R3 = D/2.0                                                        EXB01490
      IF (EPI .LT. 2.5) GO TO 308                                       EXB01500
      CF =(CFV -PA/PC*EPI)*EJ                                           EXB01510
      EPOLD = EPI                                                       EXB01520
      ISP= CSTAR*CF/32.174                                              EXB01530
      AT = F/PC/CF                                                      EXB01540
      AEXIT=EPI*AT                                                      EXB01550
      RE = SQRT (AEXIT/PI)                                              EXB01560
      RT = SQRT (AT/PI)*(1. - 0.4*(1./COS(PHI) -1.))                    EXB01570
      EXLT =(RE-RT)/TAN(PHI)                                            EXB01580
      DELR = EXLT* TAN(BETA)                                            EXB01590
      REF  = (RE+DELR)*COS(BETA)                                        EXB01600
      AEFF =REF**2*PI                                                   EXB01610
      IF(AEFF .GT. AMAX*1.001) GO TO 302                                EXB01620
  312 NBOSS = N77 * PP * D*N23*AT                                       EXB01630
      STHRSL= N78 * PP * AT**1.5                                        EXB01640
      XCONE = N79 * PP * AT**1.5*(EPI-2.5)/ SIN(PHI)                    EXB01650
      INSRRG= N80 * (EPI*AT) **.5                                       EXB01660
      THININ= N81 * AT **.9                                             EXB01670
      SUM   = PC**N83*TB**N84                                           EXB01680
      XINSUL = N82*AT*(EPI-2.5)/SIN(PHI)*FSYLD**N83*SUM                 EXB01690
     1 *(CSTAR/32.174)**N85                                             EXB01700
      NOZWT = NBOSS + STHRSL + XCONE + INSRRG + THININ + XINSUL         EXB01710
      ZNERNG = 0.                                                       EXB01720
      RTH= SQRT(AT/PI)                                                  EXB01730
      DN = SQRT(AT*N24/PI)                                              EXB01740
      IF( DN .GE. R3) DN = .8*R3                                        EXB01750
      EY = DN - SQRT(AT/PI)                                             EXB01760
      EYS = EY**2                                                       EXB01770
      IF (EYS .GT. AT) EYS = AT - 1.0                                   EXB01780
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```
      X1 = SQRT(AT-EYS)                                                 EXB01790
      Z1 = SQRT((R3**2 -DN**2)/N23**2)                                  EXB01800
      X2 = EXLT*COS(BETA) + (RE + TKEXIT)*SIN(BETA)                     EXB01810
      XRN = X1 + Z1+X2*PBELL                                            EXB01820
      GO TO 144                                                         EXB01830
  308  IND = 9                                                          EXB01840
      GO TO 307                                                         EXB01850
  304  IND = 10                                                         EXB01860
  307 IF ( IPRINP .GT. 0 ) WRITE(6,305) AMAX,AEXIT,AT,EPI               EXB01870
  305 FORMAT(28H ERROR CALCULATING EXIT AREA /2X,4E20.6)                EXB01880
      GO TO 22                                                          EXB01890
  302 RMAX =DI/2.                                                       EXB01900
      AA = RMAX/ COS(BETA)                                              EXB01910
      XX = (RMAX-RT/COS(BETA)) /TAN(PHI + BETA)                         EXB01920
      YY = XX*TAN(BETA)                                                 EXB01930
      CLNX = XX + RMAX*TAN(BETA)                                        EXB01940
      DELR = CLNX*YY/XX                                                 EXB01950
      RE = AA- DELR-TKEXIT                                              EXB01960
      AEXIT= RE*RE*PI                                                   EXB01970
  303 JK = JK + 1                                                       EXB01980
      IF (JK .GT.30) GO TO 304                                          EXB01990
      EPI = AEXIT/AT                                                    EXB02000
      IF (EPI .LT. 2.5) GO TO 308                                       EXB02010
      IF ( ABS(EPOLD/EPI -1.0).LT. .001) GO TO 311                      EXB02020
      EPOLD = EPI                                                       EXB02030
      CALL NOZEX(GAM,EPI,PHI,PEPC,CFV,IND)                              EXB02040
      PE = PEPC*PC                                                      EXB02050
      IF(IND.NE.0) GO TO 9023                                           EXB02060
      GO TO 303                                                         EXB02070
  311 RT = SQRT (AT/PI)*(1. - 0.4*(1./COS(PHI) -1.))                    EXB02080
      XX = (RMAX-RT/COS(BETA)) /TAN(PHI + BETA)                         EXB02090
      YY = XX*TAN(BETA)                                                 EXB02100
      CLNX = XX + RMAX*TAN(BETA)                                        EXB02110
      DELR = CLNX*YY/XX                                                 EXB02120
      ISP= CSTAR*CF/32.174                                              EXB02130
      EXLT = CLNX                                                       EXB02140
      GO TO 312                                                         EXB02150
  143 CONTINUE                                                          EXB02160
  144 AGX = PI*(.5*D-TC-N117)**2                                        EXB02170
       AFAT = WARD(10)                                                  EXB02180
      APAT = (1.-ETAX)*AGX/AT                                           EXB02190
      IF (APAT.GT.AFAT) AFAT = APAT                                     EXB02200
C MASS OF PROPELLANT FWD HEAD                                           EXB02210
       MPFH = RHOP *(  2.09*( D*.5-TFH-N114)**2 *(.5*D/N2-TFH -N114) -  EXB02220
     1       .5*AFAT*AT*D/N2) - RHOP*VRFH                               EXB02230
C MASS OF PROPELLANT AFT HEAD                                           EXB02240
      MPAH1=RHOP*(2.09*(D*.5-TAH-N115)**2*(.5*D/N23-TAH-N115))          EXB02250
      MPAH = (MPAH1-RHOP*AFAT*AT*(.5*D/N23-TAH-N115))*FMPAH             EXB02260
      A = PI*(D/2.-TC-N117)**2                                          EXB02270
C MASS OF PROPELLANT CYLINDER                                           EXB02280
       MPCYL =MP-MPFH-MPAH                                              EXB02290
       IF(MPCYL) 2001,2002,2002                                         EXB02300
 2001  MPCYL =0.                                                        EXB02310
       KKK=KKK+1                                                        EXB02320
 2002  LCYL=MPCYL/(RHOP*(A-AFAT*AT))                                    EXB02330
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```
      TB = MP*ISP/F                                                    EXB02340
C                     FORWARD HEAD WEIGHTS                           EXB02350
      IF (N2-1.) 180,175,180                                           EXB02360
  175 MEMSTR =    N1*RHO* TFH *(PI*D*D/2.-N3*AT)                       EXB02370
      INSUL = N4*N114*1.5708*(D-2.*TFH)**2                             EXB02380
      GO TO 185                                                        EXB02390
  180 SAY1 = SQRT (1.-1./(N2**2 ) )                                    EXB02400
      SAY = ALOG ( (1.+ SAY1)/(1.-SAY1) )                              EXB02410
      MEMSTR =    N1*RHO*TFH*( D**2 * (.7854 + .3925/(N2**2 *SAY1) *   EXB02420
     1         SAY)  - N3 *AT )                                        EXB02430
      INSUL=N4*N114*((D-2.*TFH)**2*(.7854+.3925*SAY/SAY1/N2**2)-N3*AT) EXB02440
  185 IBOSS =4.5*N9*TFH *RHO * AT                                      EXB02450
      IGNITR = N10 *(LCYL +D/N2)*.01766*(AFAT*AT)**.5 + N11            EXB02460
      FOHDWT= MEMSTR + INSUL + IBOSS+ IGNITR + N13                     EXB02470
C                     CYLINDER WEIGHTS                               EXB02480
      MEMSTC = PI     *RHO* TC*D *LCYL                                 EXB02490
      LINER = N117*N4*PI*(D-2.*TC)*LCYL                                EXB02500
      TCIM = N117                                                      EXB02510
      TCIA = N117                                                      EXB02520
      CYLWT = MEMSTC+LINER+N21                                         EXB02530
C                     AFT  HEAD  WEIGHTS                             EXB02540
      TAHIA = N115                                                     EXB02550
      TAHIM = 2.*TAHIA-TCIM                                            EXB02560
      DN = SQRT(1.27323*EPSC*AT)                                       EXB02570
      IF (N23-1.) 190,187,190                                          EXB02580
  187 MEMSTA = 4.*N22*TAH*RHO *( PI*D*D/2.-EPSC* AT)                   EXB02590
      INSULA = N4*TAHIA*PI*((D-2.*TAH)**2/2.-DN**2/4.)                 EXB02600
      GO TO 195                                                        EXB02610
  190 SAY1= SQRT(1.-1./(N23**2 ) )                                     EXB02620
      SAY = ALOG ( (1.+ SAY1)/(1.-SAY1) )                              EXB02630
      MEMSTA =    N22*TAH*RHO *(D**2 *(.7854 + .3925/(N23**2 * SAY1)*  EXB02640
     1          SAY )-EPSC*AT)                                        EXB02650
      INSULA = N4*TAHIA*((D-2.*TAH)**2*(.7854+.3925*SAY/SAY1/N23**2)   EXB02660
     1     -PI*DN**2/4.)                                             EXB02670
  195 BOSS = 4.* N3C * TAH * RHO *D                                    EXB02680
  511 AFTHDW = MEMSTA + BOSS + INSULA + N33                            EXB02690
C                     MISSILE  WEIGHTS                               EXB02700
C CLD  FORSKT = N34 + 2.*N35*TC*RHO *D      +N36 *D**2 *( GMAX*ML/N37* ( EXB02710
      FORSKT = N34 +    N35*TC*RHO *D*PI   +N36 *D**2 *( GMAX*ML/N37* ( EXB02720
     1  .215*(LCYL+D/N2)/D+1.))**.5 +DLFS*PI*D*TC*RHO                   EXB02730
C CLD AFTSKT = N38 + 2.*N39*TC*RHO*D**2+N40*D**2*((ML+MP/2.)/N37        EXB02740
      AFTSKT = N38 + PI*N39*TC*RHO*D    +N40*D**2*((ML+MP/2.)/N37      EXB02750
     1         * (.215*(LCYL +D/N23)/D + 1.) )** .5                    EXB02760
C                     TOTAL  INERT  WEIGHT                           EXB02770
      ME = FOHDWT + CYLWT + AFTHDW + FORSKT +AFTSKT + N02WT + EXTWT    EXB02780
      MPME=MP+ME                                                       EXB02790
C                     BURNOUT  WEIGHT                                EXB02800
      MB =  ME  + ML                                                   EXB02810
C                     LAUNCH  WEIGHT                                 EXB02820
      MOC =  MB + MP                                                   EXB02830
      WRATL = DELVR/ISP/32.174                                         EXB02840
      WRAT= 2.71828**WRATL                                             EXB02850
      MP = (WRAT-1.)*(MB)                                              EXB02860
C                     LAUNCH  THRUST-TO-WEIGHT  RATIO                EXB02870
      FTMOC = F/MOC                                                    EXB02880
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      IF(J)2011,2011,255                                                EXB02890
  255 F = F1MO *MOC                                                     EXB02900
      LOOP1 = LOOP1 + 1                                                 EXB02910
      IF(ABS(F1MOC-F1MO)-.01) 2011,2011,2003                            EXB02920
 2003  IF (KKK-4) 2015,2006,2006                                        EXB02930
 2015  IF(LOOP1.GT.25)WRITE(6,BADRUN)                                   EXB02940
      IF(LOOP1-35 ) 1427,1427,258                                       EXB02950
 2006 IF(IPRINP.NE.0) WRITE(6,2007) SDVI,MPFH,MPAH,ISP,MB               EXB02960
 2007  FORMAT(46H NEGATIVE CYLINDER LENGTH,DELIVERED DELTA V = ,F10.3,   EXB02970
     1 17H PROP IN FWD HEAD,F10.5,17H PROP IN AFT HEAD,F10.5,/,         EXB02980
     2 5H ISP=, F10.5,17HBURN OUT WEIGHT =,F10.5)                       EXB02990
      IND  = 7                                                          EXB03000
      GO TO  22                                                         EXB03010
  258 IF ( IPRINP .GT. 0 ) WRITE(6,2012) F1MOC                          EXB03020
      IND=5                                                             EXB03030
      GO TO 22                                                          EXB03040
 2012  FORMAT(45H UNABLE TO FIND THRUST TO WEIGHT VALUE,F1MOC=,F10.5)   EXB03050
 2011 SDVI=        ISP*32.174*ALOG(MOC/MB)                             EXB03060
      LOOP2=LOOP2+1                                                     EXB03070
      IF (ABS(SDVI -DELVR)- .001*DELVR)  2004,2004,2116                 EXB03080
 2116  IF (KKK-4) 2005,2006,2006                                        EXB03090
 2005 IF((LOOP2+LOOP1).GT.90 .AND.( IPRINP.NE.0)) WRITE(6,BADRUN)       EXB03100
      IF (LOOP2+LOOP1-100)142,142,2008                                  EXB03110
 2010  FORMAT(50H UNABLE TO CONVERGE AFTER 100 ITERATIONS,DELTA V =,     EXB03120
     1 F10.3)                                                           EXB03130
 2008 IF ( IPRINP .GT. 0  )WRITE(6,2010) SDVI                           EXB03140
      IND = 4                                                           EXB03150
      GO TO 22                                                          EXB03160
 2004  CONTINUE                                                         EXB03170
      SAY = RHOP * PI *(D/2. -TC -N117) * (LCYL +D*.5/N2 +D*.5/N23)*2.  EXB03180
     RB = F/ISP/SAY                                                     EXB03190
C                    MOTOR  MASS  FRACTION                            EXB03200
      MMF = MP/(MP + ME)                                                EXB03210
      SAW = (D/2.-TFH) **2  *(D *.5/N2 -TFH)                            EXB03220
      SAW1 = ( D/2.- TAH)**2  * (D*.5/N23 -TAH)                         EXB03230
C                    VOLUMETRIC  LOADING  EFFICIENCY                  EXB03240
      VOLLD = (MP/RHOP) /(PI *LCYL*(D/2.-TC)**2  +2.09*(SAW +SAW1) )    EXB03250
     PHD=PHI*57.2957795                                                 EXB03260
     ITOT=        F*TB                                                 EXB03270
      IMPWT =  ITOT / MOC                                               EXB03280
     MPA = MP                                                           EXB03290
      LT = LCYL + D*.5/N2+DLFS+XRN                                      EXB03300
  712 TMOTOR = MP + ME                                                  EXB03310
      IF(IEX .NE. 1) GO TO 713                                          EXB03320
      CFVA = CFV* FJ                                                    EXB03330
      ISPV = CSTAP*CFVA/32.174                                          EXB03340
  713 QSUB = PSUB*100.                                                  EXB03350
      QBELL = 100.*PBELL                                                EXB03360
      FWHLT  = D/N2*.5                                                  EXB03370
      CASEWT = MEMSTR+MEMSTA+MEMSTC                                     EXB03380
      WTITOT = INSUL +INSULA+LINER                                      EXB03390
      WBOSS  = IBOSS + BOSS                                             EXB03400
      WCON   = N12 + N21+ N33                                           EXB03410
      FOADWT = FOPDWT + FORSKT                                          EXB03420
      TOMIS = FORSKT + AFTSKT                                           EXB03430
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      AFTADW = AFTHDW + AFTSKT                                          EXB03440
      FWT = FOADWT+MPFH                                                 EXB03450
      CWT = CYLWT +MPCYL                                                EXB03460
      AWT = AFTADW + MPAH                                               EXB03470
      THIKC = .3                                                        EXB03480
      TG = TIEC*2.                                                      EXB03490
      CH = FOADWT + CYLWT + AFTADW                                      EXB03500
      IF ( IPRINP  .LE.  C  )  GO TO 275                                EXB03510
      CALL PAGE                                                         EXB03520
      WRITE(6,701)                                                      EXB03530
      WRITE(6,702)MP,F    ,CF    ,ME,F1MOC,        TMOTOR,SDVI,CFVA,    EXB03540
     1ML,ITOT,TB    ,MOC,ISP    ,RB    ,MB,ISPV,AFAT                    EXB03550
      WRITE(6,703)D,PP,MMF,LCYL,PC    ,VOLLD,FWHLT,PAP    ,IMPWT,XRN,PF, EXB03560
     1 BETA,DLFS,LT                                                     EXB03570
      WRITE(6,704) IB                                                   EXB03580
      WRITE(6,705) MEMSTR,MEMSTC,MEMSTA,CASEWT,INSUL,LINER,INSULA,WTITOTEXB03590
     2,IBOSS,BOSS,WBOSS,IGNITR,                                         EXB03600
     3                  IGNITR,FORSKT,AFTSKT,TOMIS,N13,N21,N33,WCCN,    EXB03610
     4 FOADWT,CYLWT,AFTADW,CH,MPFH,MPCYL,MPAH,MP,NOZWT,FWT,CWT,AWT,     EXB03620
     5  TMOTOR                                                          EXB03630
      WRITE(6,706) N114,TCIA,TAHIA,TCIM,TAHIM,TFH,TC,TAH                EXB03640
      WRITE(6,714 ) FTU,FTY                                             EXB03650
  714 FORMAT(6X,23HULTIMATE CASE STRENGTH ,F8.0,2X21HYIELD CASE STRENGTHEXB03660
     1  ,F8.0)                                                          EXB03670
      WRITE(6,707)TMIN                                                  EXB03680
  707 FORMAT(6X,       40HTHE MINIMUM ALLOWABLE CASE THICKNESS WAS,F9.5/)EXB03690
  750  WRITE (6,755)                                                    EXB03700
      WRITE(6,751)NBOSS,STHRSL,XCONE,INSRRG,THININ,XINSUL,NOZWT,XRN     EXB03710
  755 FORMAT(//4X,6HNOZZLE)                                             EXB03720
      WRITE(6,752) QBELL,PHO,EPI,EPSC,AT                                EXB03730
  752 FORMAT(2X, 52H  BELL      HALF ANG     EPI      ENT RATIO THROAT AREAEXB03740
     1/2X,8F10.5//)                                                     EXB03750
  751 FORMAT(2X,77H   NOZZLE    THROAT      EXIT      INSERT    THROAT   EXEXB03760
     1IT CONE    TOTAL     TOTAL /6X,74HBOSS  STRUCTURE  STRUCTURE RETAINEEXB03770
     2R  ASSEMBLY  INSULATN   WEIGHT    LENGTH/2X,8F10.5/)               EXB03780
  701 FORMAT(      4X,22HBOOSTER SIZING DETAILS                ,        EXB03790
     1              5X,7HWEIGHTS,    20X                                EXB03800
     2,11HPERFORMANCE,13X'INTERNAL BALLISTICS')                         EXB03810
  702 FORMAT(6X,12HPROPELLANT  ,F10.2,5X'THRUST    ',F10.2,5X'CF',9X,F9.3EXB03820
     1/                                                                 EXB03830
     16X,12HINERTS       ,F10.2,5X'THRUST/WT',F10.2/                    EXB03840
     26X,12HTOTAL MOTOR ,F10.2,5X'DELTA VI ',F10.3,5X'CF VACUUM  ',F9.3/EXB03850
     36X,12HPAYLOAD      ,F10.2,5X'I TOTAL  ',F10.2,5X'BURN TIME  ',F9.3/EXB03860
     46X,12HLAUNCH WT    ,F10.2,5X'ISP DEL  ',F10.3,5X'BURN RATE  ',F9.3/EXB03870
     56X,12HBURN OUT WT ,F10.2,5X'ISP VAC  ',F10.3,5X'PORT/THROAT',F9.3)EXB03880
  703 FORMAT( 5X,10HDIMENSIONS,17X,9HPRESSURES ,15X,13HMISCELLANEOUS  / EXB03890
     16X,12HDIAMETER     ,F10.3,5X'DESIGN   ',F10.2,5X'MMF        ',F9.4/EXB03900
     26X,12HLT CYL       ,F10.3,5X'CHAMBER  ',F10.2,5X'VOL LOADING',F9.4/EXB03910
     36X,12HLT FWD HEAD ,F10.3,5X'AMBIENT  ',F10.2,5X'(I TOT)/WT ',F9.2/EXB03920
     46X,12HLT NOZZLE    ,F10.3,5X'EXIT     ',F10.2,5X,12HNOZ CANT ANG , EXB03930
     1 F8.2                                    /6X,10HSKIRT EXTN  ,     EXB03940
     5 F12.3/6X,8HTOTAL LT,F14.3)                                       EXB03950
  704 FORMAT(14X,28HBREAKDOWN OF CHAMBER DESIGN ,15X, 9HMATERIAL,3A4/   EXB03960
     127X,42HFORWARD   CYLINDER      AFT          TOTAL /5X,7HWEIGHTS)  EXB03970
  705 FORMAT(6X14H STRUCTURE     ,4F12.3/                               EXB03980
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     16X,14H INSULATION    ,4F12.3/6X,14H BOSS          ,F12.3,12X,2F12.3/EXB03990
     26X,14H IGNITER       ,F12.3,24X,F12.3 /                              EXB04000
     36X,14H SKIRTS        , F12.3,12X,2F12.3/                             EXB04010
     46X,14H CONSTANTS     ,4F12.3/6X,14HTOTAL CHAMBER ,4F12.3 /           EXB04020
     56X,14HPROPELLANT     ,4F12.3/6X,14HNOZZLE WEIGHT ,36X,F12.3/         EXB04030
     65X,15HTOTAL WEIGHT     ,4F12.3)                                      EXB04040
  706 FORMAT( 5X,10HTHICKNESS /6X,10HINSULATION /                           EXB04050
     16X,4H AVG,10X,3F12.5 /6X,4H MAX,22X,2F12.5/6X,4HCASE,10X,3F12.5)      EXB04060
  275 SGWT =(WRN+IGNITR/2. +MP)*FACTOR                                      EXB04070
      WMC=CASEWT+WBOSS+TOMIS                                                EXB04080
      WM=TMOTOR                                                             EXB04090
      NOZWTX=NOZWT                                                          EXB04100
      MPX=MP                                                                EXB04110
      CASEMX=CASEM                                                          EXB04120
      VBI=WTITOT/N4                                                         EXB04130
      CTHRT=2. * SQRT(AT/PI)                                                EXB04140
      RNOZI=RT/COS(BETA)                                                    EXB04150
      MP= MP*FACTOR                                                         EXB04160
      MPMF= MPMF*FACTOR                                                     EXB04170
      BEXIT = EPI * AT     /   144.                                         EXB04180
      BTHVAC = F * ISPV / ISP                                               EXB04190
      BTHVAC = BTHVAC * FACTOR                                              EXB04200
      BEXIT = BEXIT * FACTOR                                                EXB04210
      BISPV = ISPV                                                          EXB04220
      BOOWP = MP                                                            EXB04230
      DROPEB = MOC * FACTOR                                                 EXB04240
      DROPEB = MF * FACTOR                                                  EXB04250
      RETURN                                                                EXB04260
   22 IF ( IPRINP  .LE.  0  )  RETURN                                       EXB04270
      WRITE (6,12) IND                                                      EXB04280
      WRITE(6,652)          APE2,ML,A6Z3,A5Z3,PA                            EXB04290
      WRITE(6,PADRUN)                                                       EXB04300
      RETURN                                                                EXB04310
  135 IF (IPRINP .LE. C ) RETURN                                            EXB04320
      WRITE (6,36) MCASE                                                    EXB04330
   36 FORMAT(26H ERROR IN SUBROUTINE MATLS  ,I5)                            EXB04340
      RETURN                                                                EXB04350
 9023 IF (IPRINP .LE. C ) RETURN                                            EXB04360
      WRITE (6,9024) GAM, EPI, PHI                                          EXB04370
 9024 FORMAT(16H ERROR IN NOZEX  ,3F20.6)                                   EXB04380
      RETURN                                                                EXB04390
      END                                                                   EXB04400


      SUBROUTINE PROPXX(IFLY)                                               PPXX0010
      COMMON /TOVPER/ BOOWP,BISPV,BTHVAC,BEXIT,SUSWP,SEXIT,BCANTA,          PPXX0020
     1    WTINIT,DROPST,DROPEB,KIZ,ZA5,ZA6,ZAC,ZD3,EXTRA(57)                PPXX0030
      COMMON /FAILUR/ KFAIL                                                 PPXX0040
      COMMON /PRINTR/ IPRINP,KTIMES,I5(5)                                   PPXX0050
      COMMON /CMOPT/ I4(4),KBYMOI,I2(2)                                     PPXX0060
      COMMON/ SURVD/  IND(10),IBUST,BASEWT                                  PPXX0070
      COMMON /ADDON/ SPPWF,CONS,FF(18)                                      PPXX0080
      COMMON /LOOPXX/ LOOPRJ,CFNSAV,WTSAV,WSSAV,SLSAV                       PPXX0090
      COMMON /EXTRJ/ISKIP                                                   PPXX0100
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      COMMON/SEPOWR/ SP(48)                                                  PPXX0110
      EQUIVALENCE                                                            PPXX0120
     1(SP( 1),WTSP  ),(SP( 2),VOLSP )                                        PPXX0130
      COMMON/CODEXX/ II(16)                                                  PPXX0140
      COMMON /RJBLOK/ RJ(50)                                                 PPXX0150
      COMMON/ALFBLK/ AMACH1,A, ALT1,GAMRAD, ACCN, ACCT, CDO, C, SREF,        PPXX0160
     1  ACWT, ALFA,CFNREQ,   DEG, CLALFD                                     PPXX0170
      DIMENSION SCDIL(3), SADIL(3)                                           PPXX0180
      DIMENSION SAV4(14), AMSAV(14)                                          PPXX0190
      EQUIVALENCE ( SCDIL(1), CDINL )                                        PPXX0200
      EQUIVALENCE ( AMSAV(1), AMACH1 )                                       PPXX0210
      COMMON /INDATX/ HPP(22), HP                                            PPXX0220
      COMMON /INDATA/ CDINL, CLALF,WTINLT                                    PPXX0230
C     CODEXX  EXTERNAL INTEGER ARRAY                                         PPXX0240
      EQUIVALENCE                                                            PPXX0250
     1(II( 1),KIND  ),(II( 2),INLET ),(II( 3),ISIZE ),(II( 4),NODP    ),     PPXX0260
     1(II( 5),KSUS  ),(II( 6),KFM   ),(II(7 ),IBSTIN),                       PPXX0270
     2(II(13),IEX   ),(II(14),NPASS ),(II(15),NOUT  ),(II(16),IXXX )         PPXX0280
      COMMON /PJDAT/ CFNRQ,CFNET,A5A3,A6A3,ACA3,SFC,BOSTWT,BOSTLT,           PPXX0290
     1 BOSTPR                                                                PPXX0300
      DIMENSION RJSA(9)                                                      PPXX0310
      EQUIVALENCE ( RJSA(1), CFNRQ )                                         PPXX0320
      COMMON /TRAJX/ TRSA(10)                                                PPXX0330
      DIMENSION SAV1(50), SAV2(10), SAV3(9)                                  PPXX0340
      COMMON /EXTERN/ AR (20)                                                PPXX0350
      EQUIVALENCE                                                            PPXX0360
     1(AR( 1),PLLT  ),(AR(2 ),PLEX  ),(AR( 3),D3    ),(AR( 4),RANGE ),      PPXX0370
     2(AR( 5),WTTOT ),(AR(6 ),XLTOT ),(AR( 7),VL    ),(AR( 8 ),VEQR ),      PPXX0380
     3(AR( 9),DELVI ),(AR(10),PLMASS),(AR(11),ARSURF),(AR(13),PAYLD)         PPXX0390
      EQUIVALENCE(AR(15),COMLT ),(AR(20),CFSTOR)                             PPXX0400
      COMMON /TRJDTA/ POINT(10,7)                                            PPXX0410
      COMMON /GOPOL/ WARD(78)                                                PPXX0420
C     ICALF = 1 CALCULATE ANGLE OF ATTACK                                    PPXX0430
C     ICALF = 0 USE INPUT ANGLE OF ATTACK                                    PPXX0440
C     NEWPT = 1  POINT IS NEW,INITIALIZE                                     PPXX0450
C     NEWPT = 0  POINT IS NOT NEW,BYPASS INTIALIZATION                       PPXX0460
      COMMON /IPROP/ IND,IMIN,NEWPT,IRJOUT                                   PPXX0470
      COMMON /SUSDAT/ TX(44)                                                 PPXX0480
      EQUIVALENCE                                                            PPXX0490
     1 (TX(22),XFMB),(TX(24),WFMB),                                          PPXX0500
     9(TX(33), SUSLT ),(TX(34),SUSWT ),(TX(35),FTUS  ),(TX(36),FTYS  ),      PPXX0510
     1(TX(37), SMLT  ),(TX(38),SMWT  ),(TX(39),FMINT ),(TX(40),FUSABL)       PPXX0520
      COMMON /EXXRJ/ EX(48)                                                  PPXX0530
      EQUIVALENCE (EX(27),WRJ),(EX(28),XRJ)                                  PPXX0540
      DATA XSPP,XDR,XSDP,ZRJ,XSRJ,XRAM,XBOOST/4HSPPG,4HDRCC,4HDPPG,          PPXX0550
     1 4HRJET,4HRJSS,4HEXRJ,4HBSTR /                                         PPXX0560
C     II(11) = 0  NO  MOI OR CG HACK                                         PPXX0570
C     II(11) = 1  HACK MOI AND CG DATA                                       PPXX0580
      IFLY = 1                                                               PPXX0590
      KFAIL = 0                                                              PPXX0600
      KTIMES = 0                                                             PPXX0610
      II(11) = 0                                                             PPXX0620
C     DO NOT CHANGE TT4                                                      PPXX0630
C     II(10) = 0                                                             PPXX0640
      NOUT = IPRINP                                                          PPXX0650
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      IF ( IPRINP .LT. -1 ) NOUT = 0                                    PPXX0660
      NCFN = 0                                                          PPXX0670
      IND = 0                                                           PPXX0680
      CANT = WARD(17)                                                   PPXX0690
      IBUST = 0                                                         PPXX0700
      IF(KIND.LT.40) GO TO 10                                           PPXX0710
      IF(NPASS .GT. 0) GO TO 129                                        PPXX0720
      NEWPT = 1                                                         PPXX0730
C                                                                       PPXX0740
      IBSTIN = 0                                                        PPXX0750
      IF(KIND .GE. 50) GO TO 60                                         PPXX0760
      DO 444 I=1,NODP                                                   PPXX0770
  444 IND(I) = 0                                                        PPXX0780
      IMIN= 1                                                           PPXX0790
      ISKIP = 0                                                         PPXX0800
      IF(ISIZE .GT.1) GO TO 110                                         PPXX0810
  100 SUSLT=(XLTOT -PLLT)/2.                                            PPXX0820
      WTTOT = PLMASS*3.0                                                PPXX0830
      IF(LOOPRJ.GT.0) SUSLT = SLSAV                                     PPXX0840
      IF(LOOPRJ.GT.0) WTTOT=WTSAV                                       PPXX0850
       AR(19) = SUSLT                                                   PPXX0860
      SLTOLD = SUSLT                                                    PPXX0870
      GO TO 130                                                         PPXX0880
  129 IF(KIND .GE. 50) GO TO 60                                         PPXX0890
      IF ( KIND  .EQ.  42  )  RETURN                                    PPXX0900
      GO TO 130                                                         PPXX0910
  132  CALL SDUCER                                                      PPXX0920
      IF ( KFAIL .GT. 0 ) RETURN                                        PPXX0930
      GO TO 133                                                         PPXX0940
  110 SUSWT=(WTTOT -PLMASS)/3.                                          PPXX0950
      IF(LOOPRJ.GT.0) SUSWT = WSSAV                                     PPXX0960
       AR(19) = PLLT                                                    PPXX0970
      SWTOLD  = SUSWT                                                   PPXX0980
  130 WTSP  = WTTOT*SPPWF                                               PPXX0990
      PLFX = PLMASS + WTSP + ARSURF                                     PPXX1000
      IF(KIND .EQ. 42) GO TO 132                                        PPXX1010
      IF(KIND.EQ.44) SUSLT=(XLTOT-PLLT) * .7                            PPXX1020
      IF(KIND.EQ.44) SUSWT=(WTTOT-PLFX) * .7                            PPXX1030
C     SUPPRESS OUTPUT IN SUSMAS                                         PPXX1040
      NOUTN = NOUT                                                      PPXX1050
      NOUT = 0                                                          PPXX1060
      CALL SUSMAS                                                       PPXX1070
      NOUT = NOUTN                                                      PPXX1080
      IF ( KFAIL .GT. 0 ) RETURN                                        PPXX1090
  133 IF (IND .NE. 0) GO TO 25                                          PPXX1100
      NPASS = NPASS + 1                                                 PPXX1110
  131 CALL PROPRJ                                                       PPXX1120
      IF(KIND.NE.44) GO TO 137                                          PPXX1130
      BOSTLT=0.                                                         PPXX1140
      BOSTWT=0.                                                         PPXX1150
  137 CONTINUE                                                          PPXX1160
      CFMLT=BOSTLT                                                      PPXX1170
      NCFN = NCFN + 1                                                   PPXX1180
      CFNNEW = CFNRQ                                                    PPXX1190
      IF (NOUT.NE.0) WRITE(6,993) WTSP                                  PPXX1200
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 993 FORMAT( 10X20HSECONDARY POWER PKG      ,  F10.1    )                    PPXX1210
     IF ( KFAIL .GT. 0 ) RETURN                                              PPXX1220
     IF(IND.NE.0 ) GO TO 25                                                  PPXX1230
     IF(NPASS .GT. 50) GO TO 35                                              PPXX1240
     IF(IEX .NE. 1) WRJ = 0.                                                 PPXX1250
     IF(ISIZE.EQ.1) WTTOT = PLMASS + ARSURF+ SUSWT+ BOSTWT  + WRJ            PPXX1260
    1 + WTINLT                                                               PPXX1270
     IF(ISIZE.EQ.1) WTSP=WTTOT * SPPWF                                       PPXX1280
     IF ( ISIZE.EQ.1) WTTOT = WTTOT + WTSP                                   PPXX1290
     PLEX = PLMASS + WTSP + ARSURF                                           PPXX1300
     IF(IEX.EQ.1) GO TO 2000                                                 PPXX1310
     BASEWT = WTTOT          -CONS                                           PPXX1320
     GO TO 2001                                                              PPXX1330
2000 BASEWT = WTTOT -BOSTWT                                                  PPXX1340
2001 AMACH1 = POINT(1,2)                                                     PPXX1350
     Q= 0.7    *AMACH1*AMACH1*RJ(34)                                         PPXX1360
     ACWT = BASEWT - FUSABL*POINT(1,6)                                       PPXX1370
     SREF = AR(12)                                                           PPXX1380
     A= 49.02* SQRT(RJ(33) )                                                 PPXX1390
     ACCN    = POINT(1,3)                                                    PPXX1400
     ACCT    = POINT(1,4)                                                    PPXX1410
     ALT1    = POINT(1,1)                                                    PPXX1420
     GAMRAD =POINT(1,5) /57.29578                                            PPXX1430
     AR(16) = AMACH1                                                         PPXX1440
     HP = ALT1                                                               PPXX1450
     NDESPT = 1                                                              PPXX1460
     CALL XALPHA ( NDESPT )                                                  PPXX1470
     IF ( KFAIL  .GT.  0  )  RETURN                                          PPXX1480
     CFNRQ = CFNREQ                                                          PPXX1490
     RJ(25)= ALFA*57.2958                                                    PPXX1500
     IF ( NOUT .GT. 0 ) WRITE(6,91) CFNREQ,RJ(25)                            PPXX1510
  91 FORMAT(11H XALPA DATA,10X, 9HCFNREQ = ,F10.5,3X, 8HALPHA =  ,F10.5)PPXX1520
     IF(IBUST.EQ.1) RETURN                                                   PPXX1530
     IF(NEWPT.EQ. 1) GO TO 133                                               PPXX1540
     EPX=.003                                                                PPXX1550
     DCF=CFNRQ - CFNET                                                       PPXX1560
     IF(NOUT.NE.0) WRITE(6,1257) DCF, CFNRQ, CFNET                           PPXX1570
1257 FORMAT( /  5X21HCFN ITERATION MISS IS , F10.4 ,                         PPXX1580
    1     10X15HREQUIRED CFN IS , 6X, F10.4 /     41X,                      PPXX1590
    2      5X16HAVAILABLE CFN IS,5X,F10.4     )                             PPXX1600
     IF( ABS( CFNET/CFNRQ - 1. ) .LE. EPX ) GO TO 1133                       PPXX1610
     DCFNEW = DCF                                                            PPXX1620
     IF(NCFN.GT.1) CFNRQ=CFNOLD-DCFOLD*(CFNNEW-CFNOLD) /                     PPXX1630
    1      (DCFNEW-DCFOLD)                                                   PPXX1640
1132 FORMAT(/5X14HPREDICTION NO.    , I10 / 19X,5F10.4 / )                   PPXX1650
     IF ( NOUT .NE. 0 ) CALL PAGE                                            PPXX1660
     CFNOLD = CFNNEW                                                         PPXX1670
     DCFOLD = DCFNEW                                                         PPXX1680
     GO TO 133                                                               PPXX1690
1133 CONTINUE                                                                PPXX1700
     IF ( NOUT  .NE.  0  )  CALL PAGE                                        PPXX1710
     CALL RJWT                                                               PPXX1720
     NOUTSV = NOUT                                                           PPXX1730
     IF ( IPRINP .LT. 0 ) NOUT = 1                                           PPXX1740
     DO 331 IZ=1,9                                                           PPXX1750
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  331 SAV3(IZ)=RJSA(IZ)                                                  PPXX1760
      DO 332 IZ=1,10                                                     PPXX1770
  332 SAV2(IZ)=TRSA(IZ)                                                  PPXX1780
      DO 333 IZ=1,50                                                     PPXX1790
  333 SAV1(IZ)=RJ(IZ)                                                    PPXX1800
      DO 383 IZ=1,14                                                     PPXX1810
  383 SAV4(IZ) = AMSAV(IZ)                                               PPXX1820
      DO 796 IZ=1,3                                                      PPXX1830
  796 SADIL(IZ) = SCDIL(IZ)                                              PPXX1840
      CALL  SURVEY                                                       PPXX1850
      DO 797 IZ=1,3                                                      PPXX1860
  797 SCDIL(IZ) = SADIL(IZ)                                              PPXX1870
      DO 387 IZ = 1, 14                                                  PPXX1880
  387 AMSAV(IZ) = SAV4(IZ)                                               PPXX1890
      DO 351 IZ=1,9                                                      PPXX1900
  351 RJSA(IZ)=SAV3(IZ)                                                  PPXX1910
      DO 352 IZ=1,10                                                     PPXX1920
  352 TRSA(IZ)=SAV2(IZ)                                                  PPXX1930
      DO 353 IZ=1,50                                                     PPXX1940
  353 RJ(IZ)=SAV1(IZ)                                                    PPXX1950
      AMACH1 = POINT(1,2)                                                PPXX1960
      Q = 0.7 * AMACH1 * AMACH1 * RJ(34)                                 PPXX1970
      ACWT = BASEWT - FUSABL * POINT(1,6)                                PPXX1980
      SREF = AR(12)                                                      PPXX1990
      A = 49.02 * SQRT ( RJ(33) )                                        PPXX2000
      ACCN = POINT(1,3)                                                  PPXX2010
      ACCT = POINT(1,4)                                                  PPXX2020
      ALT1=POINT(1,1)                                                    PPXX2030
      GAMRAD=POINT(1,5) / 57.29578                                       PPXX2040
      AR(16) = AMACH1                                                    PPXX2050
      HP = ALT1                                                          PPXX2060
      SUSWP = FUSABL                                                     PPXX2070
      BCANTA = CANT                                                      PPXX2080
      ZA5 = A5A3                                                         PPXX2090
      ZA6 = A6A3                                                         PPXX2100
      ZAC = ACA3                                                         PPXX2110
      ZD3 = D3                                                           PPXX2120
      KIZ = KIND                                                         PPXX2130
      IF ( KFAIL .GT. 0 ) RETURN                                         PPXX2140
      IF(IND .NE. 0 .OR.(IBUST  .NE. 0 .AND. KSUS .EQ. 1)) RETURN        PPXX2150
      IF (NEWPT .EQ. 1) GO TO 131                                        PPXX2160
      KTIMES = 1                                                         PPXX2170
C  OUTPUT FINAL DATA                                                     PPXX2180
  215 FORMAT(1H1)                                                        PPXX2190
      IF (NOUT .GT. 0 ) WRITE (6,7006)                                   PPXX2200
 7006 FORMAT( 21H SUMMARY OUTPUT DATA      )                             PPXX2210
      ITYPE =KIND -40                                                    PPXX2220
      IF ( ITYPE .GT. 4 ) GO TO 2204                                     PPXX2230
      GO TO (200,201,202,203),ITYPE                                      PPXX2240
 2204 IF(NOUT.GT.0) WRITE(6,2205)                                        PPXX2250
 2205 FORMAT( 1X,20HTANDEM ROCKET RAMJET     // )                        PPXX2260
      GO TO 216                                                          PPXX2270
  200 IF (NOUT .GT. 0 ) WRITE (6,204)                                    PPXX2280
  204 FORMAT(24H INTEGRAL ROCKET RAMJET  //)                             PPXX2290
      GO TO 216                                                          PPXX2300
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  201 WRITE(6,205)                                                    PPXX2310
  205 FORMAT(14H DUCTED ROCKET  // )                                  PPXX2320
  216 IF(ISIZE.EQ.2) XLTOT = PLLT +SLSLT + BOSTLT                     PPXX2330
      IF ( NOUT .LE. 0 ) GO TO 8493                                   PPXX2340
      GO TO 210                                                       PPXX2350
  202 WRITE(6,206)                                                    PPXX2360
  206 FORMAT(24H EXTERNAL BOOSTED RAMJET  //)                         PPXX2370
      GO TO 217                                                       PPXX2380
  203 IF ( NOUT .GT. 0 ) WRITE (6,207)                                PPXX2390
  207 FORMAT(17H UNBOOSTED RAMJET  //)                                PPXX2400
  217 IF(ISIZE.EQ.2) XLTOT = PLLT +SLSLT + XRJ                        PPXX2410
  210 CONTINUE                                                        PPXX2420
      IF ( NOUT .LE. 0 ) GO TO 8493                                   PPXX2430
      KICK=1                                                          PPXX2440
      IF ( KICK .GT. 0 ) GO TO 8493                                   PPXX2450
  225 FORMAT(5X,13HINLET WEIGHT  ,F9.2,13X,13HINLET DRAG     ,F10.5)  PPXX2460
  211 FORMAT(22X,6HWEIGHT,4X,6HLENGTH /                               PPXX2470
     15X,13HPAYLOAD       ,F9.1,2X,F9.3 /                             PPXX2480
     25X,13HAERO SURFACES,F9.4,/                                      PPXX2490
     35X,13H2ND P PAKAGE ,F9.4,/                                      PPXX2500
     45X,13HFUEL MGMT BAY,F9.4,2X,F9.4 /                              PPXX2510
     55X,13HSUSTAINER     ,F9.1,2X,F9.3 )                             PPXX2520
  212 FORMAT(5X,13HCOMBUSTOR     ,F9.1,2X,F9.3 )                      PPXX2530
  213 FORMAT(5X,13HBOOSTER       ,F9.1,2X,F9.3,2X13HPROPELLANT WT,F10.2) PPXX2540
  214 FORMAT(5X,13HTOTAL         ,F9.1,2X,F9.3 )                      PPXX2550
 8493 CONTINUE                                                        PPXX2560
      BZ=COMLT                                                        PPXX2570
      IF(KIND.EQ.44) COMLT=XRJ                                        PPXX2580
      CALL INLETP                                                     PPXX2590
      COMLT=BZ                                                        PPXX2600
      CALL CDINLT                                                     PPXX2610
      II(11) = 1                                                      PPXX2620
      IF(KIND.EQ.42) GO TO 7001                                       PPXX2630
      AAA=XSRJ                                                        PPXX2640
      IF ( NOUT .NE. 0 ) CALL PAGE                                    PPXX2650
      CALL SUSMAS                                                     PPXX2660
      IF ( NOUT .NE. 0 ) WRITE(6,993) WTSP                            PPXX2670
      IF ( KFAIL .GT. 0 ) RETURN                                      PPXX2680
      CALL RJDES                                                      PPXX2690
      IF(IND.NE.0) GO TO  7000                                        PPXX2700
      SFC = RJ(7)*RJ(15)*ACA3/CFNET                                   PPXX2710
 7002 AAA=ZRJ                                                         PPXX2720
      CALL RJWT                                                       PPXX2730
      IF(IND.NE.0) GO TO  7CCC                                        PPXX2740
      IF(IEX.EQ.1)  GO TO 7003                                        PPXX2750
 7004 AAA=XBOOST                                                      PPXX2760
      IF ( KIND .NE. 44 ) CALL PAGE                                   PPXX2770
      IF(KIND.NE.44) CALL BOOST(DELVI,PAYLD,A6A3,A5A3,0,BOSTPR,BOSTWT,  PPXX2780
     1 BOSTLT,IND,CONS)                                               PPXX2790
      IF(IND.NE.0) GO TO  7CC0                                        PPXX2800
      IFLY = 0                                                        PPXX2810
      CFNSAV = CFNRQ                                                  PPXX2820
      WTSAV = WTTOT                                                   PPXX2830
      SLSAV = SUSLT                                                   PPXX2840
      WSSAV = WTTOT - BOSTWT - PLMASS - ARSURF - WTSP                 PPXX2850
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      IF ( NOUT .EQ. 0 ) RETURN                                          PPXX2860
C     PRINT MISSILE SCHEMATIC                                            PPXX2870
      CALL PAGE                                                          PPXX2880
      WRITE(6,8221)                                                      PPXX2890
 8221 FORMAT( /// 5X,25HMISSILE SYNTHESIS SUMMARY  // )                  PPXX2900
      WRITE(6,810C) WTTOT, XLTOT                                         PPXX2910
 81C0 FORMAT(15X9HTOTAL WT=,F7.1 / 15X9HTOTAL LT=,F7.1  )                PPXX2920
      WRITE(6,8110) ( POINT(1,IC), IC=1,7 )                              PPXX2930
 8110 FORMAT( /15X,14HDESIGN POINT =,F8.0, 1H/,F4.2,1H/,F4.2,1H/,        PPXX2940
     1     F4.2,1H/,F6.2,1H/,F4.2,1H/,F5.0 //   )                       PPXX2950
      NDESPT = 1                                                         PPXX2960
      CALL XALPHA ( NDESPT )                                             PPXX2970
      WRITE(6,8666)                                                      PPXX2980
 8666 FORMAT( //// )                                                     PPXX2990
      WRITE(6,8111)    ARSURF                                            PPXX3000
 8111 FORMAT( 71X13H     WT(W+T)=, F6.1,4H       //                     PPXX3010
     1 50X    ,   8H........ / 61X15H.............. ,13X1H.,7X1H. /      PPXX3020
     2     60X1H., 14X1H., 12X1H., 8X1H.   )                             PPXX3030
      WRITE(6,8112)                                                      PPXX3040
 8112 FORMAT( 39X,1CH.......... , 49H.....................................PPXX3050
     1.............     )                                                PPXX3060
      WRITE(6,8113) D3                                                   PPXX3070
 8113 FORMAT( 35X1H., 13X1H., 18X1H., 27X2H.. / 34X1H ,14X1H., 18X1H.,   PPXX3080
     1     26X3H. ., 5X5HD3  =, F7.1  )                                 PPXX3090
      SUSWX = WTTOT - BOSTWT - PLMASS - ARSURF                           PPXX3100
      SREX = SREF * 144.                                                 PPXX3110
      WRITE(6,8114) PLLT,SUSLT,BOSTLT,SREX,PLMASS,SUSWX,BOSTWT,ACA3      PPXX3120
 8114 FORMAT(33X1H.,2X4HLPL=,F6.1,3X1H.2X,6HLSUST=,F7.1,3X5H.....,       PPXX3130
     1    4X5HLB00=,F7.1, 4X2H..2X1H., 5X5HA3  =,F7.1  /                PPXX3140
     2       33X1H ,2X4HWPL=,F6.1,3X1H.2X,6HWSUST=,F7.1,3X5H.    .,     PPXX3150
     3    4X5HWB00=,F7.1, 4X2H..2X1H., 5X5HACA3=,F7.4  )                PPXX3160
      WRITE(6,8115) FUSABL,BOSTPR,A5A3,A6A3                              PPXX3170
 8115 FORMAT(33X1H.,15X1H.,2X6HWFUEL=,F7.1, 3X5H....., 4X5HWBPR=,F7.1,   PPXX3180
     1    4X2H..,2X1H., 5X5HA5A3=,F7.4 / 34X1H ,14X1H.,18X1H.,          PPXX3190
     2    26X3H. ., 5X5HA6A3=,F7.4 / 36X1H.,12X1H.,18X1H., 27X2H.. )    PPXX3200
      WRITE(6,8112)                                                      PPXX3210
      WRITE(6,8311)                                                      PPXX3220
 8311 FORMAT( 60X1H., 14X1H., 12X1H., 8X1H. / 61X15H.............. ,     PPXX3230
     1     13X1H., 7X1H.  /  90X8H........     )                        PPXX3240
      ACX= ACA3 * SREF * 144.                                            PPXX3250
      WRITE(6,8116) ACX,WTINLT                                           PPXX3260
 8116 FORMAT( /// 66X7HC.AREA= , F7.1 / 66X7HWT.INL= , F7.1 /// )        PPXX3270
      RETURN                                                             PPXX3280
 7CC1 AAA=XSDR                                                           PPXX3290
      CALL SDUCER                                                        PPXX3300
      IF ( KFAIL .GT. C ) RETURN                                         PPXX3310
      CALL DRDES                                                         PPXX3320
      IF(IND.NE.0) GO TO  7CC0                                           PPXX3330
      SFC = RJ(7)*RJ(15)*ACA3/CFNET                                      PPXX3340
      GO TO 7002                                                         PPXX3350
 70C3 AAA=XRAM                                                           PPXX3360
      IF(NOUT.NE.C) CALL PAGE                                            PPXX3370
      CALL EXRAM                                                         PPXX3380
      IF ( KFAIL .GT. C ) RETURN                                         PPXX3390
      IF(IND.NE.0) GO TO  7000                                           PPXX3400
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      GO TO 7004                                                        PPXX3410
 7000 IF(NOUT.NE.0) WRITE(6,7005) AAA                                   PPXX3420
 7005 FORMAT(21H ERROR IN SUBROUTINE ,A4,27H WHEN TRYING TO OUTPUT DATA)PPXX3430
      RETURN                                                            PPXX3440
   10 IF ( NOUT .LE. 0 ) RETURN                                         PPXX3450
      IF ( KIND/10 - 2 ) 20,30,40                                       PPXX3460
   20 WRITE(6,21)                                                       PPXX3470
   21 FORMAT(51H NO SOLID ROCKET CAPABILITY IN ROUTINE AT THIS TIME  )  PPXX3480
      RETURN                                                            PPXX3490
   30 WRITE(6,31)                                                       PPXX3500
   31 FORMAT(51H NO LIQUID RCKET CAPABILITY IN ROUTINE AT THIS TIME  )  PPXX3510
      RETURN                                                            PPXX3520
   40 WRITE(6,41)                                                       PPXX3530
   41 FORMAT(51H NO COMBINED CYL CAPABILITY IN ROUTINE AT THIS TIME  )  PPXX3540
      RETURN                                                            PPXX3550
   60 IF (NOUT .GT. 0 ) WRITE (6,61)                                    PPXX3560
   61 FORMAT(32H TURBOJET LOGIC NOT YET INCLUDED )                      PPXX3570
      RETURN                                                            PPXX3580
   25 IF(NOUT.NE.0) WRITE(6,26)                                         PPXX3590
   26 FORMAT(16H ERROR IN PROPRJ)                                       PPXX3600
      RETURN                                                            PPXX3610
   35 IF(NOUT.NE.0) WRITE(6,36)                                         PPXX3620
   36 FORMAT(38H EXCESSIVE ITERATIONS IN EXTERNAL LOOP )                PPXX3630
      RETURN                                                            PPXX3640
      END                                                               PPXX3650


      SUBROUTINE BOOST (APE2,PL,A6Z3,A5Z3,IPRINT,MP,MPME,LT,IND,SGWT)   BOST0010
      REAL NOZWTX,MPX                                                   BOST0020
      COMMON /COMVLS/ COM(51)                                           BOST0030
      EQUIVALENCE (COM(16),WMC),                                        BOST0040
     1 (COM(17),VBI),                                                   BOST0050
     2 (COM(15),DCOM),                                                  BOST0060
     3 (COM(20),NOZWTX),                                                BOST0070
     4 (COM(21),MPX),                                                   BOST0080
     5 (COM(22),CASEMX),                                                BOST0090
     6 (COM( 9),R5X),                                                   BOST0100
     7 (COM(10),Y1X)                                                    BOST0110
      COMMON /TOVPER/ BOOWP,BISPV,BTHVAC,BEXIT,SUSWP,SEXIT,BCANTA,      BOST0120
     1    WTINIT,DROPST,DROPEB,KIZ,ZA4(4),EXTRA(57)                     BOST0130
      COMMON /MATTYP/ IB(3)                                             BOST0140
      COMMON/CODEXX/ II(16)                                             BOST0150
      EQUIVALENCE                                                       BOST0160
     2(II(13),IEX    ),(II(15),NOUT )                                   BOST0170
      COMMON/ARRAY/ E,PC,PAP,CF,CFB,ISP,TB                              BOST0180
      COMMON /BESYET/ FACTOR, BES14(14)                                 BOST0190
      COMMON /COBOL/ WAPD (78)                                          BOST0200
      COMMON  /CODEBT/ IFIRST,JRJ,J                                     BOST0210
      COMMON  /INSERT/ WG,WA,WTB,WC,WTI,DELA,PE,X1,XG,XI,WRN,EPSC,      BOST0220
     1       A6A3,A5A3,Y1,RC,     AT,XRN,TIEC,RE,RECHK,PI,CFVA,     TTH,BOST0230
     1 THED,ICG,X3,Z1,XA,LN,TAH,NOZWT,ISPV                              BOST0240
      REAL   ISP,N1,N2,N3,N4,          N9,N10,N11,N13,          N21,N22,N23BOST0250
     1      ,N24,               N30,N33,N34,N35,N36,N37,N38,N39,N40,    BOST0260
     2     N77,N78,N79,N80,N81,N82,N83,N84,N85,N114,N115,N117,          BOST0270
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     3       N119,N120,N121,LN,LT,   LCYL,MPFH,MPAH,MPCYL,MP,MPA,MEMSTR,BOST0280
     4       INSUL,LINER,IBOSS,NBOSS,ML,IGNITR,MEMSTC,MEMSTA,INSULA,    BOST0290
     5       INSRRG,NOZWT, ME, MB, MOC, MMF,MPMF,ITOT, IMPWT,ISPV       BOST0300
      COMMON  /NOZMP/ DZ1(28),ZNOZ,XINOZ                                 BOST0310
      DIMENSION WT(20),Z(20),ZW(20),XII(20)                              BOST0320
      EQUIVALENCE                                                       BOST0330
     1(WT(1 ),IBOSS  ),(WT( 2), MEMSTR),(WT( 3),MPFH  ),(WT( 4),IGNITR),BOST0340
     2(WT(5 ),INSUL  ),(WT( 7), MEMSTC),(WT( 8),LINER ),(WT(10),MPCYL ),BOST0350
     3(WT(11),MEMSTA ),(WT(12), INSULA),(WT(13),MPAH  ),(WT(14),BOSS  ),BOST0360
     4(WT(16),FORSKT ),(WT(17), AFTSKT),                (WT(19),ZNFRNG) BOST0370
      EQUIVALENCE                                                       BOST0380
     1(WARD( 1),D      ),(WARD( 3),FJ     ),(WARD( 4),PA     ),        BOST0390
     2(WARD( 5),F1     ),(WARD( 6),PBELL  ),(WARD( 7),PHI    ),        BOST0400
     3(WARD( 8),GAM    ),(WARD( 9),RHOP   ),(WARD(11),CSTAR  ),        BOST0410
     4(WARD(12),PCM    ),(WARD(13),FSYLD  ),(WARD(14),FSULT  ),        BOST0420
     5(WARD(15),TMIN   ),(WARD(16),TCASEF),(WARD(17),BETA   ),        BOST0430
     6(WARD(18),CASEM  ),(WARD(19),DM     ),(WARD(20),ETAX   ),        BOST0440
     7(WARD(21),DLFS   ),(WARD(23),N1     ),(WARD(24),N2     ),        BOST0450
     8(WARD(25),N3     ),(WARD(26),N4     ),(WARD(27),N114   ),        BOST0460
     9(WARD(28),NS     ),(WARD(29),N10    ),(WARD(30),N11    ),        BOST0470
     X(WARD(31),N13    ),(WARD(32),VREH   ),(WARD(33),N34    )         BOST0480
      EQUIVALENCE                                                       BOST0490
     1(WARD(34),N35    ),(WARD(35),N36    ),(WARD(36),N37    ),        BOST0500
     2(WARD(37),N38    ),(WARD(38),N39    ),(WARD(39),N40    ),        BOST0510
     3(WARD(40),GMAX   ),(WARD(41),N22    ),(WARD(42),N23    ),        BOST0520
     4(WARD(43),N24    ),(WARD(44),N33    ),(WARD(45),N115   ),        BOST0530
     5(WARD(46),N117   ),(WARD(47),FMPAH  ),(WARD(48),N30    ),        BOST0540
     6(WARD(49),N21    ),(WARD(50),N77    ),(WARD(51),N78    ),        BOST0550
     7(WARD(52),N79    ),(WARD(53),N80    ),(WARD(54),N81    ),        BOST0560
     8(WARD(55),N82    ),(WARD(56),N83    ),(WARD(57),N84    ),        BOST0570
     9(WARD(58),N85    ),(WARD(59),N121   ),(WARD(61),EPI    ),        BOST0580
     X(WARD(62),PSUB   ),(WARD(63),RHO    )                          BOST0590
      NAMELIST /BADRUN/ A5A3,A6A3,    MOC,   ME,MPCYL,MPAH,MPFH,ISPV,   BOST0600
     1NOZWT,F1MOC,F1MO,DELVP,SDVI,LCYL,AT,LOOP1,LOOP2                   BOST0610
  12  FORMAT (//10X17HPROBLEM STOP NO.  I2,15H HAS OCCURRED.    )       BOST0620
      AEAT = WARD(10)                                                   BOST0630
      TTH= WARD(22)*.0174532S                                           BOST0640
      IF(IEX.LT.1) FACTOR=1.                                            BOST0650
      RR =0/2.                                                          BOST0660
      IF ( IEX  .GT.  C  )  TIEC = 0.0                                  BOST0670
      IPRINP = NOUT                                                     BOST0680
      ML=PL/FACTOR                                                      BOST0690
      EXTWT = 0.                                                        BOST0700
      TR = 5.                                                           BOST0710
      IF(IFIRST.LT.1) GO TO 66C                                         BOST0720
      PSUB = 1.0                                                        BOST0730
      IFIPST = 0                                                        BOST0740
      BETA= BETA*.0174532S                                              BOST0750
      IF (IPRINP .LE. 0 ) GO TO 660                                     BOST0760
      IF(IEX.GT.0)WRITE(6,301)                                          BOST0770
 301  FORMAT(17H EXTERNAL BOOSTER)                                      BOST0780
      WRITE(6,652)          APE2,ML,A6Z3,A5Z3,PA                        BOST0790
 652  FORMAT(//35H          VALUES OF BOOST CALL LIST   / 3X,           BOST0800
     1                    61H  DELTA V    PAYLOAD    A6A3      A5A3    BOST0810
     1P AMB                                                             BOST0820
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     2       /  3X,       2F10.3,3F10.5,F10.2/)                          BOST0830
      IF(J) 653,654,653                                                  BOST0840
  653 WRITE (6,655)                                                      BOST0850
  655 FORMAT(10X23H THRUST TO WEIGHT INPUT /)                            BOST0860
      GO TO 660                                                          BOST0870
  654 WRITE (6,657)                                                      BOST0880
  657 FORMAT(10X13H THRUST INPUT  /)                                     BOST0890
  660 IND=0                                                              BOST0900
      PC = WARD(2)                                                       BOST0910
      DELVR = APE2                                                       BOST0920
      PAP = PA                                                           BOST0930
      IF(PAP .LE. 0) PAP = .0001                                         BOST0940
 6001 PI=3.141593                                                        BOST0950
      A5A3 = A573                                                        BOST0960
      A6A3 = A673                                                        BOST0970
      ISP = CSTAR*1.5/32.174                                             BOST0980
      WRATL =DELVR/ISP   /32.174                                         BOST0990
       WRAT= 2.71828**WRATL                                              BOST1000
      MP=(WRAT*ML-ML)/(1.2-.2*WRAT)                                      BOST1010
      IF (J) 2200,2202,2200                                              BOST1020
 2202 F = F1                                                             BOST1030
      GO TO 2201                                                         BOST1040
 2200 F = (1.2 * MP+ML)*F1                                               BOST1050
 2201 TP = MP*ISP/F                                                      BOST1060
      IF(A6A3 .LE. A5A3) A6A3 = A5A3 + .001                              BOST1070
      IF ( GAM -1.0) 30, 30, 35                                          BOST1080
   30 IND = 2                                                            BOST1090
      IF ( IPRINP .GT. 0 ) WRITE ( 6,9002) GAM                           BOST1100
 9002 FORMAT(42H GAMMA LESS THAN 1 NOT PERMITTED. GAMMA = ,F16.6)        BOST1110
      GO TO 22                                                           BOST1120
C     TEST  TO  DETERMINE IF F    IS INPUT OR TO BE FOUND BY ITERATION   BOST1130
   35  IF  (J)  100,95,100                                               BOST1140
   95 F = F1                                                             BOST1150
      GO TO 103                                                          BOST1160
  100  F1MO = F1                                                         BOST1170
  103  LOOP2 = 1                                                         BOST1180
       KKK=0                                                             BOST1190
      ICC = 0                                                            BOST1200
      FLAMBD=.5*(1.+COS(PHI))                                            BOST1210
      TKEXIT = .25                                                       BOST1220
      DI =DM-2.*TKEXIT                                                   BOST1230
       EPSC = N23                                                        BOST1240
      AMAX =(DI/2.)**2*PI                                                BOST1250
      PP= PC*FSYLD                                                       BOST1260
      MCASE= IFIX(CASEM+.1)                                              BOST1270
      CALL MATLS(MCASE,TCASEF,RHO,FTU,FTY,IND)                           BOST1280
      IF(IND .NE. 0 ) GO TO 135                                          BOST1290
      TCYLU =FSULT*PC *D /(FTU*2.)                                       BOST1300
C                                                                        BOST1310
      TCYLY =FSYLD*PC *D /(FTY*2.)                                       BOST1320
      TCYLT =AMAX1(TCYLU,TCYLY)                                          BOST1330
      TC    = AMAX1(TCYLT,TMIN )                                         BOST1340
      A=PI*( D/2. - TC - N117 ) **2                                      BOST1341
      TAHU  =FSULT*PC *N23*D/FTU/4.                                      BOST1350
      TAHY  =FSYLD*PC *N23*D/FTY/4.                                      BOST1360
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      TAHT  =AMAX1(TAHU,TAHY)                                          BOST1370
      TAH   =AMAX1(TAHT,TMIN )                                         BOST1380
      IF (N2.EQ. N23) GO TO 136                                        BOST1390
      TFHU  =FSULT*PC *N2 *D/FTU/4.                                    BOST1400
      TFHY  =FSYLD*PC *N2 *D/FTY/4.                                    BOST1410
      TFHT  =AMAX1(TFHU,TFHY)                                          BOST1420
      TFH   =AMAX1(TFHT,TMIN )                                         BOST1430
      GO TO 142                                                        BOST1440
  136 TFH = TAH                                                        BOST1450
  142  LOOP1 = 1                                                       BOST1460
 1427 IF(IEX.EQ.0)GO TO 143                                           BOST1470
      PEPC = PA/PC                                                     BOST1480
      EPS=((GAM+1.)/2.)**(1./(GAM-1.))*(PEPC )**(1./GAM) *             BOST1490
     1 SQRT ((GAM+1.)/(GAM-1.)*(1. - (PEPC )**((GAM-1.)/GAM)))         BOST1500
      EPI = 1./EPS                                                     BOST1510
      CFV = FLAMBD * SQRT(2.*GAM**2/(GAM-1.)*(2./(GAM+1.))**((GAM+1.)/ BOST1520
     1(GAM-1.)) * (1.-PEPC**((GAM-1.)/GAM)) +PEPC*EPI                  BOST1530
      JK = 0                                                           BOST1540
      R3 = D/2.0                                                       BOST1550
      IF (EPI .LT. 2.5) GO TO 308                                      BOST1560
      CF =(CFV -PA/PC*EPI)*FJ                                          BOST1570
      EPOLD = EPI                                                      BOST1580
      ISP= CSTAR*CF/32.174                                             BOST1590
      AT = F/PC/CF                                                     BOST1600
      AEXIT=EPI*AT                                                     BOST1610
      RE = SQRT (AEXIT/PI)                                             BOST1620
      RT = SQRT (AT/PI)*(1. - 0.4*(1./COS(PHI) -1.))                   BOST1630
      EXLT =(RE-RT)/TAN(PHI)                                           BOST1640
      DELR = EXLT* TAN(BETA)                                           BOST1650
      REF  = (RE+DELR)*COS(BETA)                                       BOST1660
      AEFF =REF**2*PI                                                  BOST1670
      IF(AEFF .GT. AMAX*1.001) GO TO 302                               BOST1680
  312 NBOSS = N77 * PP * D*N23*AT                                      BOST1690
      STHRSL= N78 * PP * AT**1.5                                       BOST1700
      XCONE = N79 * PP * AT**1.5*(EPI-2.5)/ SIN(PHI)                   BOST1710
      INSRRG= N80 * (EPI*AT) **.5                                      BOST1720
      THININ= N81 * AT **.9                                            BOST1730
      SUM   = PC**N83*TB**N84                                          BOST1740
      XINSUL = N82*AT*(EPI-2.5)/SIN(PHI)*FSYLD**N83*SUM                BOST1750
     1 *(CSTAR/32.174)**N85                                            BOST1760
      NOZWT = NBOSS + STHRSL + XCONE + INSRRG + THININ + XINSUL        BOST1770
      ZNERNG = 0.                                                      BOST1780
      RTH= SQRT(AT/PI)                                                 BOST1790
      DN = SQRT(AT*N24/PI)                                             BOST1800
      IF( DN .GE. R3) DN = .8*R3                                       BOST1810
      EY = DN - SQRT(AT/PI)                                            BOST1820
      EYS = EY**2                                                      BOST1830
      IF (EYS .GT. AT) EYS = AT - 1.0                                  BOST1840
      X1 = SQRT(AT-EYS)                                                BOST1850
      Z1 = SQRT((R3**2 -DN**2)/N23**2)                                 BOST1860
      X2 = EXLT*COS(BETA) + (RE + TKEXIT)*SIN(BETA)                    BOST1870
      XRN = X1 + Z1+X2*PRELL                                           BOST1880
C     CG AND MOI                                                       BOST1890
      FX = RTH*(2.- COS(PHI))                                          BOST1900
C     BOSS                                                             BOST1910
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      H=3.*TAH                                                          BOST1920
      CALL ZCYLLL(H,NBOSS,DN,0.,XII1,Z1,ZW1)                            BOST1930
      WTH= STHPSL + INSRRG + THININ                                     BOST1940
      CALL ZCONHH(X1,WTH,DN,HX,0.,0,XII2,Z2,ZW2)                        BOST1950
      WEXT=XCONE+ XINSUL                                                BOST1960
      X3=X2*PRELL                                                       BOST1970
      CALL ZCONHH(X3,WEXT,RE,HX,X1,1,XII3,Z3,ZW3)                       BOST1980
      ZNMIS= N121*X1                                                    BOST1990
      Z(18)=(ZW1+ZW2+ZW3+ZNMIS)/(NBOSS+WTH+WEXT+N121)  + Z1             BOST2000
      XINOZ    = XII1+XII2+XII3 +(Z1-Z(18))**2*NBOSS +(Z2-Z(18))**2*WTH BOST2010
     1 +(Z3-Z(18))**2*WEXT+ (X1-Z(18))**2*N121                          BOST2020
      ZW(18)=Z(18)*NOZWT                                                BOST2030
      Z(19)=0.0                                                         BOST2040
      ZW(19) = 0.0                                                      BOST2050
      XII(19)= 0.0                                                      BOST2060
      GO TO 144                                                         BOST2070
  308  IND = 9                                                          BOST2080
      GO TO 307                                                         BOST2090
  304  IND = 10                                                         BOST2100
  307 IF ( IPRINP .GT. 0 ) WRITE(6,305) AMAX,AEXIT,AT,EPI               BOST2110
  305 FORMAT(28H ERROR CALCULATING EXIT AREA /2X,4E20.6)                BOST2120
      GO TO 22                                                          BOST2130
  302 RMAX =DI/2.                                                       BOST2140
      AA = RMAX/ COS(BETA)                                              BOST2150
      XX = (RMAX-RT/COS(BETA)) /TAN(PHI + BETA)                         BOST2160
      YY = XX*TAN(BETA)                                                 BOST2170
      CLNX = XX + RMAX*TAN(BETA)                                        BOST2180
      DELR = CLNX*YY/XX                                                 BOST2190
      RE = AA- DELR-TKEXIT                                              BOST2200
      AEXIT= RE*RE*PI                                                   BOST2210
  303 JK = JK + 1                                                       BOST2220
      IF (JK .GT.30) GO TO 304                                          BOST2230
      EPI = AEXIT/AT                                                    BOST2240
      IF (EPI .LT. 2.5) GO TO 308                                       BOST2250
      IF ( ABS(EPOLD/EPI -1.0).LT. .001) GO TO 311                      BOST2260
      EPOLD = EPI                                                       BOST2270
      CALL NOZEX(GAM,EPI,PHI,PEPC,CFV,IND)                              BOST2280
      PE = PEPC*PC                                                      BOST2290
      IF(IND.NE.0) GO TO 9023                                           BOST2300
      GO TO 303                                                         BOST2310
  311 RT = SQRT (AT/PI)*(1. - 0.4*(1./COS(PHI) -1.))                    BOST2320
      XX = (RMAX-RT/COS(BETA)) /TAN(PHI + BETA)                         BOST2330
      YY = XX*TAN(BETA)                                                 BOST2340
      CLNX = XX + RMAX*TAN(BETA)                                        BOST2350
      DELR = CLNX*YY/XX                                                 BOST2360
      ISP= CSTAR*CF/32.174                                              BOST2370
      EXLT = CLNX                                                       BOST2380
      GO TO 312                                                         BOST2390
C  ITERATION LOOP                                                       BOST2400
  143  CALL RAMNOZ(D,          IND,IPRINT,CSTAR)                       BOST2410
      IF(IND.NE.0) GO TO 9013                                           BOST2420
      ZNERNG = RHO*PI*D*(.05*XRN + .1)                                  BOST2430
       NOZWT = NOZWT + N121 + ZNERNG                                    BOST2440
      IF(II(11).EQ. 0) GO TO 144                                        BOST2450
C     NOZZLE FAIRING  ITEM 19                                           BOST2460
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      XAFT = LCYL+ RR/N2                                                    BOST2470
      CALL ZCYLLL(XRN,ZNERNG,RR,XAFT,XI1(19),Z(19),ZW(19))                  BOST2480
  144 AGX = PI*(.5*D-TC-N117)**2                                            BOST2490
       AFAT = WARD(10)                                                      BOST2500
      APAT = (1.-ETAX)*AGX/AT                                               BOST2510
      IF (APAT.GT.AFAT) AFAT = APAT                                         BOST2520
CMASS OF PROPELLANT FWD HEAD                                                BOST2530
       MPFH = RHOP *(  2.09*( D*.5-TFH-N114)**2 *(.5*D/N2-TFH -N114) -      BOST2540
     1      .5*AFAT*AT*D/N2) - RHOP*VRFH                                    BOST2550
CMASS OF PROPELLANT AFT HEAD                                                BOST2560
      MPAH1=RHOP*(2.09*(D*.5-TAH-N115)**2*(.5*D/N23-TAH-N115))              BOST2570
      MPAH = (MPAH1-RHOP*AFAT*AT*(.5*D/N23-TAH-N115))*FMPAH                 BOST2580
      A = PI*(D/2.-TC-N117)**2                                              BOST2590
CMASS OF PROPELLANT CYLINDER                                                BOST2600
       MPCYL =MP-MPFH-MPAH                                                  BOST2610
       IF(MPCYL) 2001,2002,2002                                             BOST2620
 2001  MPCYL =0.                                                            BOST2630
       KKK=KKK+1                                                            BOST2640
 2002  LCYL=MPCYL/(RHOP*(A-AFAT*AT))                                        BOST2650
    /  TB = MP*ISP/F                                                        BOST2660
C                      FORWARD HEAD WEIGHTS                                 BOST2670
      IF (N2-1.) 180,175,180                                                BOST2680
  175  MEMSTR =    N1*RHO* TFH *(PI*D*D/2.-N3*AT)                           BOST2690
      INSUL = N4*N114*1.5708*(D-2.*TFH)**2                                  BOST2700
       GO TO 185                                                            BOST2710
  180  SAY1 = SQRT (1.-1./(N2**2 ) )                                        BOST2720
       SAY = ALOG ( (1.+ SAY1)/(1.-SAY1) )                                  BOST2730
       MEMSTR =    N1*RHO*TFH*( D**2 * (.7854 + .3925/(N2**2 *SAY1) *       BOST2740
     1          SAY)  - N3 *AT )                                            BOST2750
      INSUL=N4*N114*((D-2.*TFH)**2*(.7854+.3925*SAY/SAY1/N2**2)-N3*AT)      BOST2760
  185  IBOSS =4.5*N9*TFH *RHO * AT                                          BOST2770
       IGNITR = N10 *(LCYL +D/N2)*.01766*(AFAT*AT)**.5 + N11                BOST2780
       FORDWT= MEMSTR + INSUL + IBOSS+ IGNITR + N13                         BOST2790
C                      CYLINDER WEIGHTS                                     BOST2800
       MEMSTC = PI    *RHO* TC*D *LCYL                                      BOST2810
      LINER = N117*N4*PI*(D-2.*TC)*LCYL                                     BOST2820
      TCIM = N117                                                           BOST2830
      TCIA = N117                                                           BOST2840
      CYLWT = MEMSTC+LINER+N21                                              BOST2850
C                      AFT  HEAD  WEIGHTS                                   BOST2860
      TAHIA = N115                                                          BOST2870
      TAHIM = 2.*TAHIA-TCIM                                                 BOST2880
      DN = SQRT(1.27323*EPSC*AT)                                            BOST2890
      IF (N23-1.) 190,187,190                                               BOST2900
  187  MEMSTA = 4.*N22*TAH*RHO *( PI*D*D/2.-EPSC* AT)                       BOST2910
      INSULA = N4*TAHIA*PI*((D-2.*TAH)**2/2.-DN**2/4.)                      BOST2920
       GO TO 195                                                            BOST2930
  190  SAY1= SQRT(1.-1./(N23**2 ) )                                         BOST2940
       SAY = ALOG ( (1.+ SAY1)/(1.-SAY1) )                                  BOST2950
       MEMSTA =    N22*TAH*RHO *(D**2 *(.7854 + .3925/(N23**2 * SAY1)*      BOST2960
     1          SAY )-EPSC*AT)                                              BOST2970
      INSULA = N4*TAHIA*((D-2.*TAH)**2*(.7854+.3925*SAY/SAY1/N23**2)        BOST2980
     1     -PI*DN**2/4.)                                                    BOST2990
  195  BOSS = 4.* N30 * TAH * RHO *D                                        BOST3000
  511  AFTHDW = MEMSTA + BOSS + INSULA + N33                                BOST3010
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C                       MISSILE  WEIGHTS                                        BOST3020
C CLD  FORSKT = N34 + 2.*N35*TC*RHO *D      +N36 *D**2 *( GMAX*ML/N37* (        BOST3030
       FORSKT = N34 +    N35*TC*RHO *D*PI   +N36 *D**2 *( GMAX*ML/N37* (        BOST3040
     1  .215*(LCYL+D/N2)/D+1.))**.5 +DLFS*PI*D*TC*RHO                           BOST3050
C CLD AFTSKT = N38 + 2.*N39*TC*RHO*D**2+N40*D**2*((ML+MP/2.)/N37                BOST3060
       AFTSKT = N38 + PI*N39*TC*RHO*D    +N40*D**2*((ML+MP/2.)/N37              BOST3070
     1         * (.215*(LCYL +D/N23)/D + 1.) )** .5                            BOST3080
C                       TOTAL  INERT  WEIGHT                                    BOST3090
       MF = FOHDWT + CYLWT + AFTHDW + FORSKT +AFTSKT + NOZWT + EXTWT            BOST3100
      MPMF=MP+MF                                                                BOST3110
C                       BURNOUT  WEIGHT                                         BOST3120
       MB =  MF  + ML                                                           BOST3130
C                       LAUNCH  WEIGHT                                          BOST3140
       MOC =  MB + MP                                                           BOST3150
      WRATL = DELVR/ISP/32.174                                                  BOST3160
        WRAT= 2.71828**WRATL                                                    BOST3170
       MP = (WRAT-1.)*(MB)                                                      BOST3180
C                       LAUNCH  THRUST-TO-WEIGHT  RATIO                         BOST3190
      F1MOC = F/MOC                                                             BOST3200
       IF(J)2011,2011,255                                                       BOST3210
  255 F = F1MO *MOC                                                             BOST3220
       LOOP1 = LOOP1 + 1                                                        BOST3230
       IF(ABS(F1MOC-F1MO)-.01) 2011,2011,2003                                   BOST3240
 2003  IF (KKK-4) 2015,2006,2006                                                BOST3250
 2015  IF(LOOP1.GT.25)WRITE(6,BADRUN)                                           BOST3260
       IF(LOOP1-35 ) 1427,1427,258                                              BOST3270
 2006 IF(IPRINP.NE.0) WRITE(6,2007) SDVI,MPFH,MPAH,ISP,MB                       BOST3280
 2007  FORMAT(46H NEGATIVE CYLINDER LENGTH,DELIVERED DELTA V = ,F10.3,          BOST3290
     1 17H PROP IN FWD HEAD,F10.5,17H PROP IN AFT HEAD,F10.5,/,                 BOST3300
     2 5H ISP=, F10.5,17HBURN OUT WEIGHT =,F10.5)                               BOST3310
       IND  = 7                                                                 BOST3320
       GO TO  22                                                                BOST3330
  258 IF ( IPRINP .GT. 0 ) WRITE(6,2012) F1MOC                                  BOST3340
      IND=5                                                                     BOST3350
      GO TO 22                                                                  BOST3360
 2012  FORMAT(45H UNABLE TO FIND THRUST TO WEIGHT VALUE,F1MOC=,F10.5)           BOST3370
 2011 SDVI=        ISP*32.174*ALOG(MOC/MB)                                     BOST3380
      LOOP2=LOOP2+1                                                             BOST3390
       IF (ABS(SDVI -DELVR)- .001*DELVR)  2004,2004,2116                        BOST3400
 2116  IF (KKK-4) 2005,2006,2006                                                BOST3410
 2005 IF((LOOP2+LOOP1).GT.90 .AND.( IPRINP.NE.0)) WRITE(6,BADRUN)               BOST3420
       IF (LOOP2+LOOP1-100)142,142,2008                                         BOST3430
 2010  FORMAT(50H UNABLE TO CONVERGE AFTER 100 ITERATIONS,DELTA V =,            BOST3440
     1 F10.3)                                                                   BOST3450
 2008 IF ( IPRINP .GT. 0  )WRITE(6,2010) SDVI                                   BOST3460
       IND = 4                                                                  BOST3470
       GO TO 22                                                                 BOST3480
 2004  CONTINUE                                                                 BOST3490
       SAY = RHOP * PI *(D/2. -TC -N117) * (LCYL +D*.5/N2 +D*.5/N23)*2.         BOST3500
      RR = F/ISP/SAY                                                            BOST3510
C                       MOTOR  MASS  FRACTION                                   BOST3520
       MMF = MP/(MP + MF)                                                       BOST3530
       SAW = (D/2.-TFH) **2  *(D *.5/N2 -TFH)                                   BOST3540
       SAW1 = ( D/2.- TAH)**2  * (D*.5/N23 -TAH)                                BOST3550
C                       VOLUMETRIC  LOADING  EFFICIENCY                         BOST3560
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      VOLLD = (MP/RHOP) /(PI *LCYL*(D/2.-TC)**2  +2.09*(SAW +SAW1) )    BOST3570
      PHO=PHI*57.2957795                                                BOST3580
      ITOT=       F*TB                                                  BOST3590
      IMPWT =  ITOT / MOC                                               BOST3600
      MPA = MP                                                          BOST3610
      LT = LCYL + D*.5/N2+DLES+XRN                                      BOST3620
      IF(III(11) .EQ.0) GO TO 710                                       BOST3630
C     IGNITER BOSS  ITEM 1                                              BOST3640
      R= SQRT(AT/PI/2.)                                                 BOST3650
      H= TEH*3.                                                         BOST3660
      RID =R-H                                                          BOST3670
      XD= H/2.                                                          BOST3680
      CALL ZCYLHH(H,IBOSS,R,RID,XD,XII(1),Z(1),ZW(1))                   BOST3690
C     FWD CLOSURE  ITEM 2                                               BOST3700
      RBOSS=R                                                           BOST3710
      RINS= RR-TEH                                                      BOST3720
      IF(N2.EQ.1.0) GO TO 711                                           BOST3730
      CALL ZELPLL(N2,RHO,RR,RBOSS,TEH,0.0,1,XII(2),Z(2),ZW(2))          BOST3740
      ZW(2) = Z(2)* MEMSTR                                              BOST3750
C     FWD INSULATION  ITEM 5                                            BOST3760
      EE=RINS/(RR/N2-TEH)                                               BOST3770
      CALL ZELPLL(EE,N4, RINS,RBOSS,NL14,TEH,1,XII(5),Z(5),ZW(5))       BOST3780
C     FWD PROPELLANT  ITEM 3                                            BOST3790
  512 RHOLE = SQRT(AFAT*AT/PI)                                          BOST3800
      CALL ZELPSS(N2,RHOP,RR,RHOLE,0.,1,XII(3),Z(3),ZW(3))              BOST3810
      ZW(3) = Z(3)* MPFH                                                BOST3820
C     IGNITER  ITEM 4                                                   BOST3830
      Z(4) = RBOSS                                                      BOST3840
      ZW(4) = RBOSS*IGNITR                                              BOST3850
      XII(4)= 0.0                                                       BOST3860
C     MISCELLANEOUS FWD WTS  ITEM 6                                     BOST3870
      WT(6) =    N13                                                    BOST3880
      XII(6)= 0.0                                                       BOST3890
      Z(6)=.5                                                           BOST3900
      ZW(6)= Z(6)*N13                                                   BOST3910
C     CYL CASE    ITEM 7                                                BOST3920
      XLF=RR/N2                                                         BOST3930
      CALL  ZCYLLL(LCYL,MEMSTC,RR,XLF,XII(7),Z(7),ZW(7))                BOST3940
C     CYL INSULATION  ITEM 8                                            BOST3950
      RI=RR-TC                                                          BOST3960
      CALL  ZCYLLL(LCYL,LINER,RI,XLF,XII(8),Z(8),ZW(8))                 BOST3970
C     MISCELLANEOUS CYL WTS  ITEM 9                                     BOST3980
      WT(9) = N21                                                       BOST3990
      Z(9) = LCYL/2. + XLF                                              BOST4000
      ZW(9)= Z(9)*WT(9)                                                 BOST4010
      XII(9) = 0.0                                                      BOST4020
C     CYL  PROPELLANT ITEM 10                                           BOST4030
      RPC = RR-TC-N114                                                  BOST4040
      CALL ZCYLHH(LCYL,MPCYL,RPC,RHOLE,XLF,XII(10),Z(10),ZW(10))        BOST4050
C     AFT  CLOSURE ITEM 11                                              BOST4060
      XAFT= XLF+LCYL                                                    BOST4070
      RAFT= DN/2.                                                       BOST4080
      RINS = RR -TAH                                                    BOST4090
      IF(N23.EQ.1.0) GO TO 513                                          BOST4100
      CALL ZELPLL(N23,RHO,RR,RAFT,TAH,XAFT,0,XII(11),Z(11),ZW(11))      BOST4110
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      ZW(11) = MEMSTA*Z(11)                                                    BOST4120
C     AFT INSULATION  ITEM 12                                                  BOST4130
      EE= RINS/(RR/N23- TAH)                                                   BOST4140
      CALL ZELPLL(EE,N4,RINS,RAFT,TAHIA,XAFT,0,XII(12),Z(12),ZW(12))           BOST4150
      ZW(12) = INSULA*Z(12)                                                    BOST4160
C     AFT PROPELLANT ITEM 13                                                   BOST4170
  514 DELAP =MPAH1-MPAH                                                        BOST4180
      HOLAFT = SQRT(DELAP/PI/RHOP/RR*N23)                                      BOST4190
      RAP = RR- TAH-TAHIA                                                      BOST4200
      EEP = RAP/(RR/N23-TAH-TAHIA)                                             BOST4210
      CALL ZELPSS(EEP,RHOP,RAP,HOLAFT,XAFT,0,XII(13),Z(13),ZW(13))             BOST4220
      ZW(13) = Z(13)*MPAH                                                      BOST4230
C     AFT BOSS  ITEM 14                                                        BOST4240
      H=3.*TAH                                                                 BOST4250
      HH= RR/N23                                                               BOST4260
      Y=HH*(1.-SQRT(1.-(RAFT/RR)**2))                                          BOST4270
      ACL = HH-Y                                                               BOST4280
      XDNOZ=XAFT+ACL                                                           BOST4290
      CALL ZCYLLL(H,BOSS,RAFT,XDNOZ,XII(14),Z(14),ZW(14))                      BOST4300
C     MISCELLANEOUS AFT WTS  ITEM 15                                           BOST4310
      XII(15) =0.0                                                             BOST4320
      Z(15) = XAFT+ ACL/2.                                                     BOST4330
      ZW(15) = Z(15)* N33                                                      BOST4340
      WT(15) = N33                                                             BOST4350
C     FORESKIRT  ITEM 16                                                       BOST4360
      FLSKT =N35                                                               BOST4370
      IF(N35.LE.0.0) FLSKT= RR/N2                                              BOST4380
      H     =FLSKT+ DLFS                                                       BOST4390
      XSKT  = FLSKT- DLFS                                                      BOST4400
      CALL ZCYLLL(H,FORSKT,RR,XSKT,XII(16),Z(16),ZW(16))                       BOST4410
C     AFT SKIRT  ITEM 17                                                       BOST4420
      ALSKT = N39                                                              BOST4430
      IF(N39.LE.0.0) ALSKT= RR/N23                                             BOST4440
      CALL ZCYLLL(ALSKT,AFTSKT,RR,XAFT,XII(17),Z(17),ZW(17))                   BOST4450
C     NOZZLE ITEM 18                                                           BOST4460
      WT(18) =  NOZWT - ZNERNG                                                 BOST4470
      Z(18) = ZNOZ + XAFT                                                      BOST4480
      ZW(18) = WT(18)*Z(18)                                                    BOST4490
      XII(18)= XINOZ                                                           BOST4500
      WTT =0.0                                                                 BOST4510
      ZTT =0.0                                                                 BOST4520
      DO 501  I=1,19                                                           BOST4530
      WTT = WTT +WT(I)                                                         BOST4540
  501 ZTT =ZTT+ ZW(I)                                                          BOST4550
      ZTE =  ZTT - ZW(3) - ZW(10) - ZW(13)                                     BOST4560
      ZBOOST = ZTT/WTT + DLFS                                                  BOST4570
      WTE =  WTT - WT(3) - WT(10) - WT(13)                                     BOST4580
      ZEMTY = ZTE/WTE + DLFS                                                   BOST4590
      XITOT =0.0                                                               BOST4600
      XMOV  =0.0                                                               BOST4610
      XMT   = 0.0                                                              BOST4620
      DO 502 I=1,19                                                            BOST4630
      XITOT = XITOT + XII(I)                                                   BOST4640
      XMT   =  XMT +(ZEMTY-Z(I))**2*WT(I)                                      BOST4650
  502 XMOV = XMOV +(ZBOOST-Z(I))**2*WT(I)                                      BOST4660
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      XIIBST =  XITOT + XMOV                                                    BOST4670
      XFF=(ZEMTY-Z(3))**2*WT(3)+(ZEMTY-Z(10))**2*WT(10)+(ZEMTY-Z(13))**         BOST4680
     12*WT(13)                                                                  BOST4690
      XIFF  = XII(3) + XII(10) + XII(13)                                        BOST4700
      XIIMT  = XMT-XFF + XITOT -XIFF                                            BOST4710
  710 IF(NOUT)712,275,712                                                       BOST4720
  711 CALL ZSPRLL(RHO,RR,TFH,RBOSS,0.0,1,XII(2),Z(2),ZW(2))                     BOST4730
      CALL ZSPRLL(N4,RINS,N114,RBOSS,TFH,1,XII(5),Z(5),ZW(5))                   BOST4740
      GO TO 512                                                                 BOST4750
  513 CALL ZSPRLL(RHO,RR,TAH,RAFT,XAFT,0,XII(11),Z(11),ZW(11))                  BOST4760
      CALL ZSPRLL(N4,RINS,TAHIA,RAFT,XAFT,0,XII(12),Z(12),ZW(12))               BOST4770
      GO TO 514                                                                 BOST4780
  712 TMOTOR = MP + ME                                                          BOST4790
      IF(IEX .NE. 1) GO TO 713                                                  BOST4800
      CFVA = CFV* FJ                                                            BOST4810
      ISPV = CSTAR*CFVA/32.174                                                  BOST4820
  713 QSUB = PSUB*100.                                                          BOST4830
      QPELL = 100.*PBELL                                                        BOST4840
      FWHLT  = D/N2*.5                                                          BOST4850
      CASEWT = MEMSTR+MEMSTA+MEMSTC                                             BOST4860
      WTITOT = INSUL +INSULA+LINER                                              BOST4870
      WBOSS  = IBOSS + BOSS                                                     BOST4880
      WCON   = N13 + N21+ N33                                                   BOST4890
      FOADWT = FORDWT + FORSKT                                                  BOST4900
       TOMIS = FORSKT + AFTSKT                                                  BOST4910
      AFTADW = AFTHDW + AFTSKT                                                  BOST4920
      FWT = FOADWT+MPFH                                                         BOST4930
      CWT = CYLWT +MPCYL                                                        BOST4940
      AWT = AFTADW + MPAH                                                       BOST4950
      THIKC = .3                                                                BOST4960
      TC = TIEC*2.                                                              BOST4970
      CH = FOADWT + CYLWT + AFTADW                                              BOST4980
      IF(IPRINP .EQ.0) GO TO 275                                                BOST4990
C     PRINT BOOSTER DATA                                                        BOST5000
      WRITE(6,701)                                                              BOST5010
      WRITE(6,702)MP,F    ,CF    ,ME,FIMOC,        TMOTOR,SDVI,CFVA,          BOST5020
     1ML,ITOT,TB    ,MOC,ISP    ,RB    ,MB,ISPV,AFAT                           BOST5030
      WRITE(6,703)D,PP,MMF,LCYL,PC    ,VOLLD,FWHLT,PAP    ,IMPWT,XPN,PF,    BOST5040
     1 BETA,DLFS,LT                                                             BOST5050
      IF ( IPRINP .LE. 0 ) GO TO 275                                            BOST5060
      IF(II(11).GT. 0)                                                          BOST5070
     1WRITE(6,726) ZBOOST,ZEMTY,XIIBST,XIIMT                                    BOST5080
      WRITE(6,704) IB                                                           BOST5090
      WRITE(6,705) MEMSTR,MEMSTC,MEMSTA,CASEWT,INSUL,LINER,INSULA,WTITOTBOST5100
     2,IBOSS,BOSS,WBOSS,IGNITR,                                                 BOST5110
     3                  IGNITR,FORSKT,AFTSKT,TOMIS,N13,N21,N33,WCON,           BOST5120
     4 FOADWT,CYLWT,AFTADW,CH,MPFH,MPCYL,MPAH,MP,NOZWT,FWT,CWT,AWT,             BOST5130
     5  TMOTOR                                                                 BOST5140
      WRITE(6,706) N114,TCIA,TAHIA,TCIM,TAHIM,TFH,TC,TAH                        BOST5150
      WRITE(6,714 ) FTU,FTY                                                     BOST5160
  714 FORMAT(6X,23HULTIMATE CASE STRENGTH ,F8.0,2X21HYIELD CASE STRENGTHBOST5170
     1  ,F8.0)                                                                 BOST5180
      WRITE(6,707)TMIN                                                          BOST5190
  707 FORMAT(6X,      40HTHE MINIMUM ALLOWABLE CASE THICKNESS WAS,F9.5/)BOST5200
      IF(IEX.NE.0) GO TO 750                                                    BOST5210
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      WRITE(6,708)                                                          BOST5220
      WRITE(6,709)WG,XG,TG,QBELL,WA,X1,DELA,QSUB,WTB,     PHO,WC,          BOST5230
     1EPI,WTI,XI,     X3,EPSC,Z1,AT,THICKC,X1,WRN,XRN,TAH, ZNERNG,N121,     BOST5240
     2 NOZWT                                                                BOST5250
      WRITE (6,720) Y1,THED,RC                                              BOST5260
      GO TO 275                                                             BOST5270
750   WRITE (6,755)                                                         BOST5280
      WRITE(6,751)NBOSS,STHRSL,XCONE,INSRRG,THININ,XINSUL,NOZWT,XRN         BOST5290
755 FORMAT(//4X,6HNOZZLE)                                                   BOST5300
      WRITE(6,752) QBELL,PHO,EPI,EPSC,AT                                    BOST5310
752 FORMAT(2X, 52H  BELL      HALF ANG     EPI      ENT RATIO THROAT AREABOST5320
     1/2X,8F10.5//)                                                         BOST5330
751 FORMAT(2X,77H   NOZZLE    THRCAT      EXIT      INSERT     THROAT   EXBOST5340
     1IT CONE    TOTAL      TOTAL /6X,74HBOSS  STRUCTURE  STRUCTURE RETAINEBOST5350
     2R  ASSEMBLY  INSULATN    WEIGHT     LENGTH/2X,8F10.5/)               BOST5360
701 FORMAT(      4X,22HBOOSTER SIZING DETAILS                 ,            BOST5370
     1              5X,7HWEIGHTS,    20X                                   BOST5380
     2,11HPERFORMANCE,13X'INTERNAL BALLISTICS')                             BOST5390
702 FORMAT(6X,12HPROPELLANT  ,F10.2,5X'THRUST    ',F10.2,5X'CF',9X,F9.3BOST5400
     1/                                                                     BOST5410
     16X,12HINERTS       ,F10.2,5X'THRUST/WT',F10.2/                       BOST5420
     26X,12HTOTAL MOTOR ,F10.2,5X'DELTA VI ',F10.3,5X'CF VACUUM  ',F9.3/BOST5430
     36X,12HPAYLOAD     ,F10.2,5X'I TOTAL  ',F10.2,5X'BURN TIME  ',F9.3/BOST5440
     46X,12HLAUNCH WT   ,F10.2,5X'ISP DEL  ',F10.3,5X'BURN RATE  ',F9.3/BOST5450
     56X,12HBURN OUT WT ,F10.2,5X'ISP VAC  ',F10.3,5X'PORT/THROAT',F9.3)BOST5460
703 FORMAT( 5X,10HDIMENSIONS,17X,9HPRESSURES ,15X,13HMISCELLANEOUS  / BOST5470
     16X,12HDIAMETER    ,F10.3,5X'DESIGN    ',F10.2,5X'MMF         ',F9.4/BOST5480
     26X,12HLT CYL      ,F10.3,5X'CHAMBER   ',F10.2,5X'VOL LOADING',F9.4/BOST5490
     36X,12HLT FWD HEAD ,F10.3,5X'AMBIENT   ',F10.2,5X'(I TOT)/WT ',F9.2/BOST5500
     46X,12HLT NOZZLE   ,F10.3,5X'EXIT      ',F10.2,5X,12HNOZ CANT ANG ,  BOST5510
     1 F8.2                                    /6X,10HSKIRT EXTN  ,        BOST5520
     5 F12.3/6X,8HTOTAL LT,F14.3)                                           BOST5530
726 FORMAT(6X,12HCG LOADED  ,F10.3,5X,9HCG EMPTY ,F10.3,5X,11HMOI LOADBOST5540
     1ED   ,F9.0,5X,11H,MOI EMPTY  ,F9.0 )                                  BOST5550
704 FORMAT(14X,28HBREAKDOWN OF CHAMBER DESIGN ,15X, 9HMATERIAL,3A4/    BOST5560
     127X,42HFORWARD   CYLINDER      AFT          TOTAL /5X,7HWEIGHTS)  BOST5570
705 FORMAT(6X14H STRUCTURE    ,4F12.3/                                      BOST5580
     16X,14H INSULATION   ,4F12.3/6X,14H BOSS         ,F12.3,12X,2F12.3/BOST5590
     26X,14H IGNITER      ,F12.3,24X,F12.3 /                               BOST5600
     36X,14H SKIRTS       , F12.3,12X,2F12.3/                              BOST5610
     46X,14H CONSTANTS    ,4F12.3/6X,14HTOTAL CHAMBER ,4F12.3 /            BOST5620
     56X,14HPROPELLANT    ,4F12.3/6X,14HNOZZLE WEIGHT ,36X,F12.3/          BOST5630
     65X,15HTOTAL WEIGHT    ,4F12.3)                                        BOST5640
706 FORMAT( 5X,10HTHICKNESS /6X,10HINSULATION /                             BOST5650
     16X,4H AVG,10X,3F12.5 /6X,4H MAX,22X,2F12.5/6X,4HCASE,10X,3F12.5)  BOST5660
708 FORMAT(4X26HBREAKDOWN OF NOZZLE DESIGN /22X,50HWEIGHT   LENGTH    BOST5670
     1THICKNESS    DESIGN CONDITIONS  /24X,24HLBS    INCHES     INCHES/ BOST5680
     25X,6HINSERT )                                                         BOST5690
709 FORMAT(5X,15H GRAPHITE      ,3F10.3,3X,12HPERCENT BELL ,7X,F9.3/  BOST5700
     25X,15H ABLATIVE MATL ,3F10.3,3X,19HPERCENT SUBMERGED  F9.3/       BOST5710
     45X,15H THROAT BAND   ,F10.3,23X,      19HHALF ANGLE          ,F9.3/BOST5720
     55X,15H CLAMP         ,F10.3,      23X,19HEXPANSION RATIO    ,F9.3/BOST5730
     65X,15HINSERT TOTAL   ,F10.3,F10.3/                                  BOST5740
     75X,15H ENTRANCE      ,10X,F10.3,13X,  19HENTRANCE RATIO     ,F9.3/BOST5750
     85X,15H AFT DOME      ,10X,F10.3,13X,  19HTHROAT AREA        ,F9.3/BOST5760
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     85X,15H CLAMP             ,10X,F10.3/                                          BOST5770
     95X,15H EXIT CONE      ,10X,F10.3/5X,15HRAMJET NOZZLE   ,F10.3,2F10.3BOST5780
     X /6X,14HNOZZLE FAIRING     ,F10.3,                                           BOST5790
     X  /6X,14HMISCELLANEOUS   ,F10.3,                                             BOST5800
     1       /5X,15HTOTAL NOZ ASSY   ,F10.3)                                       BOST5810
  720 FORMAT(5X,32HRAMJET NOZZLE  ENTRANCE GEOMETRY / 5X,                          BOST5820
     133HAFT DOME/ENTRANCE TANGENT RADIUS ,F8.3,13H ENTRANCE ARC ,F7.2,            BOST5830
     2 8H DEGREES /5X,26HNOZZLE RADIUS OF CURVATURE ,F8.3,17H NOZZLE FLABOST5840
     3T 0.20)                                                                      BOST5850
  275 SCWT=(WTI + IGNITR/2. + MP ) * FACTOR                                        BOST5860
      IF ( II(1) .NE. 41 ) GO TO 8118                                              BOST5870
      WMC=CASEWT+WBOSS+TOMIS                                                       BOST5880
      MPX=MP                                                                       BOST5890
      NOZWTX=NOZWT                                                                 BOST5900
      VBI=WTITOT/N4                                                                BOST5910
      Y1X=Y1                                                                       BOST5920
      R5X=SQRT(A5A3) * D/2.                                                        BOST5930
 8118 CONTINUE                                                                     BOST5940
      DCOM=D                                                                       BOST5950
      CASEMX=CASEM                                                                 BOST5960
      MP= MP*FACTOR                                                                BOST5970
      MPMF= MPMF*FACTOR                                                            BOST5980
      PEXIT = EPI * AT     /    144.                                               BOST5990
      BTHVAC = F * ISPV / ISP                                                      BOST6000
      BTHVAC = BTHVAC * FACTOR                                                     BOST6010
      BEXIT = BEXIT * FACTOR                                                       BOST6020
      BISPV = ISPV                                                                 BOST6030
      BOOWP = MP                                                                   BOST6040
      SEXIT = RR * RR * PI * A6A3      /  144.                                     BOST6050
      DROPST  = ( WTI + IGNITR/2. ) * FACTOR                                       BOST6060
      DROPEB = MOC * FACTOR                                                        BOST6070
      DROPEB = ME * FACTOR                                                         BOST6080
      RETURN                                                                       BOST6090
 9013 IF (IPRINP .LE. 0 ) RETURN                                                   BOST6100
      WRITE (6,9003)                                                               BOST6110
 9003 FORMAT(16H ERROR IN RAMNOZ)                                                  BOST6120
   22  WRITE (6, 12 ) IND                                                          BOST6130
      WRITE(6,652)          APE2,ML,A6Z3,A5Z3,PA                                   BOST6140
      WRITE(6,BADRUN)                                                              BOST6150
       CALL POUMP(WG,ISPV,5)                                                       BOST6160
      RETURN                                                                       BOST6170
  135 IF (IPRINP .LE. 0 ) RETURN                                                   BOST6180
      WRITE (6,36) MCASE                                                           BOST6190
   36 FORMAT(26H ERROR IN SUBROUTINE MATLS  ,I5)                                   BOST6200
      RETURN                                                                       BOST6210
 9023 IF (IPRINP .LE. 0 ) RETURN                                                   BOST6220
      WRITE (6,9024) GAM, EPI, PHI                                                 BOST6230
 9024 FORMAT(16H ERROR IN NOZEX  ,3E20.6)                                          BOST6240
      RETURN                                                                       BOST6250
       END                                                                         BOST6260


      SUBROUTINE COINLT                                                          COIL0010
C   NUK.CM-CGSM  R.K.MCDONOUGH  FIV/EBCD   10/18/73                              COIL0020
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C   SUBROUTINE FOR  INLET DRAG                                                  CDIL0030
      COMMON/OUTPI/ CDSKIN,CDPDIV,CDCOWL,CDPAFT,CDFDIV,CDFFWD,                  CDIL0040
     1     OUTP8(8), CDPFWD, OUTDUM(20)                                         CDIL0050
      COMMON /RJDAT/ RJ4(4), ACA3, RJD44(4)                                     CDIL0060
      COMMON/PRINTR/ IPSM, IPIM(2), IAIR, IPUM(3)                               CDIL0070
      COMMON /INLSTF/ AWEQ                                                      CDIL0080
      COMMON /IPROP/ IND,IMIN,NEWPT,IRJOUT                                      CDIL0090
      COMMON /INDATA/ CDINL, CLALF,WEIGHT                                       CDIL0100
      COMMON /INDES/ X1(12),        DEL1,DEL2,DEL3,XMDES                        CDIL0110
      COMMON/CODEXX/ ININ(16)                                                   CDIL0120
      EQUIVALENCE (ININ(2),ITYPE),(ININ(15),NOUT)                               CDIL0130
      COMMON/EXTERN/ ARR(20)                                                    CDIL0140
      EQUIVALENCE (ARR(3),D3),(ARR(16),XMZERO),(ARR(17),XMRJTC)                 CDIL0150
      COMMON / SUSDAT/ TX(44)                                                   CDIL0160
      EQUIVALENCE (TX(33),SUSLT)                                                CDIL0170
      DATA C /0.0174532S/                                                       CDIL0180
      EQUIVALENCE        (SREF,A3),(AMACH,XMZERO,RM),(DBL,HBLYER),              CDIL0190
     1(XLBYD,FAIRER),(AFFPRJ,AWDFG)                                             CDIL0200
      COMMON/INDATX/ HPROJ,HC,W,HBLYER,ANGLEL,ANGLEU,ANGDUB,ABLDIV,             CDIL0210
     1HBLDIV,XCHECK,XFRNG,XNAC   ,XDIST ,AWET,AWETFF,DELEXT,ADIVWT,             CDIL0220
     2XLBYD,AFFPRJ,ACPROJ,              TSTART,TFRNG, HP                       CDIL0230
      COMMON /ALTDD/                                                            CDIL0240
     1K1,ALT(24),SDTEMP(24),PRESS(24),ID(8)                                     CDIL0250
      COMMON /INCOMM/XLDUMP,XFFRNG,XINLET,XTIPCL,STERM,TNOZL                    CDIL0260
       DIMENSION TAB3(50),TABX(20),TABY(44), TABZ(22),FRCTN3(42)                CDIL0270
      DIMENSION TAB4(20)                                                        CDIL0280
      DATA TABX/0.0, 0.0, 1.0, 0.480, 2.0, 1.740, 3.0, 2.46, 4.0, 2.99,         CDIL0290
     15.0, 3.32, 6.0, 3.72, 8.0, 4.25, 10.0, 5.00, 16.0, 5.60/                  CDIL0300
      DATA TABY/0.0, 2.0, 0.10, 1.60, 0.20, 1.24, 0.30, 1.03, 0.40,             CDIL0310
     10.89, 0.50, 0.80, 0.60, 0.72, 0.70, 0.65, 0.80, 0.60, 0.90, 0.55,        CDIL0320
     21.0, 0.50, 1.25, 0.41, 1.5, 0.35, 1.75, 0.30, 2.0, 0.25, 2.5,            CDIL0330
     30.17, 3.0, 0.12, 4.0, 0.08, 5.0, 0.05, 10.0, 0.02, 100.0,                CDIL0340
     40.01, 1000.0, 0.0/                                                        CDIL0350
      DATA TABZ/0.0, 0.135, 0.80, 0.135, 0.90, 0.144, 1.0, 0.195,               CDIL0360
     11.2, 0.190, 1.6, 0.167, 2.0, 0.140, 3.0, 0.092, 4.0, 0.065,              CDIL0370
     25.0, 0.048, 6.0, 0.037/                                                   CDIL0380
      DATA TAB3 / 0.,0.,.05,.016,.1,.029,.15,.05,.2,.071,.25,.098,.3,           CDIL0390
     1 .122, .35,.151,.4,.18,.45,.212,.5,.247,.55,.283,.6,.317,.65,.36,        CDIL0400
     2 .7,.406,.75,.45,.8,.503,.85,.554,.9,.606,.95,.667,1.,.73,1.05,          CDIL0410
     3 .794,1.1,.864,1.15,.931,1.2,1.005 /                                      CDIL0420
CALCULATE THE INLET DRAG                                                        CDIL0430
      DATA FRCTN3/      0.0,      0.0,      1.0,      0.5,    0.973,     0.75,CDIL0440
     1                0.945,      1.0,    0.915,      1.5,    0.834,      2.5,CDIL0450
     2                 0.65,      3.0,    0.574,      4.0,    0.445,      5.0,CDIL0460
     3      0.353,    6.0,     .29,    80000.,   0.0,   1.0,                   CDIL0470
     4                  0.5,    0.978,     0.75,     0.96,      1.0,    0.933,CDIL0480
     5                  1.5,    0.858,      2.5,     0.68,      3.0,     0.61,CDIL0490
     6                  4.0,    0.491,      5.0,      0.4,      6.0,    0.347/CDIL0500
      DATA TAB4/    0.0,    0.0,    10.0,    0.20,    20.0,    0.37,           CDIL0510
     1              30.0,    0.5,    40.0,    0.67,    50.0,    0.80,           CDIL0520
     2              60.0,    0.87,    70.0,    0.92,    80.0,    0.98,          CDIL0530
     3              90.0,    1.00/                                              CDIL0540
       PYPX(A,B)=(7.*A**2 *B**2 -1.)/6.                                         CDIL0550
      XMSQD(A,B)=(36.*A**4 *B**2 -5.*((A*B)**2 -1.)*(7.*(A*B)**2 +5.))/         CDIL0560
     1((7.*(A*B)**2 -1.)*((A*B)**2 +5.))                                        CDIL0570
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      NAMELIST /QQ/ CDINL,CDPFWD,CDFFWD,CDPDIV,CDFDIV,CDPAFT,CDSKIN,     CDIL0580
     1 CDCOWL,REYNAC,AMACH,HP                                            CDIL0590
      A3 = ARR(12)*144.                                                  CDIL0600
      SREF=A3                                                            CDIL0610
      AC=ACA3 * A3                                                       CDIL0620
      ACPER=AC/XNINLT                                                    CDIL0630
      KBYXIN = 0                                                         CDIL0640
      CDSKIN=0.                                                          CDIL0650
      CDCOWL=0.                                                          CDIL0660
      XNINLT = ITYPE                                                     CDIL0670
      CDPFWD=0.                                                          CDIL0680
      CDFFWD=0.                                                          CDIL0690
      CDPDIV=0.                                                          CDIL0700
      CDFDIV=0.                                                          CDIL0710
      CDPAFT=0.                                                          CDIL0720
      CALL TLU1(HP,ALT,K1,PRESS,P0,IND)                                  CDIL0730
      IF(IND .NE. 0) GO TO 38                                            CDIL0740
      CALL TLU11(SDTEMP,T0)                                              CDIL0750
      ALK=HP/1000.                                                       CDIL0760
      RHOAIR=P0/(53.3*T0)                                                CDIL0770
      RHOSLG=RHOAIR/32.2                                                 CDIL0780
      XMU=(0.302/1000000)*((392.+198.)/(T0+198.))*(T0/392.)**1.5         CDIL0790
      VSOUND=49.02*SQRT(T0)                                              CDIL0800
      REYFTM=VSOUND*RHOSLG/XMU                                           CDIL0810
      REYFT=REYFTM*XMZERO                                                CDIL0820
      REY=REYFT*(XCHECK/12.)                                             CDIL0830
      IF(ININ(1).GT.49.AND.XMZERO.LE.1) GO TO 502                        CDIL0840
C CALCULATE THE COWL PRESSURE COEFFICIENT                                CDIL0850
      IF( (XMZERO.GT.XMRJTO) .AND. (XMZERO.GE.XMDES) ) GO TO 174         CDIL0860
      DELEND=DEL1+DEL2+DEL3                                              CDIL0870
      DELLIP=DELEXT-DELEND                                               CDIL0880
      CPLIP = 0.0                                                        CDIL0890
      IF ( XMZERO .LT. XMRJTO ) GO TO 50                                 CDIL0900
C SHOCKS OUTSIDE INLET. HAVE POSSIBLY 4 SHOCKS. TWIS RETURNED IN DEG.    CDIL0910
      CALL THETA(DEL1,XMZERO,TW,IND)                                     CDIL0920
      IF(IND.NE.0)GO TO 49                                               CDIL0930
      TWR=TW*C                                                           CDIL0940
      P1P0=PYPX(XMZERO,SIN(TWR))                                         CDIL0950
      XM1=SQRT(XMSQD(XMZERO,SIN(TWR)))                                   CDIL0960
      CALL THETA(DEL2,XM1,TW,IND)                                        CDIL0970
      IF(IND.NE.0)GO TO 51                                               CDIL0980
      TWR=TW*C                                                           CDIL0990
      P2P1=PYPX(XM1,SIN(TWR))                                            CDIL1000
      P2P0=P2P1*P1P0                                                     CDIL1010
      XM2=SQRT(XMSQD(XM1,SIN(TWR)))                                      CDIL1020
      CALL THETA(DEL3,XM2,TW,IND)                                        CDIL1030
      IF(IND.NE.0) GO TO 52                                              CDIL1040
      TWR=TW*C                                                           CDIL1050
      P3P2=PYPX(XM2,SIN(TWR))                                            CDIL1060
      P3P0=P2P0*P3P2                                                     CDIL1070
      XM3=SQRT(XMSQD(XM2,SIN(TWR)))                                      CDIL1080
C CHECK IF HAVE EXPANSION OF SHOCK OFF EXTERNAL COWL LIP                 CDIL1090
      IF (DELEXT.GT.DELEND) GO TO 53                                     CDIL1100
      CPLIP=(P3P0-1.)/(.7*XMZERO**2 )                                    CDIL1110
      GO TO 50                                                           CDIL1120
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C GO TO 53 INDICATES SHOCK OFF COWL LIP AT XMZERO.LT.XMDES                    CDIL1130
   53  CALL THETA((DELEXT-DELEND),XM3,TW,IND)                                CDIL1140
       IF(IND.NE.0) GO TO 48                                                 CDIL1150
       TWR=TW*C                                                              CDIL1160
       P4P3=PYPX(XM3,SIN(TWR))                                               CDIL1170
       P4P0=P3P0*P4P3                                                        CDIL1180
       CPLIP=(P4P0-1.)/(.7*XMZERO**2)                                        CDIL1190
       GO TO 50                                                              CDIL1200
   48  P4P3=PYPX(XM3,1.)                                                     CDIL1210
       P4P0=P4P3*P3P0                                                        CDIL1220
       CPLIP=(P4P0-1.)/(.7*XMZERO**2)                                        CDIL1230
       GO TO 50                                                              CDIL1240
C GO TO 174 INDICATES ALL INLET SHOCKS INSIDE LIP                            CDIL1250
   174 DELLIP=DELEXT                                                         CDIL1260
       CALL THETA(DELLIP,XMZERO,TW,IND)                                      CDIL1270
       IF(IND.NE.0)GO TO 49                                                  CDIL1280
       TWR=TW*C                                                              CDIL1290
       CPLIP=   (XMZERO*XMZERO*(SIN(TWR)**2 )-1.)*5./(3.*XMZERO**2 )         CDIL1300
       GO TO 50                                                              CDIL1310
C GO TO 49 INDICATES DETACHED SHOCK. USE NORMAL SHOCK PRESSURE RISE           CDIL1320
   49  CPLIP= 5.*(XMZERO**2 -1.)/(3.*XMZERO**2 )                             CDIL1330
       GO TO 50                                                              CDIL1340
  51   P3P1=PYPX(XM1,1.)                                                     CDIL1350
       P3P0=P3P1*P1P0                                                        CDIL1360
       CPLIP=(P3P0-1.)/(.7*XMZERO**2 )                                       CDIL1370
       GO TO 50                                                              CDIL1380
  52   P3P2=PYPX(XM2,1.)                                                     CDIL1390
       P3P0=P3P2*P2P0                                                        CDIL1400
       CPLIP=(P3P0-1.)/(.7*XMZERO**2 )                                       CDIL1410
       GO TO 50                                                              CDIL1420
   502 CPLIP=0.                                                              CDIL1430
   50  CPBAR=CPLIP/2.                                                        CDIL1440
       IND = 0                                                               CDIL1450
CALCULATE THE DIVERTER PRESSURE AND FRICTION DRAG                            CDIL1460
CALCULATE THE DIVERTER PRESSURE DRAG                                         CDIL1470
       IF(XMZERO.LT.XMRJTO) GO TO 3697                                       CDIL1480
       THEDIV=10.*C                                                          CDIL1490
       IF(ITYPE.EQ.1) GO TO 4271                                             CDIL1500
       ADD1 = ANGLEL + ANGLEU                                                CDIL1510
       HTOT=HPROJ+HC+2.*TSTART                                               CDIL1520
       XLDIV=0.5*HTOT/SIN(THEDIV)                                            CDIL1530
       TOC=HTOT/(2.*XLDIV)                                                   CDIL1540
       GO TO 4272                                                            CDIL1550
  4271 XLDIV=0.5*(W+2.*TSTART)/SIN(THEDIV)                                   CDIL1560
       TOC=(W+2.*TSTART)/(2.*XLDIV)                                          CDIL1570
       ADD1 = ANGDUB                                                         CDIL1580
       IF(ININ(1).GT.49.AND.XMZERO.LE.1) GO TO 4273                          CDIL1590
  4272  CONTINUE                                                             CDIL1600
        XMM = 0.882*RM                                                       CDIL1610
        XCDM = (RM*RM-1.0)/(RM*RM*TOC)**(2./3.)                              CDIL1620
        XCDMB = (XMM*XMM-1.0)/(XMM*XMM*TOC)**(2./3.)                         CDIL1630
        P = XCDM                                                             CDIL1640
       QL=0.                                                                 CDIL1650
        IF (P.GT.-3.0)QL=0.1233*(P+3.0)                                      CDIL1660
        IF (P.GT.-1.25)QL=0.21+0.828*(P+1.25)                                CDIL1670
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      IF (P.GT.1.25)QL=2.28                                                  CDIL1680
      IF (P.GT.1.9)QL=2.28-2.085*(P-1.9)                                     CDIL1690
      IF (P.GT.2.25)QL=1.55-0.314*(P-2.25)                                   CDIL1700
     IF(P.GT.4.25) QL=.922-.0907*(P-4.25)                                    CDIL1710
      CDTC = QL                                                              CDIL1720
      P = XCDMB                                                              CDIL1730
     QL=0.                                                                   CDIL1740
      IF (P.GT.-3.0)QL=0.1233*(P+3.0)                                        CDIL1750
      IF (P.GT.-1.25)QL=0.21+0.828*(P+1.25)                                  CDIL1760
      IF (P.GT.1.25)QL=2.28                                                  CDIL1770
      IF (P.GT.1.9)QL=2.28-2.085*(P-1.9)                                     CDIL1780
      IF (P.GT.2.25)QL=1.55-0.314*(P-2.25)                                   CDIL1790
     IF(P.GT.4.25) QL=.922-.0907*(P-4.25)                                    CDIL1800
     CDTCB=QL                                                                CDIL1810
     RD=D3/2.                                                                CDIL1820
     SBL = ADD1*((RD+DBL)**2-RD*RD)*C                                        CDIL1830
     SDIV=ABLDIV                                                             CDIL1840
     SOBL = SDIV-SBL                                                         CDIL1850
     CDPD =    CDTCB*(SDIV/SREF)*(XMM/RM)**2*((TOC/(XMM*XMM))**(2./3.))     CDIL1860
     CDPDIV=CDPD                                                             CDIL1870
     CDPC = 0.0                                                              CDIL1880
     HBLD=HBLDIV                                                             CDIL1890
     IF (DBL.LT.HBLD) CDPC=(CDPD/SDIV)*SBL+CDTC*(SOBL/SREF)*                 CDIL1900
    1                  ((TOC/(RM*RM))**(2./3.))*2.0                         CDIL1910
     IF(DBL.LT.HBLD) CDPDIV=CDPC                                             CDIL1920
     GO TO 4274                                                              CDIL1930
 4273 CDPDIV=0.                                                              CDIL1940
 4274 CONTINUE                                                               CDIL1950
CALCULATE THE B/L DIVERTER SKIN FRICTION                                     CDIL1960
     REYLDG=REY                                                              CDIL1970
     CFII=0.482/(ALOG10(REYLDG))**2.62                                       CDIL1980
     CALL BLINE(2,10,FRCTN3(1),ALK,XMZERO,CFCFII)                            CDIL1990
     CDFDIV=CFII*CFCFII*ADIVWT/A3                                            CDIL2000
     GO TO 1111                                                              CDIL2010
 3697 CONTINUE                                                               CDIL2020
     IF(ININ(1).GT.49) GO TO 912                                             CDIL2030
CALCULATE FWD FAIRING PRESSURE AND FRICTION DRAG                             CDIL2040
C**********NACELLE FORWARD FAIRING DRAG**********                           CDIL2050
     FAIRFR=XLBYD                                                            CDIL2060
     IF(FAIRFR.LE.1.) FAIRFR=1.                                              CDIL2070
     TNF=ATAN(1.0/(FAIRFR + FAIRFR))*57.296                                  CDIL2080
     IF(RM.NE.1.0) GO TO 910                                                 CDIL2090
     CALL LINE(10, TNF, TAB4(1), CDPF1)                                      CDIL2100
     CDPFWD=CDPF1                                                            CDIL2110
     CDPFWD = CDPFWD * AWDFG / SREF                                          CDIL2120
     GO TO 911                                                               CDIL2130
  910 DML=RM/FAIRFR                                                          CDIL2140
     CALL LINE(25,DML,TAB3,CDWW2)                                            CDIL2150
     CDPFWD=(AWDFG)*(CDWW2/RM**2)/SREF                                       CDIL2160
     IF ( RM .LT. 1.0 ) CDPFWD = 0.0                                         CDIL2170
  911 CONTINUE                                                               CDIL2180
CALCULATE THE FRICTION DRAG ON THE FWD FAIRING                               CDIL2190
     REYFWD=REYFTM*XMZERO*XDIST/12.                                          CDIL2200
     CFFWDI=0.482/(ALOG10(REYFWD))**2.62                                     CDIL2210
     CALL BLINE (2,10,FRCTN3(1),ALK,XMZERO,CFCFII)                           CDIL2220
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      CDFFWD=CFFWDI*CFCFII*AWETFF/A3                                    CDIL2230
      GO TO 1111                                                        CDIL2240
  912 CDFFWD=C.                                                         CDIL2250
      CDFFWD=0.                                                         CDIL2260
C AFT FAIRING                                                           CDIL2270
 1111  CDNBTL=0.                                                       CDIL2280
      IF(ITYPE.EQ.1) GO TO 7849                                         CDIL2290
      STERM=   (HBLDIV+W+2.*TSTART)                                     CDIL2300
      HTOT=HC+HPROJ+2.*TSTART                                           CDIL2310
      GO TO 7850                                                        CDIL2320
 7849 STERM=   (HBLDIV+HC+HPROJ+2.*TSTART)                              CDIL2330
      HTOT=W+2.*TSTART                                                  CDIL2340
 7850 CONTINUE                                                          CDIL2350
       AEFF= HTOT*STERM                                                 CDIL2360
       DEFF=1.12838*SQRT(AEFF)                                          CDIL2370
      RLD = XFRNG / DEFF                                                CDIL2380
      RMCR = .865 + .032 * RLD                                          CDIL2390
C                                                                       CDIL2400
       BETA=SQRT(ABS(RM**2-1.))                                         CDIL2410
       IF(RM.GT.1.1) GO TO 851                                          CDIL2420
       THDBT=ATAN(0.5*DEFF/XFRNG)                                       CDIL2430
      IF(RM -1.0) 100C,75C,850                                          CDIL2440
  851  RLDB=(RLD + RLD)/BETA                                            CDIL2450
       CALL LINE(10,RLDB,TABX,CDA)                                      CDIL2460
       CDBTL= 0.25*CDA*(1.0/RLD)**2                                     CDIL2470
  800  CDNBTL=CDBTL*AEFF/SREF                                           CDIL2480
       BOVER=BETA/RLD                                                   CDIL2490
       CALL LINE(22,BOVER,TABY,CDBT)                                    CDIL2500
       CDNBTX=CDBT/RLD**2                                               CDIL2510
      IF (CDNBTX .GT. CDNBTL) CDNBTL = CDNBTX  * AEFF / SREF            CDIL2520
       GO TO 760                                                        CDIL2530
  750  CONTINUE                                                         CDIL2540
       CDBTL=0.233/(THDBT*RLD*RLD)                                      CDIL2550
       GO TO 800                                                        CDIL2560
  850  CONTINUE                                                         CDIL2570
       CDBT1=0.233/(THDBT*RLD*RLD)                                      CDIL2580
       IF(RLD.LE.2.) GO TO 900                                          CDIL2590
       CALL LINE(10,RLDB,TABX,CDA)                                      CDIL2600
       CDPBTL=0.25*CDA*(1.0/RLD)**2                                     CDIL2610
       CDNBTL=CDPBTL*AEFF/SREF                                          CDIL2620
       GO TO 1200                                                       CDIL2630
  900  CONTINUE                                                         CDIL2640
       BOVER=BETA/RLD                                                   CDIL2650
       CALL LINE(22,BOVER,TABY,CDBT)                                    CDIL2660
       CDPBTL=CDBT/RLD**2                                               CDIL2670
       XFRAC=10.*(1.1-RM)                                               CDIL2680
       DELCD=CDPBTL-CDBT1                                               CDIL2690
       CDNBTL=CDBT1 +XFRAC*DELCD                                        CDIL2700
       CDNBTL=CDNBTL*AEFF/SREF                                          CDIL2710
      GO TO 760                                                         CDIL2720
 1000  CONTINUE                                                         CDIL2730
      IF ( RM .LE. RMCR ) GO TO 9728                                    CDIL2740
       XFRAC=(RM-RMCR)/(1.0-RMCR)                                       CDIL2750
       CDRAT=0.15*XFRAC + 1.47*XFRAC**2 -0.62*XFRAC**5                  CDIL2760
       CDBT1=0.233/(THDBT*RLD*RLD)                                      CDIL2770
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      CDNBTL=CDBT1*CDRAT*AEFF/SREF                                      CDIL2780
      GO TO 1200                                                        CDIL2790
  760 CALL LINE(11,RM,TAB7,CPB)                                         CDIL2800
      CDBASE=CPB*AEFF/SREF                                              CDIL2810
      IF(CDBASE.LT.CDNBTL) CDNBTL=CDBASE                                CDIL2820
      GO TO 1200                                                        CDIL2830
 9728 CONTINUE                                                          CDIL2840
      CDNBTL = 0.0                                                      CDIL2850
 1200 CONTINUE                                                          CDIL2860
      CDAFT=CDNBTL                                                      CDIL2870
     REYNAC=REYFTM*XMZERO*XNAC/12.                                      CDIL2880
     CFIINC=0.482/(ALOG10(REYNAC))**2.62                                CDIL2890
     CALL BLINE(2,10,FRCTN3(1),ALK,XMZERO,CFCFII)                       CDIL2900
     CFCOMP=CFIINC*CFCFII                                               CDIL2910
     CDFINL=CFCOMP*(AWFQ-AWETFF)/A3                                     CDIL2920
     CDSKIN=CDFINL                                                      CDIL2930
     CDCOWL=CPBAR*ACPROJ/A3                                             CDIL2940
     CDINL =CDPFWD+CDFFWD+CDPDIV+CDFDIV+CDPAFT+CDSKIN+CDCOWL            CDIL2950
     CDINL =CDINL *XNINLT                                               CDIL2960
     IF ( NOUT .GT. 1 ) WRITE ( 6, QQ )                                 CDIL2970
   6 FORMAT(13H INLET DRAG =,F10.5)                                     CDIL2980
     RETURN                                                             CDIL2990
  38 IF ( NOUT  .NE.  0  )  WRITE(6,39) HP                              CDIL3000
  39  FORMAT(46H ERROR TRYING TO FIND ALTITUDE DATA IN CDINLET ,E15.5)  CDIL3010
     RETURN                                                             CDIL3020
      END                                                               CDIL3030



     SUBROUTINE EXRAM                                                   EXRM0010
     COMMON /COMVLS/ COM(51)                                            EXRM0020
     EQUIVALENCE ( COM(7), WCOMM),                                      EXRM0030
    1  ( COM( 8),VCOMI),                                               EXRM0040
    2  ( COM( 9),R5),                                                  EXRM0050
    3  ( COM(10),Y1),                                                  EXRM0060
    4  ( COM(11),WNOZ)                                                 EXRM0070
     COMMON /FAILUR/ KFAIL                                              EXRM0080
     COMMON/CODEXX/ II(16)                                              EXRM0090
     COMMON /MATTYP/ IB(3)                                              EXRM0100
     COMMON /ERPRT/ BOMB(4),MUM,IARI(2)                                 EXRM0110
     COMMON /EXTERN/ AR (20)                                            EXRM0120
     EQUIVALENCE (AR(3),D3)                                             EXRM0130
     COMMON /EMPT/ HP,AMACH,ALF1,FARD                                   EXRM0140
     COMMON /RJCAT/ CFNRQ,CFNET,A5A3,A6A3,ACA3,SFC,BOSTWT,BOSTLT,       EXRM0150
    1 BOSTPR                                                            EXRM0160
     COMMON /IPROP/ IND,IMIN,NEWPT,IRJOUT                               EXRM0170
     COMMON/INLETX/                                                     EXRM0180
    6K8,KPTC(15),ALPHV(15),AAMACH(15,15),AOACC(15,15),PT3PTC(15,15),    EXRM0190
    1AODD(15,15)                                                        EXRM0200
     COMMON /ALTDD/                                                     EXRM0210
    1K1,ALT(24),SDTEMP(24),PRESS(24),ID(8)                              EXRM0220
     COMMON /EXTRJ/ISKIP                                                EXRM0230
     COMMON/EXXRJ/ EX(48)                                               EXRM0240
     EQUIVALENCE                                                        EXRM0250
    1(EX( 1),PHI   ),(EX( 2),THETA ),(EX( 3),TEXIT ),(EX( 4),TTHRCT),   EXRM0260
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     2(EX( 5),TENT   ),(EX( 6),RHOEXT),(EX( 7),RHOTHT),(EX( 8),RHOENT),   EXRM0270
     3(EX( 9), EXTER),(EX(10),RHOX   ),(EX(11),TMINC ),(EX(12),TMIND ),   EXRM0280
     4(EX(13),EL     ),(EX(14),FSULT ),(EX(15),FSYLD ),(EX(16),TINS   ),   EXRM0290
     5(EX(17),RHOIN  ),(EX(18),XSTAR ),(EX(19),CLEAR ),(EX(20),C1     ),   EXRM0300
     6(EX(21),C2     ),(EX(22),C3    ),(EX(23),C4     ),(EX(24),C5     ),   EXRM0310
     7(EX(25),C6     ),(EX(26),TINAFT),(EX(27),WRJ    ),(EX(28),XRJ    ),   EXRM0320
     8(EX(29),TEMPC  ),(EX(30),MTLRAM),(EX(31),R3     ),(EX(32),RCR5 ),    EXRM0330
     8(EX(33),DS     ),(EX(34),RHO    ),(EX(35),TAH    ),(EX(36),VDOMES),   EXRM0340
     8(EX(37),TCYL   ),(EX(38),A3     ),(EX(39),SSAFS )                    EXRM0350
      COMMON /EXCWT/ WT(15)                                                EXRM0360
      DIMENSION         Z(15),ZW(15),XII(15)                               EXRM0370
      EQUIVALENCE (WT(1),FWDWTS),(WT(2),FWDWTI),(WT(3),BOSDMP),            EXRM0380
     1(WT(4),WCYS),(WT(5),WCYLI),(WT(6),EXTI),(WT(7),SKTS),(WT(9),AFTENGEXRM0390
     2),(WT(11),ADWTS),(WT(12),ADWTI),(WT(13),WENT),(WT(14),WTHRST),      EXRM0400
     1(WT(15),WEXIT)                                                       EXRM0410
C    C1 DUMP BOSS MULTIPLIER                                               EXRM0420
C    C2 SKIRT WT MULTIPLIER                                                EXRM0430
C    C3 ATTACHMENT RING MULTIPLIER                                         EXRM0440
C    C4 MISC FWD WT                                                        EXRM0450
C    C5 MISC CYL WT                                                        EXRM0460
C    C6 MISC NOZ WT                                                        EXRM0470
      DATA PI /3.14159/                                                    EXRM0480
      IF (ISKIP .EQ. 1) GO TO 10                                           EXRM0490
      ISKIP = 1                                                            EXRM0500
      CALL TLU1(HP,ALT,K1,PPESS,PO,IND)                                    EXRM0510
      IF (IND .NE. 0 )  GO TO 38                                           EXRM0520
      TO = 500.                                                            EXRM0530
      CALL ISEN(TO,PO,AMACH,TT2,PTO)                                       EXRM0540
      IF(KFAIL .GT. 0 ) RETURN                                             EXRM0550
      CALL TLU2(ALF1,ALPHV,K8,AMACH,AAMACH,KPTC,PT3PTC,PTR,IND)            EXRM0560
      IF(IND.NE.0) GO TO 2014                                              EXRM0570
      PCC = PTO*PTR/144.                                                   EXRM0580
       NOUT = 1                                                            EXRM0590
      R3 = D3/2.                                                           EXRM0600
      RCR5= 0.4                                                            EXRM0610
      A3 = D3**2/4.*PI                                                     EXRM0620
       ADUMP = A3/6.                                                       EXRM0630
      DS= D3 -2.*EXTER                                                     EXRM0640
      CALL MATLS(MTLRAM,TEMPC,RHO,FTU,FTY,IND)                             EXRM0650
      IF(IND .NE. 0 ) GO TO 35                                             EXRM0660
      TCYLU =FSULT*PCC*DS/(FTU*2.)                                         EXRM0670
      TCYLY =FSYLD*PCC*DS/(FTY*2.)                                         EXRM0680
      TCYLT =AMAX1(TCYLU,TCYLY)                                            EXRM0690
      TCYL  = AMAX1(TCYLT,TMINC)                                           EXRM0700
      TAHU  =FSULT*PCC*EL*DS/FTU/4.                                        EXRM0710
      TAHY  =FSYLD*PCC*EL*DS/FTY/4.                                        EXRM0720
      TAHT  =AMAX1(TAHU,TAHY)                                              EXRM0730
      TAH   =AMAX1(TAHT,TMIND)                                             EXRM0740
      IF(EL .LE. 1.)GO TO 11                                               EXRM0750
      SEE   =(1.-1./(EL*EL))**.5                                           EXRM0760
      SSAFS =(PI*DS**2)/4.+((PI*DS**2)/(8.*EL**2*SEE))*ALOG((1.+SEE)       EXRM0770
     1/(1.-SEE))                                                           EXRM0780
   12 FWDWTS= SSAFS*TAH*RHO + C4                                           EXRM0790
      FWDWTI= SSAFS*TINS*RHOIN                                             EXRM0800
      BOSDMP = ADUMP*RHO*TCYL *C1                                          EXRM0810
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      VCOMFS=PI*(DS-2.*(TINS+TAH))**3/(6.*EL)                          EXRM0820
   10 R6 = SQRT(A6A3)*R3                                               EXRM0830
      R5 = SQRT(A5A3)*R3                                               EXRM0840
      RC = RCR5*R5                                                     EXRM0850
      XA = RC      *SIN(PHI)                                           EXRM0860
      XB = (R6-RC      *(1.-COS(PHI))-R5)*COS(PHI)/SIN(PHI)            EXRM0870
      X1 =  XA + XB                                                    EXRM0880
      YZ=  (1.-COS(THETA))*RC                                          EXRM0890
      YD=(R3-R5)*.8                                                    EXRM0900
      IF(YD-YZ) 30,31,31                                               EXRM0910
   30 COTH=-YD/RC+1.                                                   EXRM0920
      IF(COTH.GT.1 .OR.COTH .LE. 0.) GO TO 34                          EXRM0930
      TANC=(SQRT(1.-COTH**2))/COTH                                     EXRM0940
      THET=  ATAN(TANC)                                                EXRM0950
      THED=THET/.01745329                                              EXRM0960
      X3=RC*SIN(THET)                                                  EXRM0970
      Y1 = R5 + YD                                                     EXRM0980
      IF(NOUT.EQ.1) WRITE(6,6) THED                                    EXRM0990
    6 FORMAT(53H THE RAMJET NOZZLE ENTRANCE ARC HAS BEEN REVALUED TO ,  EXRM1000
     1F7.1, 8H DEGREES )                                               EXRM1010
      GO TO 32                                                         EXRM1020
   11 SSAFS = PI * DS**2/2.                                            EXRM1030
      GO TO 12                                                         EXRM1040
   31 X3=RC*SIN(THETA)                                                 EXRM1050
      Y1 = R5 + RC*(1.-COS(THETA) )                                    EXRM1060
      THET = THETA                                                     EXRM1070
      THED = THETA/.0174533                                            EXRM1080
   32 Z1 = SQRT((R3**2-Y1**2)/EL**2)                                   EXRM1090
      XRN = Z1+X3+X1                                                   EXRM1100
C     EXIT SECTION                                                     EXRM1110
      DELN = TAH + TEXIT                                               EXRM1120
      RHON = (RHO*TAH+RHOEXT*TEXIT)/DELN                               EXRM1130
      YN= DELN/2./COS(PHI)                                             EXRM1140
      YM1=R6+YN                                                        EXRM1150
      YM2= R5+RC*(1.-COS(PHI))+YN                                      EXRM1160
      RBRN1=(YM1+YM2)/2.                                               EXRM1170
      ABRN1=XB/COS(PHI)*DELN                                           EXRM1180
      WEXIT = 2.*PI*RBRN1*ABRN1*RHON                                   EXRM1190
C     THROAT SECTION                                                   EXRM1200
      XT=2.*XA                                                         EXRM1210
      RHOT =(RHO* TAH +1.5*TTHROT*RHOTHT)/(TAH +1.5*TTHROT)           EXRM1220
      DELM =TAH + TTHROT *1.5                                          EXRM1230
      ABRN2 = XT*  DELM                                                EXRM1240
      RBRN2 = R5 + DELM/2.                                             EXRM1250
      WTHROT=2.*  ABRN2*RHOT    *PI*RBRN2 +C6                          EXRM1260
C     ENTRANCE SECTION                                                 EXRM1270
      TEAH =TAH + TENT                                                 EXRM1280
      YM3 = YZ- TEAH/2.                                                EXRM1290
      XE=X3-XA                                                         EXRM1300
      X4=SQRT(XE**2 +(YM3-YM2)**2)                                     EXRM1310
      ABRN3 = X4*TEAH                                                  EXRM1320
      RBRN3 =(YM3+YM2)/2.                                              EXRM1330
      RENT=(RHO*TAH+RHOENT*TENT)/TEAH                                  EXRM1340
      WENT=2.*PI*RENT*ABRN3*RBRN3                                      EXRM1350
      WRN = WENT +WTHROT+ WEXIT                                        EXRM1360
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      EPSC =(Y1/R5)**2                                                    EXRM1370
      VREQ= A5A3*A3*XSTAR                                                 EXRM1380
      VCYL = VREQ - VDOMES                                                EXRM1390
      XCYL = VCYL/(PI*(DS-2.*(TCYL+TINS))**2.)*4.                         EXRM1400
      DI=DS-2.*TINS                                                       EXRM1410
      WCYS =PI*DS*XCYL*TCYL*RHC +C5                                       EXRM1420
      WCYLI=PI*DI*XCYL*TINS*RHOIN                                         EXRM1430
      AAFT  =(SSAFS/2.-EPSC*A5A3*A3)                                      EXRM1440
      ADWTS= AAFT*TAH*RHO                                                 EXRM1450
      ADWTI= AAFT*TINAFT*RHOIN                                            EXRM1460
      ATTACH = 4.*PI*DS*TMINC*RHO *C3                                     EXRM1470
      XSKT = DS/EL/2.                                                     EXRM1480
      XSK1= XSKT+ CLEAR                                                   EXRM1490
      SKTS =PI*DS*XSK1*TMINC*RHO*C2                                       EXRM1500
      AFTENG =PI*DS*XRN*TMINC*RHO                                         EXRM1510
      XRJ =  XCYL+XSKT +CLEAR + XRN                                       EXRM1520
      EXTI =PI*D3*XRJ *EXTER*RHOX                                         EXRM1530
      WT(8) = ATTACH/2.                                                   EXRM1540
      WT(10) = WT(8)                                                      EXRM1550
      WRJ= 0.0                                                            EXRM1560
      DO 105 I=1,15                                                       EXRM1570
  105 WRJ= WRJ+ WT(I)                                                     EXRM1580
      IF(II(11).EQ. 0) GO TO 110                                          EXRM1590
C     ITEM 1  FWD DOME                                                    EXRM1600
      RS= DS/2.                                                           EXRM1610
      RI= RS-TINS                                                         EXRM1620
      IF(EL .LE.1.) GO TO 100                                             EXRM1630
      CALL ZELPLL(EL,RHO,RS,0.0,TAH,0.0,1,XII(1),Z(1),ZW(1))              EXRM1640
C     ITEM 2  FWD INSULATION                                              EXRM1650
      H=RS/EL-TINS                                                        EXRM1660
      EE= RI/H                                                            EXRM1670
      CALL ZELPLL(EE,RHOIN,RI,C.0,TINS,TAH,1,XII(2),Z(2),ZW(2))           EXRM1680
C     ITEM 3  DUMP STIFFNERS                                              EXRM1690
  101 CALL ZCYLLL (RS,BOSDMP,RS,XSKT,XII(3),Z(3),ZW(3))                   EXRM1700
C     ITEM 4  SIDEWALL CASE                                               EXRM1710
      CALL ZCYLLL (XCYL,WCYS,RS,XSKT,XII(4),Z(4),ZW(4))                   EXRM1720
C     ITEM 5  SIDEWALL INSULATION                                         EXRM1730
      CALL ZCYLLL (XCYL,WCYLI,RI,XSKT,XII(5),Z(5),ZW(5))                  EXRM1740
C     ITEM 6 EXERNAL INSULATION                                           EXRM1750
      XRJ = XCYL + XSK1+ XRN                                              EXRM1760
      CALLZCYLLL(XRJ,EXTI,R3,0.0,XII(6),Z(6),ZW(6))                       EXRM1770
C     ITEM 7 SKIRT WT  FWD                                                EXRM1780
      CALL ZCYLLL(XSK1,SKTS, RS,0.0,XII(7),Z(7),ZW(7))                    EXRM1790
C     ITEM 8 ATTACH WT  FWD                                               EXRM1800
      CALL ZCYLLL(2.,WT(8),RS,C.0,XII(8),Z(8),ZW(8))                      EXRM1810
C     ITEM 9 AFT FAIRING                                                  EXRM1820
      FLX= XSK1 + XCYL                                                    EXRM1830
      CALL ZCYLLL(XRN,AFTENG,RS,FLX,XII(9),Z(9),ZW(9))                    EXRM1840
C     ITEM  10 AFT ATTACH WT                                              EXRM1850
      FLX2= FLX + Z1                                                      EXRM1860
      CALL ZCYLLL(2.,WT(10),RS,FLX2,XII(10),Z(10),ZW(10))                 EXRM1870
C     ITEM  11 AFT DOME                                                   EXRM1880
      CALL ZELPLL(EL,RHO,RS,EPSC,TAH,FLX,0,XII(11),Z(11),ZW(11))          EXRM1890
C     ITEM  12 AFT INSULATION                                             EXRM1900
      CALL ZELPLL(EE,RHOIN,RI,EPSC,TINAFT,FLX,0,XII(12),Z(12),ZW(12))     EXRM1910
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C     ITEM 13  ENTRANCE SECTION                                                 EXRM1920
      CALL ZCONHH(XE,WENT,YM3,YM2,FLX,0,XII(13),Z(13),ZW(13))                   EXRM1930
C     ITEM 14  THROAT SECTION                                                   EXRM1940
      FL3=FLX+XE                                                                EXRM1950
      CALL ZCYLLL(XT,WTHROT,YM2,FL3,XII(14),Z(14),ZW(14))                       EXRM1960
C     ITEM 15  EXIT SECTION                                                     EXRM1970
      FL3=FL3+XT                                                                EXRM1980
      CALL ZCONHH(XA,WEXIT,YM1,YM2,FL3,1,XII(15),Z(15),ZW(15))                  EXRM1990
      ZWT= 0.0                                                                  EXRM2000
      DO 106 I=1,15                                                             EXRM2010
  106 ZWT= ZWT + ZW(I)                                                          EXRM2020
      ZEXRAM = ZWT/WRJ                                                          EXRM2030
      XITOT =0.0                                                                EXRM2040
      XMOV  =0.0                                                                EXRM2050
      DO 107  I=1,15                                                            EXRM2060
      XITOT = XITOT +XII(I)                                                     EXRM2070
  107 XMOV= XMOV +(ZEXRAM-Z(I))**2*WT(I)                                        EXRM2080
      XIIEXR = XMOV + XITOT                                                     EXRM2090
  110 CONTINUE                                                                  EXRM2100
      WCOMM=PCSDMP+SKTS+FWDWTS+WCYC+ADWTS                                       EXRM2110
      VCOMI= (FWDWTI+WCYLI+ADWTI) / RHOIN + EXTI/RHOX                           EXRM2120
      WNOZ=WRN                                                                  EXRM2130
      IF( II(15) .EQ. 0 ) RETURN                                                EXRM2140
      WRITE(6,99)                                                               EXRM2150
   99 FORMAT(1H1)                                                               EXRM2160
      WRITE(6,120) WRJ,WT                                                       EXRM2170
  120 FORMAT(10X,38H *** NON INTEGRAL RAMJET COMBUSTOR ***//13H WEIGHTS,EXRM2180
     1 LBS /                                                                    EXRM2190
     12X,13HTOTAL RAMJET ,F9.3,9X,13HFWD CLOSURE  ,F9.3,9X,13HFWD INSULTEXRM2200
     1N  ,F9.4/                                                                 EXRM2210
     22X,13HDUMP STIFFNR ,F9.3,9X,13HCYL STRUCTUR ,F9.3,9X,13HCYL INSULTEXRM2220
     2N  ,F9.4/                                                                 EXRM2230
     32X,13HEXT INSULTN  ,F9.3,9X,13HFWD SKIRT    ,F9.3,9X,13HFWD ATCHMNEXRM2240
     3T  ,F9.4/                                                                 EXRM2250
     42X,13HAFT SKT/FRNG ,F9.3,9X,13HAFT ATCHMNT  ,F9.3,9X,13HAFT CLOSUREXRM2260
     4E  ,F9.4/                                                                 EXRM2270
     52X,13HAFT INSULTN  ,F9.3,9X,13HNOZ ENTRANCE ,F9.3,9X,13HNOZ THROATEXRM2280
     5   ,F9.4/                                                                 EXRM2290
     62X,13HNOZ EXIT CONE,F9.3//)                                               EXRM2300
      WRITE(6,121) IB                                                           EXRM2310
  121 FORMAT(30H  STRUCTURAL AND CASE MATERIAL,2X,3A4/)                         EXRM2320
      IF (II(11) .GT. 0)                                                        EXRM2330
     1WRITE(6,123) ZEXRAM,XIIEXR                                                EXRM2340
  123 FORMAT(/2X, 5HC.G. ,F9.3,9X,5HMOI   ,F9.1)                                EXRM2350
      WRITE(6,122) XRJ,XRN,VREQ,XCYL,XSKI,TCYL,TAH,TINS,EXTER,                  EXRM2360
     1 XE,TEAH,YM3,XT,YM2,XB,DELN,YM1                                           EXRM2370
  122 FORMAT(2X,15HDIMENSIONS, INS  /                                           EXRM2380
     12X,13HTOTAL LENGTH ,F9.3,9X,13HNOZ LENGTH   ,F9.3,9X,13HVOLUME CU EXRM2390
     1IN ,F9.1/                                                                 EXRM2400
     22X,13HCYL  LENGTH  ,F9.3,9X,13HFWD SKT LT   ,F9.3,9X,13HCYL THICKNEXRM2410
     2ESS,F9.4/                                                                 EXRM2420
     32X,13HCLOSURE TKNS ,F9.4,9X,13HINSLN THKNS  ,F9.4,9X,13HEXT INS THEXRM2430
     3KNS,F9.4/                                                                 EXRM2440
     42X,13HENTRANCE LT  ,F9.3,9X,13HENTRANCE TK  ,F9.4,9X,13HENTRANCE REXRM2450
     4AD ,F9.3/                                                                 EXRM2460
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     52X,13HTHROAT LT     ,F9.3,40X,13HTHROAT EX RAD,F9.3/                    EXRM2470
     62X,13HEXIT CONE LT ,F9.3,9X,13HEXIT CONE TK ,F9.4,9X,13HEXIT CONE EXRM2480
     6RAD,F9.3)                                                              EXRM2490
      RETURN                                                                 EXRM2500
  100 CALL ZSPRLL(RHO,RS,TAH,C.C,0.0,1,XII(1),Z(1),ZW(1))                    EXRM2510
      CALL ZSPRLL(RHOIN,RI,TINS,C.C,TAH,1,XII(2),Z(2),ZW(2))                 EXRM2520
      GO TO 101                                                              EXRM2530
 2014 WRITE(6,2015) AMACH, ALPHV                                             EXRM2540
 2015 FORMAT( /10X,34HFAILURE TRYING TO READ INLET MAP  /                    EXRM2550
     110X,  7HAMACH = ,F10.5,  8H ALFI = ,F10.5 )                            EXRM2560
      WRITE (6,545) BOMB,IARI(MUM)                                           EXRM2570
  545 FORMAT (' 1ST IND VARIABLE=',E12.5,' 2ND IND VARIABLE= ',E12.5,' SEXRM2580
     1UBTABLE =',F10.3,' SUBTABLE SIZE =',F10.3/' THE VARIABLE OUT OF RAEXRM2590
     2NGE IS THE ',A4,' INDEPENDENT VARIABLE'/)                              EXRM2600
      RETURN                                                                 EXRM2610
   38 WRITE (6,39) HP                                                        EXRM2620
   39 FORMAT(2X,42HERROR TRYING TO OBTAIN ATITUDE DATA,ALT = ,F8.1)          EXRM2630
      RETURN                                                                 EXRM2640
   34 WRITE(6,3)                                                             EXRM2650
    3 FORMAT(' FAILURE IN EXRAM  WHEN TRYING TO REVALUE ENTRANCE ARC')       EXRM2660
      IND= 1                                                                 EXRM2670
      RETURN                                                                 EXRM2680
   35 WRITE (6,36) MTLRAM                                                    EXRM2690
   36 FORMAT(26H ERROR IN SUBROUTINE MATLS  ,I5)                             EXRM2700
      RETURN                                                                 EXRM2710
      END                                                                    EXRM2720
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      SUBROUTINE INLETP                                                      INLT0010
C   NUK.CM-CGSM  R.K.MCDONOUGH  FIV/EBCD   10/18/73                          INLT0020
COMPUTER PROGRAM TO CALCULATE INLET WEIGHT AND DRAG (STAND-ALONE CHECK       INLT0030
      COMMON /INLSTF/ AWETQ                                                  INLT0040
       COMMON/TJINLP/XENG,RENGO,XMISSL                                       INLT0050
      COMMON /PJDAT/ CENRO,CEN,  A5A3,A6A3,ACA3,SEC,BOSTWT,BOSTXX,           INLT0060
     1 BOSTPP                                                                INLT0070
      COMMON /INCOMM/XLDUMP,XFERNG,XINLET,XTIPCL,STERM,TNOZL                 INLT0080
      COMMON /MATTYP/ IR(3)                                                  INLT0090
      DIMENSION ICC1(3)                                                      INLT0100
      COMMON /IPROP/ IND,IMIN,NEWPT,IRJOUT                                   INLT0110
      COMMON /ALTDD/                                                         INLT0120
     1K1,ALT(24),SDTEMP(24),PRESS(24),ID(8)                                  INLT0130
      COMMON /INDATA/ CDINL, CLALF,WEIGHT                                    INLT0140
      DATA PI,C               / 3.14159,        0.01745329 /                 INLT0150
      COMMON /INDEX/ X1,X2,X3,X4,XC,Y1,Y2,Y3,Y4,YC,XT,AMT,DEL1,DEL2,DEL3INLT0160
     1,XMDES                                                                 INLT0170
      COMMON/INDATX/ HPROJ,HC,W,HBLYER,ANGLEL,ANGLEU,ANGDUB,ABLDIV,          INLT0180
     1HPLDIV,XCHECK,XFRNG,XNAC  ,XDIST ,AWET,AWETFF,DELEXT,ADIVWT,           INLT0190
     2XLBYD,AFFPRJ,ACPROJ,             TSTART,TFRNG, HP                     INLT0200
      COMMON/CODEXX/ ININ(16)                                                INLT0210
      EQUIVALENCE (ININ(2),ITYPE),(ININ(8),NDUCT),(ININ(9),NFRNG)            INLT0220
      EQUIVALENCE (ININ(15),NOUT)                                            INLT0230
      COMMON/EXTERN/ ARR(20)                                                 INLT0240
      EQUIVALENCE (ARR(1),PLLT),(ARR(3),D3),              (ARR(14),TANLT)INLT0250
     1,(ARR(15),AR),(ARR(16),XMZERO),(ARR(17),XMRJTO),(ARR(18),HEIGHT),      INLT0260
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     1(ARR(19),BOSTLT)                                                          INLT0270
      COMMON / SUSDAT/ TX(44)                                                   INLT0280
      EQUIVALENCE (TX(33),SUSLT)                                                INLT0290
       EQUIVALENCE (ININ(1),KIND)                                               INLT0300
      DIMENSION X(50),Y(50),Z(50),AREA(50),WGHT(50),RIX(50)                     INLT0310
      NAMELIST /JONSON/ HBLDIV,AWETAF,AWETFF,ADIVWT,AWET                        INLT0320
      APATIO(X)=125./(216.*X)*(1.+.2*X*X)**3.                                   INLT0330
      NAMELIST /QQ/ PLLT,SUSLT,D3,XDUMP,       XLCB,HTH,X4,XC,XTIPCL            INLT0340
      T=TSTART                                                                  INLT0350
      IND=0                                                                     INLT0360
       HP = HEIGHT                                                              INLT0370
      CALL TLU1(HP,ALT,K1,PRESS,PO,IND)                                         INLT0380
      IF(IND .NE. 0) GO TO 38                                                   INLT0390
      CALL TLU11(SDTEMP,TO)                                                     INLT0400
      TTEMP=TO*(1.+.2*XMZERO*XMZERO)-460.                                       INLT0410
      CALL MATLS(NDUCT,TTEMP,RHOA,FTU,FTY,IND)                                  INLT0420
      IF (IND .NE. 0) GO TO 1492                                                INLT0430
      DO 5  I=1,3                                                               INLT0440
    5 ICC1(I)= IB(I)                                                            INLT0450
      CALL MATLS(NERNG,TTEMP,RHOERG,FTU,FTY,IND)                                INLT0460
      IF (IND .NE. 0) GO TO 1492                                                INLT0470
      CONTR=1./XT                                                               INLT0480
C MATERIALS ARE DESIGNATED AS FOLLOWS                                           INLT0490
C A    AISI 150 PSI STEEL              CODE  1                                  INLT0500
C B    AISI 200 PSI STEEL              CODE  2                                  INLT0510
C C    300 GR MARAGING STEEL           CODE  3                                  INLT0520
C D    17-4 PH STAINLESS               CODE  4                                  INLT0530
C E    2014-T6 ALUMINUM                CODE  5                                  INLT0540
C G    AZ31B-O MAGNESIUM               CODE  6                                  INLT0550
C H    6AL-4V TITANIUM                 CODE  7                                  INLT0560
C P    RENE 41                         CODE  8                                  INLT0570
C Q    WC129Y COLUMBIUM                CODE  9                                  INLT0580
C R    GLASS FABRIC EPOXY LAMINATE     CODE 10                                  INLT0590
C S    FILAMENT WOUND GLASS EPOXY      CODE 11                                  INLT0600
      A3 = ARR(12) *144.                                                        INLT0610
      AC=ACA3*A3                                                                INLT0620
       IF(KIND.NE.41.AND.KIND.NE.43.AND.KIND.NE.53) XMRJTC=0.01                 INLT0630
C ITYPE=1 IS A SINGLE BELLY-LINE. ITYPE =2 IS DUAL AFT.                         INLT0640
C BRANCH DEPENDING ON ITYPE.                                                    INLT0650
      XNINLT = ITYPE                                                            INLT0660
      ACPER=AC/XNINLT                                                           INLT0670
CALCULATE COWL LIP ANGLES AT THE INLET DESIGN MACH NUMBER                       INLT0680
      SINMAX=(3.*AMT*AMT-5 +SQRT(9.*AMT**4 +12.*AMT**2 +60.))/                 INLT0690
     1(7.*AMT**2)                                                               INLT0700
      WAVMAX=ARSIN(SQRT(SINMAX))                                                INLT0710
      AA=6.*AMT**2                                                              INLT0720
      BB=5.*(AMT**2 *SINMAX-1.)                                                 INLT0730
      COTAN=TAN(WAVMAX)*(AA/BB-1.)                                              INLT0740
      TANDEL=1./COTAN                                                           INLT0750
      DELCLR=ATAN(TANDEL)                                                       INLT0760
      DELCLD=DELCLR/C -1.                                                       INLT0770
      DELEND=DEL1+DEL2+DEL3                                                     INLT0780
      DELINT=DELEND-DELCLD                                                      INLT0790
      DELEXT=DELINT+7.                                                          INLT0800
CALCULATE THE RATIO OF DUMP AREA TO THROAT AREA                                 INLT0810
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      AMTY=SQRT((AMT**2 +5.)/(7.*AMT**2 -1.))                          INLT0820
      ARTHRT=ARATIO(AMTY)                                              INLT0830
C     R/J ONLY                                                         INLT0840
      GO TO 5001                                                       INLT0850
 5009 CONTINUE                                                         INLT0860
      ATHRT=XT*AC                                                      INLT0870
      RTHRT=SQRT(ATHRT/PI)                                             INLT0880
      XLDIFF=(RENGO-RTHRT)/(TAN(3.5*C))                                INLT0890
 5001 CONTINUE                                                         INLT0900
      ARDUMP=ARATIO(0.3)                                               INLT0910
      ACUATH =ARDUMP/ARTHRT                                            INLT0920
      IF ( NOUT .EQ. 0 ) GO TO 300                                     INLT0930
C     WRITE INLET DATA                                                 INLT0940
      WRITE(6,3000)                                                    INLT0950
 3000 FORMAT (    5X,61HSUMMARY DATA FOR INLET WEIGHT,DRAG,C.G.AND MOMENINLT0960
     1T  OF INERTIA,/)                                                 INLT0970
      WRITE(6,6) ICC1,IB                                               INLT0980
    6 FORMAT(10X,14HDUCT MATERIAL ,3A4,18H FAIRING MATERIAL ,3A4)      INLT0990
      IF(ITYPE.EQ.1)WRITE(6,3001)                                      INLT1000
 3001 FORMAT(10X,23HSINGLE BELLY-LINE INLET,/)                         INLT1010
      IF(ITYPE.EQ.1)GO TO 1747                                         INLT1020
      WRITE(6,3002)                                                    INLT1030
 3002 FORMAT(10X,15HDUAL APT INLETS,/)                                 INLT1040
 1747 WRITE (6,3003) ACA3,AC,D3,DEL1,DEL2,DEL3,CONTR,DELINT,DELEXT,    INLT1050
     1XMDES,XMZERO,AMT,DELCLD ,XMRJTO                                  INLT1060
 3003 FORMAT(10X,19HCAPTURE AREA RATIO=,F5.3,/,10X,19HINLET CAPTURE AREAINLT1070
     1=,F6.2,1X,25HSQ.IN.(TOTAL FOR MISSILE),/,10X,                    INLT1080
     217HMISSILE DIAMETER=,F5.2,2X,3HIN.,/,10X,27HCOMPRESSION RAMP ANGLEINLT1090
     3S ARE,F5.2,1H,,F5.2,1H,,F5.2,1X,13HDEG(RELATIVE),/,              INLT1100
     410X,29HINLET OVERALL CONTRACTION IS ,F5.2,/,10X,                  INLT1110
     531HCOWL  INITIAL INTERNAL ANGLE IS ,F5.2,4H DEG,/,10X,           INLT1120
     631HCOWL  INITIAL EXTERNAL ANGLE IS ,F5.2,4H DEG,/,10X,           INLT1130
     728HINLET DESIGN MACH NUMBER IS ,F4.2,/,10X,29HFLIGHT        MACH NINLT1140
     8UMBER IS ,F4.2,/,10X,28HINLET THROAT MACH NUMBER IS ,F6.3,/,10X,  INLT1150
     950HMAXIMUM DEFLECTION ANGLE AT THROAT MACH NUMBER IS ,F5.2,1X,    INLT1160
     A4HDEG.,/,10X,31HRAMJET TAKEOVER MACH NUMBER IS ,F4.2,//)         INLT1170
CALCULATE INLET WIDTH,HEIGHT,ETC. FOR 6 ASPECT RATIOS. ASPECT RATIO IS INLT1180
C WIDTH (CONSTANT) DIVIDED BY HEIGHT(COMPRESSION DIRECTION).           INLT1190
CALCULATE THE AREAS OF THE INLET SURFACES  FIRST,DO THE SIDEPLATE       INLT1200
  300 HC=SQRT(ACPER/AR)                                                INLT1210
      W=ACPER/HC                                                       INLT1220
      X1=X1*HC                                                         INLT1230
      X2=X2*HC                                                         INLT1240
      X3=X3*HC                                                         INLT1250
      X4=X4*HC                                                         INLT1260
      XC=XC*HC                                                         INLT1270
      XT=XT*HC                                                         INLT1280
      Y1=Y1*HC                                                         INLT1290
      Y2=Y2*HC                                                         INLT1300
      Y3=Y3*HC                                                         INLT1310
      Y4=Y4*HC                                                         INLT1320
      YC=YC*HC                                                         INLT1330
C TURNBACK COWL AT 10 DEG PER THROAT HEIGHT                            INLT1340
      XLTURN=DELINT/10.                                                INLT1350
      XLTURN=XLTURN*XT                                                 INLT1360
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      XTIPCL=XC                                                          INLT1370
C USE A THROAT LENGTH OF 2 THROAT HEIGHTS                                INLT1380
      HTH=XT                                                             INLT1390
CALCULATE APPROX. THE INCREASE IN EXT. LIP HT. TO TURNBACK COWL.         INLT1400
      HPROJ=XLTURN*TAN((DELINT/2.)*C)                                    INLT1410
      ACPROJ=HPROJ*W                                                     INLT1420
C THE INCREASE IN CENTERBODY HEIGHT IS EQUAL TO HPROJ. ADD A 1DEG THROATINLT1430
      HDIFF=Y4    +HPROJ-2.*HTH*TAN(1.*C)                                INLT1440
C REDUCE THE CENTERBODY HEIGHT TO ZERO AT 7.  DEG                        INLT1450
       XLCB=HDIFF/(TAN(7.*C))                                            INLT1460
       IF(KIND.GT.49.AND.KIND.LT.60) XLCB=XLDIFF                         INLT1470
CALCULATE THE LENGTH OF THE DUMP AREA                                    INLT1480
      ATHRT=XT*W                                                         INLT1490
      ADUMP=ADUATH*ATHRT                                                 INLT1500
      XLDUMP=ADUMP/(HC+HPROJ)                                            INLT1510
       IF(KIND.GT.49.AND.KIND.LT.60) XLDUMP=0.                           INLT1520
      XINLET=XLCB+2.*HTH+X4-XC+XTIPCL+XLTURN                             INLT1530
CHECK THAT INLET LEADING EDGE IS AFT OF TANGENCY POINT                   INLT1540
       XTOTAL=PLLT+BOSTLT+SUSLT                                          INLT1550
C      R/J ONLY                                                          INLT1560
      GO TO 5002                                                         INLT1570
 5008 CONTINUE                                                           INLT1580
       IF(KIND.GT.49.AND.KIND.LT.60) XTOTAL=XMISSL                       INLT1590
       XLENG=XENG+2.*RENGO                                               INLT1600
       XPRTJ=XLENG+XINLET                                                INLT1610
       XTJCHK=XTOTAL-XPRTJ                                               INLT1620
       IF(KIND.GT.49.AND.KIND.LT.60)XCHECK=XTJCHK                        INLT1630
 5002 CONTINUE                                                           INLT1640
       XDUMP=PLLT+SUSLT+03/4.                                            INLT1650
       XCHECK=XDUMP-XINLET                                               INLT1660
       IF(XCHECK.LE.TANLT)GO TO 111                                      INLT1670
C INLET LEADING EDGE OK  NOW ADD AFT FAIRING                             INLT1680
       GO TO 200                                                         INLT1690
  111 IF ( NOUT  .NE.  0  )  WRITE ( 6, 10 )                             INLT1700
      IF ( NOUT  .GT.  0  )  WRITE ( 6, 99 )                             INLT1710
      IND = 1                                                            INLT1720
      GO TO 113                                                          INLT1730
   10   FORMAT(5X,50HINLET STARTS FORWARD OF TANGENCY POINT ERRORED OUT)  INLT1740
  200   XERNG=XTOTAL-XDUMP                                               INLT1750
       IF(KIND.GT.49.AND.KIND.LT.60) XERNG=XLENG                         INLT1760
C XERNG IS DISTANCE FROM END OF DUMP PORT TO END OF MISSILE              INLT1770
CALCULATE THE BOUNDARY LAYER (AND DIVERTER) THICKNESSES                  INLT1780
      RHOAIR=PO/(53.3*TO)                                                INLT1790
      RHOSLG=RHOAIR/32.2                                                 INLT1800
      XMU=(0.302/1000000)*((392.+198.)/(TO+198.))*(TO/392.)**1.5         INLT1810
      VSOUND=49.02*SQRT(TO)                                              INLT1820
      REYFTM=VSOUND*RHOSLG/XMU                                           INLT1830
      REYFT=REYFTM*XMZERO                                                INLT1840
      REY=REYFT*(XCHECK/12.)                                             INLT1850
      BLYER=0.378*XCHECK/(REY**0.2)                                      INLT1860
      REYDES=7101000.*XMDES*XCHECK/12.                                   INLT1870
       IF(HP.GT.0.) REYDES=REYFTM*XMDES*XCHECK/12.                       INLT1880
      BLDIV=.75*.378*XCHECK/(REYDES**.2)                                 INLT1890
CALCULATE THE MASS PROPERTIES.FIRST,LOCATE THE PIECES.FIRST,OUTBD SDPLT. INLT1900
      AREA(1)=XTIPCL*HC/2.                                               INLT1910
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      X(1)=W+1.5*T                                                        INLT1920
      IF(ITYPE.EQ.1) X(1)=(W+T)/2.                                        INLT1930
      Y(1)=-(T+HC/3.)                                                     INLT1940
      Z(1)=2.*XTIPCL/3.                                                   INLT1950
      AREA(2)=XLTURN*HC                                                   INLT1960
      X(2)=X(1)                                                           INLT1970
      Y(2)=-(T+HC/2.)                                                     INLT1980
      Z(2)=XTIPCL+XLTURN/2.                                               INLT1990
      AREA(3)=(HPROJ+T)*(XLTURN/2.)                                       INLT2000
      X(3)=X(1)                                                           INLT2010
      Y(3)=-(T+HC+(HPROJ+T)/3.)                                           INLT2020
      Z(3)=2.*XLTURN/3.+XTIPCL                                            INLT2030
      AREA(4)=(HC+HPROJ+T)*((X4-XC)+2.*XT)                                INLT2040
      X(4)=X(1)                                                           INLT2050
      Y(4)=-(T+(HC+HPROJ+T)/2.)                                           INLT2060
      Z(4)=XTIPCL+XLTURN+((X4-XC)+2.*XT)/2.                               INLT2070
      AREA(5)=(HC+HPROJ+T)*(XLCB+XLDUMP)                                  INLT2080
      X(5)=X(1)                                                           INLT2090
      Y(5)=Y(4)                                                           INLT2100
      Z(5)=XTIPCL+XLTURN+X4-XC+2.*XT+0.5*(XLCB+XLDUMP)                    INLT2110
C CALCULATE THE INBOARD SIDEPLATE                                         INLT2120
      AREA(7)=AREA(1)                                                     INLT2130
      X(7)=T/2.                                                           INLT2140
      IF(ITYPE.EQ.1) X(7)=-X(1)                                           INLT2150
      Y(7)=Y(1)                                                           INLT2160
      Z(7)=Z(1)                                                           INLT2170
      AREA(8)=AREA(2)                                                     INLT2180
      X(8)=X(7)                                                           INLT2190
      Y(8)=Y(2)                                                           INLT2200
      Z(8)=Z(2)                                                           INLT2210
      AREA(9)=AREA(3)                                                     INLT2220
      X(9)=X(7)                                                           INLT2230
      Y(9)=Y(3)                                                           INLT2240
      Z(9)=Z(3)                                                           INLT2250
      AREA(10)=AREA(4)                                                    INLT2260
      X(10)=X(7)                                                          INLT2270
      Y(10)=Y(4)                                                          INLT2280
      Z(10)=Z(4)                                                          INLT2290
      AREA(11)=AREA(5)                                                    INLT2300
      X(11)=X(7)                                                          INLT2310
      Y(11)=Y(5)                                                          INLT2320
      Z(11)=Z(5)                                                          INLT2330
C CALCULATE THE BOTTOM SURFACE AREA (COWL SIDE)                           INLT2340
      AREA(13)=W*SQRT(XLTURN**2+(HPROJ+T)**2)                             INLT2350
      X(13)=T+W/2.                                                        INLT2360
      IF(ITYPE.EQ.1) X(13)=0.                                             INLT2370
      Y(13)=-(T+HC+(HPROJ+T)/2.)                                          INLT2380
      Z(13)=XTIPCL+XLTURN/2.                                              INLT2390
      AREA(14)=(X4-XC+2.*XT+XLCB+XLDUMP)*W                                INLT2400
      X(14)=X(13)                                                         INLT2410
      Y(14)=-(T+HC+HPROJ+T/2.)                                            INLT2420
      Z(14)=XTIPCL+XLTURN+0.5*(X4-XC+2.*XT+XLCB+XLDUMP)                   INLT2430
C CALCULATE THE TOP INLET SURFACE                                         INLT2440
      AREA(16)=(XTIPCL+XLTURN+X4-XC+2.*XT+XLCB+XLDUMP)*W                  INLT2450
      X(16)=T+W/2.                                                        INLT2460
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      IF(ITYPE.EQ.1) X(16)=C.                                          INLT2470
      Y(16)=-T/2.                                                      INLT2480
      Z(16)=AREA(16)/(2.*W)                                            INLT2490
C THAT COMPLETES THE EXTERNAL. NOW DO THE INTERNAL. DO SPLITTER FIRST. INLT2500
      AREA(18)=X2*Y2/2.                                                INLT2510
      X(18)=T+W/2.                                                     INLT2520
      IF(ITYPE.EQ.1) X(18)=C.                                          INLT2530
      Y(18)=-(T+Y2/3.)                                                 INLT2540
      Z(18)=2.*X2/3.                                                   INLT2550
      AREA(19)=Y2*(X3-X2)                                              INLT2560
      X(19)=X(18)                                                      INLT2570
      Y(19)=-(T+Y2/2.)                                                 INLT2580
      Z(19)=X2+(X3-X2)/2.                                              INLT2590
      AREA(20)=(X3-X2)*(Y3-Y2)/2.                                      INLT2600
      X(20)=X(18)                                                      INLT2610
      Y(20)=-(T+Y2+(Y3-Y2)/3.)                                         INLT2620
      Z(20)=X2+0.667*(X3-X2)                                           INLT2630
      AREA(21)=Y3*(X4-X3)                                              INLT2640
      X(21)=X(18)                                                      INLT2650
      Y(21)=-(T+Y3/2.)                                                 INLT2660
      Z(21)=X3+(X4-X3)/2.                                              INLT2670
      AREA(22)=(Y4-Y3)*(X4-X3)/2.                                      INLT2680
      X(22)=X(18)                                                      INLT2690
      Y(22)=-(T+Y3+(Y4-Y3)/3.)                                         INLT2700
      Z(22)=X3+(X4-X3)*2./3.                                           INLT2710
C NOW THE SPLITTER EXTENDS FROM THE COWL CLEAR ACROSS THE INLET         INLT2720
      AREA(23)=(X4-XC)*(YC-Y4)/2.                                      INLT2730
      X(23)=X(18)                                                      INLT2740
      Y(23)=-(T+Y4+2.*(YC-Y4)/3.)                                      INLT2750
      Z(23)=XC+2.*(X4-XC)/3.                                           INLT2760
      AREA(24)=XLTURN*HPROJ/2.                                         INLT2770
      X(24)=X(18)                                                      INLT2780
      Y(24)=-(T+HC+HPROJ/3.)                                           INLT2790
      Z(24)=XC+2.*XLTURN/3.                                            INLT2800
      AREA(25)=HC*(XLTURN-(X4-XC))                                     INLT2810
      X(25)=X(18)                                                      INLT2820
      Y(25)=-(T+HC/2.)                                                 INLT2830
      Z(25)=X4+0.5*(XLTURN-(X4-XC))                                    INLT2840
      AREA(26)=(HC+HPROJ)*((X4-XC)+2.*XT+XLCB)                         INLT2850
      X(26)=X(18)                                                      INLT2860
      Y(26)=-(T+(HC+HPROJ)/2.)                                         INLT2870
      Z(26)=XTIPCL+XLTURN+0.5*(X4-XC+2.*XT+XLCB)                       INLT2880
C NEXT DO THE FLOOR (COMPRESSION SURFACE)                               INLT2890
      AREA(27)=W*SQRT(X2*X2+Y2*Y2)                                     INLT2900
      X(27)=X(18)                                                      INLT2910
      Y(27)=-(T+Y2/2.)                                                 INLT2920
      Z(27)=X2/2.                                                      INLT2930
      AREA(28)=W*SQRT((X3-X2)**2 +(Y3-Y2)**2 )                         INLT2940
      X(28)=X(18)                                                      INLT2950
      Y(28)=-(T+Y2+(Y3-Y2)/2.)                                         INLT2960
      Z(28)=X2+(X3-X2)/2.                                              INLT2970
      AREA(29)=W*SQRT((X4-X3)**2 +(Y4-Y3)**2 )                         INLT2980
      X(29)=X(18)                                                      INLT2990
      Y(29)=-(T+Y3+(Y4-Y3)/2.)                                         INLT3000
      Z(29)=X3+(X4-X3)/2.                                              INLT3010
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      AREA(30)=W*SQRT(XLTURN**2 +HPROJ**2 )                                  INLT3020
      X(30)=X(18)                                                            INLT3030
      Y(30)=-(T+Y4+HPROJ/2.)                                                 INLT3040
      Z(30)=X4+XLTURN/2.                                                     INLT3050
      AREA(31)=W*2.*XT                                                       INLT3060
      X(31)=X(18)                                                            INLT3070
      Y(31)=-(T+(Y4+HPROJ+HDIFF)/2.)                                         INLT3080
      Z(31)=X4+XLTURN+XT                                                     INLT3090
      AREA(32)=W*SQRT(HDIFF**2+XLCB**2)                                      INLT3100
      X(32)=X(18)                                                            INLT3110
      Y(32)=-(T+HDIFF/2.)                                                    INLT3120
      Z(32)=X4+XLTURN+2.*XT+XLCB/2.                                          INLT3130
C THE NEXT PIECE IS THE TURN SECTION                                         INLT3140
      IF(ITYPE.EQ.1) GO TO 76                                                INLT3150
      AREA(33)=(HC+HPROJ)*SQRT(XLDUMP**2+(W+T+HBLDIV)**2)                    INLT3160
      X(33)=(T+W+HBLDIV)/2. -HBLDIV                                          INLT3170
      Y(33)=-(T+(HC+HPROJ)/2.)                                               INLT3180
      Z(33)=X4+XLTURN+2.*XT+XLCB+XLDUMP/2.                                   INLT3190
CALCULATE THE BOUNDARY LAYER DIVERTER PROJECTED AND WETTED AREAS. INCLUDINLT3200
C  THE EFFECT OF MISSILE BODY DIAMETER(VARYING DISTANCE TO EDGE OF INLETINLT3210
CALCULATE PROJECTED AREA                                                     INLT3220
      SINU=(HC/2.+T)/(D3/2.)                                                 INLT3230
      ANGLEU=ARSIN(SINU)                                                     INLT3240
      SINL=(HC/2.+T+HPROJ)/(D3/2.)                                           INLT3250
      ANGLEL=ARSIN(SINL)                                                     INLT3260
      AREA1U=(HC/2.+T)*HBLDIV                                                INLT3270
      AREA2U=(D3/2.)*(1.-COS(ANGLEU))*(HC/2.+T)/2.                           INLT3280
      ASEGU=0.5*((D3/2.)**2)*(ANGLEL-SINU)                                   INLT3290
      AUBLDV=AREA1U+AREA2U-ASEGU                                             INLT3300
      AREA1L=(HC/2.+HPROJ+T)*HBLDIV                                          INLT3310
      AREA2L=(D3/2.)*(1.-COS(ANGLEL))*(HC/2.+HPROJ+T)/2.                     INLT3320
      ASEGL=0.5*((D3/2.)**2)*(ANGLEL-SINL)                                   INLT3330
      ALBLDV=AREA1L+AREA2L-ASEGL                                             INLT3340
      ABLDIV=AUBLDV+ALBLDV                                                   INLT3350
CALCULATE WETTED AREAS UPPER HALF,THEN LOWER HALF                            INLT3360
      AREA( 6)=HBLDIV*(HC/2.+T)/SIN(10.*C)                                   INLT3370
      X( 6)=-HBLDIV/2.                                                       INLT3380
      Y( 6)=-(T+HC/4.)                                                       INLT3390
      Z( 6)=XC/2.+0.5*(HC/2.+T)/TAN(10.*C)                                   INLT3400
      AREA(12)=((HC/2.+T)/SIN(10.*C))*(D3/2.-SQRT((D3/2.)**2-(HC/2.+T)**2INLT3410
     12))                                                                    INLT3420
      AREA(12)= AREA(12)/2.                                                  INLT3430
      X(12)=-HBLDIV-1.*(D3/2.-SQRT((D3/2.)**2-(HC/2.+T)**2))/3.              INLT3440
      Y(12)= -(HC/2.+T)/3.                                                   INLT3450
      Z(12)=XC/2.+2.*((HC/2.+T)/TAN(10.*C))/3.                               INLT3460
      AREA(15)=HBLDIV*((HC/2.+T+HPROJ)/SIN(10.*C))                           INLT3470
      X(15)= X( 6)                                                           INLT3480
      Y(15)=-(T+HC/2.+(HC/2.+T+HPROJ)/2.)                                    INLT3490
      Z(15)=XC/2.+C.5*((HC/2.+HPROJ+T)/TAN(10.*C))                           INLT3500
      AREA(17)=((HC/2.+HPROJ+T)/SIN(10.*C))*(D3/2.-SQRT((D3/2.)**2           INLT3510
     1-(HC/2.+HPROJ+T)**2))                                                  INLT3520
      AREA(17)=AREA(17)/2.                                                   INLT3530
      X(17)=-HBLDIV-1.*((D3/2.-SQRT((D3/2.)**2-(HC/2.+T+HPROJ)**2))/3.)      INLT3540
      Y(17)=-(T+HC/2.+2.*(HC/2.+HPROJ+T)/3.)                                 INLT3550
      Z(17)=XC/2.+2.* (HC/2.+HPROJ+T)/(TAN(10.*C))/3.                        INLT3560
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      GO TO 1692                                                        INLT3570
C  LOOP TO CORRECT BACK IF WIDTH EXCEEDS MISSLE DIAMETER                INLT3580
   41 SINE = 1.0                                                        INLT3590
      HAL = 0.                                                          INLT3600
      GO TO 42                                                          INLT3610
CALCULATE FOR SINGLE BELLY-LINE                                         INLT3620
 76   AREA(33)=W*SQRT(XLDUMP**2+(HC+HPROJ+T)**2)                        INLT3630
      X(33)=X(18)                                                       INLT3640
      Y(33)=-(T+HC+HPROJ-HBLDIV)/2.                                     INLT3650
      Z(33)=XTIPCL+XLTURN+X4-XC+2.*XT+XLCB+XLDUMP/2.                    INLT3660
CALCULATE DIVERTER PROJECTED AREA                                       INLT3670
      IF((W/2. +T) .GT. D3/2.) GO TO 41                                 INLT3680
      HAL = SQRT((D3/2.)**2 - (W/2. + T)**2)                            INLT3690
      SINE=(W/2.+T)/(D3/2.)                                             INLT3700
   42 ANG=ARSIN(SINE)                                                   INLT3710
      ANGDUB=2.*ANG                                                     INLT3720
      AGROSS = (W+2.*T)*(D3/2. - HAL/2. + HBLDIV)                       INLT3730
      ASEG=0.5*(D3/2.)**2*(ANGDUB-SIN(ANGDUB))                          INLT3740
      ABLDIV=AGROSS-ASEG                                                INLT3750
CALCULATE DIVERTER WETTED AREA                                          INLT3760
      AREA( 6)=HBLDIV*(W/2.+T)/SIN(10.*C)                               INLT3770
      X( 6)=(W/2.+T)/2.                                                 INLT3780
      Y( 6)=HBLDIV/2.                                                   INLT3790
      Z( 6)=0.5*(W/2.+T)/TAN(10.*C)                                     INLT3800
      AREA(12) = ((W/2. +T)/SIN(10.*C))*(D3/2. -HAL)/2.                 INLT3810
      X(12)= 2.*(W/2.+ T)/3.                                            INLT3820
      Y(12) = HBLDIV + (D3/2.-HAL)/3.                                   INLT3830
      Z(12)=2.*(W/2.+T)/TAN(10.*C)/3.                                   INLT3840
      AREA (15) = AREA( 6)                                              INLT3850
      X(15) = -X( 6)                                                    INLT3860
      Y(15) = Y( 6)                                                     INLT3870
      Z(15) = Z( 6)                                                     INLT3880
      AREA(17) = AREA(12)                                               INLT3890
      X(17) = -X(12)                                                    INLT3900
      Y(17) =  Y(12)                                                    INLT3910
      Z(17) =  Z(12)                                                    INLT3920
 1692  CONTINUE                                                         INLT3930
CALCULATE THE AFF AND FWD FAIRING PROJECTED AND WETTED AREAS            INLT3940
C XFRNG IS DISTANCE FROM END OF DUMP PORT TO END OF MISSILE AND XLFWD   INLT3950
C IS AXIAL LENGTH OF FWD FAIRING. DO FWD FAIRING FIRST.                 INLT3960
      IF(ITYPE.EQ.1)GO TO 1600                                          INLT3970
      AFFPRJ=HC*(W+T+HBLDIV)                                            INLT3980
      GO TO 1601                                                        INLT3990
 1600 AFFPRJ=W*(HC+HBLDIV+T)                                            INLT4000
 1601 REQUIV=SQRT(2.*AFFPRJ/PI)                                         INLT4010
CHECK THAT AN L/D=3. CONE DOES NOT EXTEND FWD OF THE TANGENCY POINT     INLT4020
      XLFWD=6.*REQUIV                                                   INLT4030
      STAFWD=XFRNG+XLDUMP+XINLET+XLFWD                                  INLT4040
       STACHK=XTOTAL-STAFWD                                             INLT4050
      IF(STACHK.LT.TANLT) XLFWD=XTOTAL-TANLT-(STAFWD-XLFWD)             INLT4060
      IF(XLFWD.LT.(2.*REQUIV)) XLFWD=2.*REQUIV                          INLT4070
      XFFRNG=XLFWD                                                      INLT4080
      XLBYR=XLFWD/REQUIV                                                INLT4090
      XLBYD=XLBYR/2.                                                    INLT4100
      IF(ITYPE.EQ.1)GO TO 1817                                          INLT4110
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      AREA(34)=HC*(SQRT((W+HBLDIV+T   )**2+XLFWD**2))/2.                INLT4120
      X(34)=2.*(W+T   +HBLDIV)/3. -HBLDIV                               INLT4130
      Y(34)=-(T+HC/2.)                                                  INLT4140
      Z(34)=-XLFWD/3.                                                   INLT4150
      AREA(37)=(W+HBLDIV+T)*(SQRT((HC/2.)**2+XLFWD**2))/2.              INLT4160
      X(37)=(W+T+HBLDIV)/3.  -HBLDIV                                    INLT4170
      Y(37)=-(T+2.*HC/3.)                                               INLT4180
      Z(37)=Z(34)                                                       INLT4190
      AREA(38)=AREA(37)                                                 INLT4200
      X(38)=X(37)                                                       INLT4210
      Y(38)=-(T+HC/6.)                                                  INLT4220
      Z(38)=Z(34)                                                       INLT4230
C FILL IN THE SIDEPLATES AND THE BOTTOM (COWL) FOR FWD FAIRING          INLT4240
      AREA(41)=XC*HC/2.                                                 INLT4250
      X(41)=W+1.5*T                                                     INLT4260
      Y(41)=-(T+2.*HC/3.)                                               INLT4270
      Z(41)=XC/3.                                                       INLT4280
      X(42) =0.                                                         INLT4290
      Y(42) =C.                                                         INLT4300
      Z(42) =C.                                                         INLT4310
      AREA(42)=0.                                                       INLT4320
      AREA(43)=W*XC                                                     INLT4330
      X(43)=T+W/2.                                                      INLT4340
      Y(43)=-(1.5*T+HC)                                                 INLT4350
      Z(43)=XC/2.                                                       INLT4360
      GO TO 2118                                                        INLT4370
 1817 AREA(34)=   SQRT((W/2.)**2+XLFWD**2)*(HC+T+HBLDIV)/2.             INLT4380
      X(34)=W/3.                                                        INLT4390
      Y(34)=-(T+HC+HBLDIV)/3. -HBLDIV                                   INLT4400
      Z(34)=-XLFWD/3.                                                   INLT4410
      AREA(37)=AREA(34)                                                 INLT4420
      X(37)=-X(34)                                                      INLT4430
      Y(37)=Y(34)                                                       INLT4440
      Z(37)=Z(34)                                                       INLT4450
      AREA(38)=W*SQRT((HC+HBLDIV+T)**2+XLFWD**2)/2.                     INLT4460
      X(38)=0.                                                          INLT4470
      Y(38)=-2.*(HC+T+HBLDIV)/3.  -HBLDIV                               INLT4480
      Z(38)=Z(34)                                                       INLT4490
      AREA (40)=0.                                                      INLT4500
      X    (40)=0.                                                      INLT4510
      Y    (40)=0.                                                      INLT4520
      Z    (40)=0.                                                      INLT4530
      AREA(41)=XC*HC/2.                                                 INLT4540
      X(41)=(W+T)/2.                                                    INLT4550
      Y(41)=-(T+2.*HC/3.)                                               INLT4560
      Z(41)=XTIPCL/3.                                                   INLT4570
      AREA(42)=AREA(41)                                                 INLT4580
      X(42)=-X(41)                                                      INLT4590
      Y(42)=Y(41)                                                       INLT4600
      Z(42)=Z(41)                                                       INLT4610
      AREA(43)=W*XC                                                     INLT4620
      X(43)=0.                                                          INLT4630
      Y(43)=-(1.5*T+HC)                                                 INLT4640
      Z(43)=XC/2.                                                       INLT4650
 2118 CONTINUE                                                          INLT4660
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CALCULATE AFT FAIRING WETTED AREA                                        INLT4670
 1818 IF(ITYPE.EQ.1)GO TO 1819                                           INLT4680
      AREA(36)=(HC+HPROJ+T+T)*SQRT((W+T+T+HBLDIV)**2+XFRNG**2)/2.        INLT4690
      X(36)= 2.*(W+T+T+HBLDIV)/3. -HBLDIV                                INLT4700
      Y(36)=-(HC/2.+T)-(HC/2. + T + HPROJ)/3.                            INLT4710
      Z(36)= XINLET + XLDUMP + XFRNG/3.                                  INLT4720
      X(39) =0.                                                          INLT4730
      Y(39) =0.                                                          INLT4740
      Z(39) =0.                                                          INLT4750
      AREA(39)=0.                                                        INLT4760
      AREA(35)=(W+T+T+HBLDIV)*SQRT((HC/2.+HPROJ+T)**2+XFRNG**2)/2.       INLT4770
      X(35)=   (W+T+T+HBLDIV)/3. -HBLDIV                                 INLT4780
      Y(35)=-(HC/2.+T)-2.*((HC/2.+HPROJ+T)/2.)/3.                        INLT4790
      Z(35)= Z(36)                                                       INLT4800
      AREA(40)=(W+T+T+HBLDIV)*SQRT((HC/2.+T)**2+XFRNG**2)/2.             INLT4810
      X(40)=X(35)                                                        INLT4820
      Y(40)=-(T+HC/2.)/3.                                                INLT4830
      Z(40)=Z(36)                                                        INLT4840
      GO TO 1820                                                         INLT4850
 1819 AREA(36)= (HC+HPROJ+T+T+HBLDIV)*SQRT((W/2.+T)**2 +XFRNG**2)/2.     INLT4860
      X(36)= 2.*(W/2.+T)/3.                                              INLT4870
      Y(36)=-(T+HC +HPROJ +T-HBLDIV)/3.                                  INLT4880
      Z(36)= XINLET + XLDUMP + XFRNG/3.                                  INLT4890
      AREA(39)= AREA(36)                                                 INLT4900
      X(39)= -X(36)                                                      INLT4910
      Y(39)= Y(36)                                                       INLT4920
      Z(39)= Z(36)                                                       INLT4930
      AREA(35)=(W+T+T)*SQRT((HC+HPROJ+T+T+HBLDIV)**2+XFRNG**2)/2.        INLT4940
      X(35)=0.                                                           INLT4950
      Y(35)=-2.*(T+HC+HPROJ+T-HBLDIV)/3.                                 INLT4960
      Z(35)= Z(36)                                                       INLT4970
 1820 CONTINUE                                                           INLT4980
CALCULATE THE TOTAL WETTED AREA OF THE AFT FAIRING                       INLT4990
      AWETAF = AREA(36)+ AREA(39) + AREA(35) + AREA(40)                  INLT5000
CALCULATE THE TOTAL WETTED OF THE FORWARD FAIRING                        INLT5010
      AWETFF=AREA(34)+AREA(37)+AREA(38)+AREA(41)+AREA(42)+AREA(43)       INLT5020
CALCULATE THE WETTED AREA OF THE BOUNDARY LAYER DIVERTER                 INLT5030
      ADIVWT=AREA( 6)+AREA(15)+AREA(12)+AREA(17)                         INLT5040
CALCULATE THE WETTED AREA OF THE ENTIRE INLET(FORE AND AFT FAIRINGS+DUCT INLT5050
      AWET=AWETAF+AWETFF+AREA(1)+AREA(2)+ AREA(3)+AREA(4)+AREA(5)+       INLT5060
     4AREA(7)+AREA(8)+AREA(9)+AREA(10)+AREA(11)+AREA(13)+AREA(14)+       INLT5070
     2AREA(16)                                                           INLT5080
C     AWETQ IS WETTED AREA OF INLET MINUS AREA MASKED ON BODY            INLT5090
      AWETQ = AWET - AREA(35)                                            INLT5100
      IF( ITYPE .GT. 1 ) AWETQ=AWET-AREA(36)-AREA(16)                    INLT5110
      ADUCT=0.                                                           INLT5120
      DO 1112 M=1,33                                                     INLT5130
 1112  ADUCT=ADUCT+AREA(M)                                               INLT5140
C TEMP IS IN DEG FARENHEIT AND RHO IS LB/IN**3                           INLT5150
      IF(IND.NE.0) GO TO 1492                                            INLT5160
      WGHTAF=AWETAF*RHOFRG*TFRNG                                         INLT5170
      WGHTFF=AWETFF*RHOFRG*TFRNG                                         INLT5180
      WGHTDU=ADUCT*RHOA*TSTART                                           INLT5190
      WEIGHT=WGHTFF+WGHTAF+WGHTDU                                        INLT5200
C     R/J ONLY                                                           INLT5210
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      GO TO 5003                                                        INLT5220
 5007 CONTINUE                                                          INLT5230
       WTCADU=PI*2.*RENGO*TSTART*RHOA                                   INLT5240
       IF(KIND.GT.49.AND.KIND.LT.60) WEIGHT=WEIGHT+WTCADU               INLT5250
 5003 CONTINUE                                                          INLT5260
CALCULATE THE INLET CENTER OF GRAVITY                                   INLT5270
      XCGSUM=0.                                                         INLT5280
      YCGSUM=0.                                                         INLT5290
      ZCGSUM=0.                                                         INLT5300
      T=TSTART                                                          INLT5310
      RHO=RHOA                                                          INLT5320
      DO 8 K=1,43                                                       INLT5330
      IF(K.EQ.34) GO TO 1313                                            INLT5340
      GO TO 1314                                                        INLT5350
 1313 T=TERNG                                                           INLT5360
      RHO=RHOERG                                                        INLT5370
 1314 WGHT(K)=AREA(K)*T*RHO                                             INLT5380
      XCOMP=AREA(K)*T*RHO*X(K)                                          INLT5390
      YCOMP=AREA(K)*T*RHO*Y(K)                                          INLT5400
      ZCOMP=AREA(K)*T*RHO*Z(K)                                          INLT5410
C     R/J ONLY                                                          INLT5420
      GO TO 5004                                                        INLT5430
 5006 CONTINUE                                                          INLT5440
       IF(KIND.GT.49.AND.KIND.LT.60) GO TO 87                           INLT5450
       XCGSUM=XCGSUM+0.*WTCADU                                          INLT5460
       YCGSUM=YCGSUM+WTCADU*(HBLDIV+D3/2.)                              INLT5470
       ZCGSUM=ZCGSUM+WTCADU*(XINLET+RENGO)                              INLT5480
 87    XCG=XCGSUM/WEIGHT                                                INLT5490
      GO TO 5005                                                        INLT5500
 5004 CONTINUE                                                          INLT5510
      XCGSUM = XCGSUM + XCOMP                                           INLT5520
 5005 CONTINUE                                                          INLT5530
      YCGSUM=YCGSUM+YCOMP                                               INLT5540
    8 ZCGSUM=ZCGSUM+ZCOMP                                               INLT5550
      XCG=XCGSUM/WEIGHT                                                 INLT5560
      YCG=YCGSUM/WEIGHT                                                 INLT5570
      ZCG=ZCGSUM/WEIGHT                                                 INLT5580
CALCULATE THE PITCH INERTIA OF EACH PIECE ABOUT ITS C.G.                INLT5590
      T=TSTART                                                          INLT5600
      DO 23 IM=34,38                                                    INLT5610
   23 RIX(IM)=0.                                                        INLT5620
      RIX(1) =WGHT(1)*(HC**2+XTIPCL**2)/18.                             INLT5630
      RIX(2) =WGHT(2)*(XLTURN**2+HC**2)/3.                              INLT5640
      RIX(3) =WGHT(3)*((HPROJ+T)**2+XLTURN**2)/18.                      INLT5650
      RIX(4) =WGHT(4)*((X4-XC+2.*XT)**2+(HC+HPROJ+T)**2)/3.             INLT5660
      RIX(5) =WGHT(5)*((HC+HPROJ+T)**2+(XLCR+XLDUMP)**2)/3.             INLT5670
      RIX(7) =RIX(1)                                                    INLT5680
      RIX(8) =RIX(2)                                                    INLT5690
      RIX(9) =RIX(3)                                                    INLT5700
      RIX(10)=RIX(4)                                                    INLT5710
      RIX(11)=RIX(5)                                                    INLT5720
      RIX(13)=WGHT(13)*( XLTURN**2+(HPROJ+T)**2+TSTART**2)/3.           INLT5730
      RIX(14)=WGHT(14)*((X4-XC+2.*XT+XLCB+XLDUMP)**2+TSTART**2)/3.      INLT5740
      RIX(16)=WGHT(35)*((XTIPCL+XLTURN+X4-XC+2.*XT+XLCB+XLDUMP)**2+     INLT5750
     1TSTART**2)/3.                                                     INLT5760
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      RIX(18)=WGHT(18)*(X2**2+Y2**2)/18.                                INLT5770
      RIX(19)=WGHT(19)*((X3-X2)**2+(Y2    )**2)/3.                      INLT5780
      RIX(20)=WGHT(20)*((X3-X2)**2+(Y3-Y2)**2)/18.                      INLT5790
      RIX(21)=WGHT(21)*((X4-X3)**2+Y3**2)/3.                            INLT5800
      RIX(22)=WGHT(22)*((X4-X3)**2+(Y4-Y3)**2)/18.                      INLT5810
      RIX(23)=WGHT(23)*((X4-XC)**2+(YC-Y4)**2)/18.                      INLT5820
      RIX(24)=WGHT(24)*(XLTURN**2+(HPROJ+TSTART)**2)/18.                INLT5830
      RIX(25)=WGHT(25)*((XLTURN-(X4-XC))**2+HC**2)/3.                   INLT5840
      RIX(26)=WGHT(26)*((HC+HPROJ)**2+(X4-XC+2.*XT+XLCB)**2)/3.         INLT5850
      RIX(27)=WGHT(27)*(X2**2+Y2**2+TSTART**2)/3.                       INLT5860
      RIX(28)=WGHT(28)*((X3-X2)**2+(Y3-Y2)**2+TSTART**2)/3.             INLT5870
      RIX(29)=WGHT(29)*((X4-X3)**2+(Y4-Y3)**2+TSTART**2)/3.             INLT5880
      RIX(30)=WGHT(30)* (XLTURN**2+HPROJ**2+TSTART**2)/3.               INLT5890
      RIX(31)=WGHT(31)*(4.*XT*XT+TSTART**2)/3.                          INLT5900
      RIX(32)=WGHT(32)*(HDIFF**2+XLCB**2+TSTART**2)/3.                  INLT5910
      IF(ITYPE.EQ.1) GO TO 4444                                         INLT5920
      RIX(36) = WGHT(36)*((HC+HPROJ+2.*TSTART)**2.+XFRNG**2)/18.        INLT5930
      RIX(39)=0.                                                        INLT5940
      RIX(35)=WGHT(35)*(3.*TFRNG**2+2.*XFRNG**2)/36.                    INLT5950
      RIX(40)=RIX(35)*WGHT(40)/WGHT(35)                                 INLT5960
                                                                        INLT5970
      RIX(33)=WGHT(33)*((HC+HPROJ)**2+(XLDUMP**2+(W+T+HBLDIV)**2))/3.   INLT5980
      RIX( 6)=WGHT( 6)*(((HC/2.+TSTART)/SIN(10.*C))**2+TSTART**2)/3.    INLT5990
      RIX(15)=WGHT(15)*(((HC/2.+HPROJ+TSTART)/SIN(10.*C))**2+TSTART**2)/INLT6000
     13.                                                                INLT6010
      RIX(12)=WGHT(12)*(3.*TSTART**2+2.*(D3/2.*(1.-COS(ANGLEU)))**2)/36 INLT6020
      RIX(17)=WGHT(17)*(3.*TSTART**2+2.*(D3/2.*(1.-COS(ANGLEL)))**2)/36 INLT6030
      GO TO 2223                                                        INLT6040
 4444 RIX(33)=WGHT(33)*(XLDUMP**2+(HC+HPROJ+TSTART)**2+TSTART**2)/3.    INLT6050
      RIX( 6)=WGHT( 6)*(HBLDIV**2+ ((W/2.+TSTART)/SIN(10.*C))**2)/3.    INLT6060
      RIX(15)=RIX( 6)                                                   INLT6070
      RIX(12)=WGHT(12)*(((W/2.+TSTART)/SIN(10.*C))**2+(D3/2.-HAL))*2/18.INLT6080
      RIX(17)=RIX(12)                                                   INLT6090
      RIX(36) = WGHT(36)*(XFRNG**2 + (HC+HPROJ+HBLDIV+2.*TSTART)**2)/18.INLT6100
      RIX(39) = RIX(36)                                                 INLT6110
      RIX(35)=WGHT(35)*2.*(3.*TFRNG**2+2.*((HC+HPROJ+HBLDIV+2.*TSTART)**INLT6120
     12+XFRNG**2))/36.                                                  INLT6130
      RIX(40)=0.                                                        INLT6140
 2223 CONTINUE                                                          INLT6150
      RMI=0.                                                            INLT6160
      DO 1109 IJ=1,40                                                   INLT6170
 1109 RMI=RMI+RIX(IJ)                                                   INLT6180
CALCULATE THE TRANSFER TERM FOR EACH PIECE TO THE INLET C.G.            INLT6190
      XITRAN=C.                                                         INLT6200
      T=TSTART                                                          INLT6210
      RHO=RHOA                                                          INLT6220
      DO 414 II=1,40                                                    INLT6230
       IF (II.EQ.34) GO TO 8402                                         INLT6240
      GO TO 8403                                                        INLT6250
 8402 T=TFRNG                                                           INLT6260
      RHO=RHOFRG                                                        INLT6270
 8403 XIADD=AREA(II)*T*RHO*((YCG-Y(II))**2+(ZCG-Z(II))**2)              INLT6280
      IF(II.EQ.34.OR.II.EQ.37.OR.II.EQ.38) XIADD =0.                    INLT6290
  414 XITRAN=XITRAN+XIADD                                               INLT6300
      PITCHI=RMI+XITRAN                                                 INLT6310
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C       P/J ONLY                                                        INLT6320
        GO TO 5010                                                      INLT6330
 5011 CONTINUE                                                          INLT6340
        PICADU=(.25*WTCADU)*((D3**2.)/4.-RENGD**2.+(4.*RENGC**2.)/3.)   INLT6350
        IF(KIND.GT.49.AND.KIND.LT.60)PITCHI=PITCHI+PICADU               INLT6360
 5010 CONTINUE                                                          INLT6370
      XDIST=XTOTAL-(XERNG+XLDUMP+XINLET+XLFWD)                          INLT6380
      XNAC=XINLET+XLDUMP+XERNG                                          INLT6390
      WGHTAF=WGHTAF*XNINLT                                              INLT6400
      WGHTFF=WGHTFF*XNINLT                                              INLT6410
      WGHTDU=WGHTDU*XNINLT                                              INLT6420
      WEIGHT=WEIGHT*XNINLT                                              INLT6430
      PITCHI=PITCHI*XNINLT                                              INLT6440
CONVERT FROM INLET COORDINATE SYSTEM TO MISSILE COORDINATE SYSTEM        INLT6450
      ZMISCG=-YCG                                                       INLT6460
      XMISCG=-ZCG                                                       INLT6470
      YMISCG=XCG                                                        INLT6480
      IF (NOUT .NE. 1) GO TO 113                                        INLT6490
      WRITE(6,3004)AR,W,HC,ACPROJ,XMISCG,YMISCG,ZMISCG,XCHECK,XDUMP,    INLT6500
     1XLDUMP,XERNG,WGHTAF,XFERNG,WGHTFF,XINLET,WGHTDU,WEIGHT,PITCHI     INLT6510
      IF ( NOUT .GT. 1 ) WRITE(6,JONSON)                                INLT6520
 3004 FORMAT (10X,3HAR=,F4.2,7H WIDTH=,F5.2,12H IN  HEIGHT=,F5.2,       INLT6530
     127H IN  COWL PROJECTED AREA = ,F5.2,7H SQ.IN ,/,15X,              INLT6540
     2                                        4HXCG=,F6.2,6H  YCG=,F6.2,INLT6550
     36H  ZCG=,F6.2,/,15X,30HINLET LEADING EDGE IS AT STA. ,F6.2,/,     INLT6560
     415X,32HLEADING EDGE OF DUMP IS AT STA. ,F6.2,10H. DUMP IS ,F5.2,  INLT6570
     51X,9HIN. LONG.,/,15X,15HAFT FAIRING IS ,F5.2,1X,20HIN. LONG AND WEINLT6580
     6IGHS ,F6.2,1X,3HLB.,/,15X,15HFWD FAIRING IS ,F5.2,1X,             INLT6590
     720HIN. LONG AND WEIGHS ,F6.2,1X,3HLB.,/,15X,18HTHE INLET DUCT IS ,INLT6600
     8F6.2,1X,20HIN. LONG AND WEIGHS ,F6.2,1X,18HLB(INCL. B/L DIV).,/,  INLT6610
     915X,26HTHE TOTAL INLET WEIGHT IS ,F6.2,1X,2HLB/15X,27HPITCH MOMENTINLT6620
     A OF INERTIA IS ,F10.2,9H LB-IN SQ)                                INLT6630
 113  X1=X1/HC                                                          INLT6640
      X2=X2/HC                                                          INLT6650
      X3=X3/HC                                                          INLT6660
      X4=X4/HC                                                          INLT6670
      XC=XC/HC                                                          INLT6680
      XT=XT/HC                                                          INLT6690
      Y1=Y1/HC                                                          INLT6700
      Y2=Y2/HC                                                          INLT6710
      Y3=Y3/HC                                                          INLT6720
      Y4=Y4/HC                                                          INLT6730
      YC=YC/HC                                                          INLT6740
 114  CONTINUE                                                          INLT6750
      RETURN                                                            INLT6760
 1492 IF ( NOUT .NE. 0 ) WRITE ( 6, 1493 )                              INLT6770
 1493 FORMAT( 5X,41HERROR IN MATERIALS SUBROUTINE. NEXT CASE )          INLT6780
      RETURN                                                            INLT6790
   38 IF ( NOUT .NE. 0 ) WRITE ( 6, 39 ) HP                             INLT6800
   39  FORMAT(46H ERROR TRYING TO FIND ALTITUDE DATA IN INLETP ,F15.5)   INLT6810
      RETURN                                                            INLT6820
      END                                                               INLT6830
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      SUBROUTINE INLIET ( NRM, CLAINL, CDBON )                          INLI0010
C     PGM=NUK.CM-CGSM    GGJ/RKM   FIV-EBCD   7/11/73                  INLI0020
C     GLINT ANOMALY                                                     INLI0030
      REAL KAR,KM                                                       INLI0040
      DIMENSION CLINLX(1)                                               INLI0050
      DIMENSION BASECP(20)                                              INLI0060
      DIMENSION CDABT1(86), CDABT2(86), CDABT3(86), CDABT4(86),         INLI0070
     1         CDABT5(86), CDABT6(430)                                  INLI0080
      EQUIVALENCE ( CDABT1(1), CDABT6(1) ), ( CDABT2(1), CDABT6(87) ),  INLI0090
     1            ( CDABT3(1), CDABT6(173) ), ( CDABT4(1), CDABT6(259)),INLI0100
     2            ( CDABT5(1), CDABT6(345)  )                           INLI0110
      DIMENSION X(3), NINV(3)                                           INLI0120
      COMMON/BASDRG/ BASEP(59)                                          INLI0130
      COMMON/BDTAB/ NCONE,NPRX,NRMX,NCONEX,NPRXX,NRMXX                  INLI0140
      COMMON /BOAT/ CDPBTL,DUM19(19)                                    INLI0150
      COMMON /PRINTR/ IKP3(3), IOUT, JKP3(3)                            INLI0160
      COMMON/INSERT/ZX17(17),TNOZL,DUMXXX,RBE,INS10(10),TBL,INS2(2)     INLI0170
      COMMON /EQRNOW/ NR7,NALT,RMV(20),ALTV(10),ERBT,FACTOR             INLI0180
      COMMON/GOBOL/ WARD(78)                                            INLI0190
      EQUIVALENCE (WARD(24), EPSR)                                      INLI0200
      EQUIVALENCE (WARD(73),TR), (WARD(74), TB)                         INLI0210
      COMMON/SUMOUT/ BODCD(20), XINCD(20), WNGCD(20), TAILCD(20),       INLI0220
     1 TAXLCD(20), FRICCD(20), CDCONA(20), CDOOFA(20), CDPNAR(20),      INLI0230
     2CDEXR1(20), CDEXR2(20), CDBTAR(20), CDLAR(20), BDRCN(20),         INLI0240
     3CDPROD(20), BLDVAR(20), CDCWL(20), FRGCD(20), CDPINX(20),         INLI0250
     4 CDPINT(20), CDPWAR(20), CDHTAR(20), CDVTAR(20), CDTLAR(20),      INLI0260
     5CDPLSA(20), BDROFF(20), CDPTAR(20), CDPOFA(20)                    INLI0270
      COMMON /INCOMM/XLDUMP,XFERNG,XINLET,XTIPCL,STERM,TNC              INLI0280
      EQUIVALENCE (  XFERNG, XFWDA  )                                   INLI0290
      COMMON /EXTERN/ZAR(20)                                            INLI0300
      EQUIVALENCE   (ZAR(17), XMRJTO ),(ZAR(6),XTOTAL)                  INLI0310
      COMMON /CODEXX/ INIZ,ITYPE, I14(14)                               INLI0320
      COMMON /INDATX/ZX9(9),XCHECK,XFRNG, ZX12(12)                      INLI0330
      COMMON /RJDAT/ ZX3(3),A6A3,ACA3, ZX4(4)                           INLI0340
      COMMON /BASVAR/ ZA7(7), SWI, STI, ARW, ZA10(10)                   INLI0350
      COMMON /UPINLT/  PRAMBL(129) , XCGDI                              INLI0360
      COMMON /ALEBLK/   AMACH, AMEX13(13)                               INLI0370
      COMMON/LET/                                                       INLI0380
     1   ATNS2T   ,ATNS2W   ,SEW      ,SET      ,DMW      ,DMT      ,   INLI0390
     2   RL4      ,RL5      ,ALPHAR   ,RITWV    ,IART     ,ICNTRL   ,   INLI0400
     3   D2       ,RL2                                                  INLI0410
      COMMON/DRG/                                                       INLI0420
     1   D1       ,THETAC   ,FINE     ,RS       ,R1       ,RL1      ,   INLI0430
     2   XCYL     ,XTHERT   ,XBT      ,RL3      ,ITN      ,AMACW    ,   INLI0440
     3   AMACT    ,THKRT    ,THKRW    ,RL1A     ,IBTL     ,ATCT     ,   INLI0450
     4   ATCW     ,DML      ,ITSECT   ,IWSECT   ,RXINT    ,RXINW    ,   INLI0460
     5   BTANST   ,BTANSW   ,RCW      ,FLTSEW   ,XLENW    ,FLTSET   ,   INLI0470
     6   XLENT    ,QRATIO   ,DN       ,DE       ,D3       ,RCT      ,   INLI0480
     7   NW       ,TCW      ,TCT      ,BT       ,BW       ,ART      ,   INLI0490
     8   ARWX     ,TRT      ,TRW      ,SREF     ,DB                     INLI0500
      COMMON/AERO/                                                      INLI0510
     1   ATNS4T   ,ATNS4W   ,BTANA    ,BART     ,BARW     ,BAPT     ,   INLI0520
     2   BAPW     ,BAPPT    ,BAPPW    ,BETA     ,BEN      ,CFT      ,   INLI0530
     3   CFW      ,CDB      ,CFB      ,CNANAC   ,CLABT    ,CLAT     ,   INLI0540
     4   CLAW     ,CLTV     ,CKWB     ,CKBW     ,CKBT     ,CKTB     ,   INLI0550
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     5    CLATWV    ,D         ,DD        ,DD2       ,DPR       ,DHL       ,    INLI0560
     6    FAFN      ,F         ,FL        ,FR        ,PI        ,RLD       ,    INLI0570
     7    RLDB      ,RBTANA    ,SLETR     ,SLEWR     ,STSREF    ,SWSREF    ,    INLI0580
     8    SKRT      ,SKTB      ,SKBW      ,SKWB      ,TRTP1     ,TRWP1     ,    INLI0590
     9    CFI       ,TANST     ,TANSW     ,TANS4T    ,TANS4W    ,TANS2T    ,    INLI0600
     A    TANS2W    ,XD1B      ,XD1BT     ,XD1T      ,XD1W      ,XNLCMB    ,    INLI0610
     B    XNLCCB    ,ACT       ,ACW       ,XNLCLB    ,BODYL     ,TAILL     ,    INLI0620
     C    WINGL     ,RL1SQR    ,D1SQR     ,FR1       ,FCAP      ,CDPNX     ,    INLI0630
     D    ACAP      ,TN1       ,SPN       ,VPN       ,FAFN1     ,PMN       ,    INLI0640
     E    ANOSE2    ,SWSBN     ,RNOSE2    ,XLINF     ,CR2       ,NCON(3)   ,    INLI0650
     F    CREMAX    ,CRAMAX    ,B2        ,CNVR      ,BI        ,B7        ,    INLI0660
     G    SV2       ,SLEI      ,SLEZ      ,XVA       ,XVB       ,XVC       ,    INLI0670
     H    CT2       ,CX        ,VOLN      ,VOLBT     ,VOLBOD    ,SWBREF    ,    INLI0680
     I    BRAT      ,ROG                                                        INLI0690
      COMMON/CHK/CON1,KAR,KM                                                   INLI0700
      NAMELIST/CHECK/ ARN,SEN,TRN,ATNS2N,BARN,AICLN,THKRN,RXINN,               INLI0710
     1SLEN,BTANSN,CNRN,DELNN,      CON1,KM,KAR                                INLI0720
      NAMELIST/OUTPUT/BN,RCN,TCN,SLEN,XCPI,CLAM,ARN,                           INLI0730
     1CDBOEF,CLATWV,RM,CLAIWV,CMAN,CNBN                                        INLI0740
      NAMELIST/INPUT/XMRJTO,STERM,XINLET,XLDUMP,XFRNG,XTOTAL,D3,               INLI0750
     1ACA3,A3,SREF,XTIPCL,ITYPE,XFWDA,XD1T,CLAT,     RMV,D1,XCHECK,           INLI0760
     2SFT,FRRT,RT,TRT,TNOZL,FACTOR,A6A3,XCGD1,ART                              INLI0770
      NAMELIST/CKOUT/ ACPER,DIAM,STERM,HBLDIV,BN,RCN,TCN,FPSR,                 INLI0780
     1 XLAH,XLE,XLEN,CLAM,CLAIN,CLAINX,ACA3,AC,X,NINV                          INLI0790
1002 FORMAT(//I3, 2X, 6HINTWOD, 2H, ,                                          INLI0800
     1     6H  XCPI, 2H =, F10.3, 2H, , 6H  CLAN, 2H =, E10.3, 2H, ,           INLI0810
     2     6H  CLAM, 2H =, F10.3, 2H, , 6H  CKNB, 2H =, E10.3, 2H, ,           INLI0820
     3     6H  CKBN, 2H =, F10.3, 2H, , 6HCLAINL, 2H =, E10.3)                 INLI0830
      DATA BASECP/                                                             INLI0840
     1        0.0, -.137, 0.8, -.137, 0.9, -.145, 1.0, -.195, 1.2, -.191,     INLI0850
     1     1.5, -.172, 2.0, -.141, 3.0, -.092, 4.0, -.065, 5.0, -.048/        INLI0860
      DATA CDART1/    1.000,                                                   INLI0870
     1              0.000,   0.480,   0.025,   0.570,   0.050,   0.600,       INLI0880
     2              0.075,   0.620,   0.100,   0.600,   0.150,   0.580,       INLI0890
     3              0.200,   0.510,   0.250,   0.480,   0.300,   0.440,       INLI0900
     4              0.350,   0.380,   0.400,   0.320,   0.450,   0.250,       INLI0910
     5              0.500,   0.210,   0.550,   0.160,   0.600,   0.130,       INLI0920
     6              0.650,   0.110,   0.700,   0.090,   0.800,   0.060,       INLI0930
     7              0.850,   0.040,   0.950,   0.000,   1.000,   0.000,       INLI0940
     8              2.000,                                                   INLI0950
     9              0.000,   1.740,   0.025,   1.640,   0.050,   1.540,       INLI0960
     A              0.075,   1.440,   0.100,   1.340,   0.150,   1.200,       INLI0970
     B              0.200,   1.070,   0.250,   0.940,   0.300,   0.810,       INLI0980
     C              0.350,   0.700,   0.400,   0.590,   0.450,   0.500,       INLI0990
     D              0.500,   0.420,   0.550,   0.350,   0.600,   0.290,       INLI1000
     E              0.650,   0.210,   0.700,   0.170,   0.800,   0.090,       INLI1010
     F              0.900,   0.020,   0.950,   0.010,   1.000,   0.000/       INLI1020
      DATA CDART2/ 3.000,                                                      INLI1030
     1              0.000,   2.460,   0.025,   2.250,   0.050,   2.020,       INLI1040
     2              0.075,   1.890,   0.100,   1.760,   0.150,   1.540,       INLI1050
     3              0.200,   1.340,   0.250,   1.170,   0.300,   1.010,       INLI1060
     4              0.350,   0.870,   0.400,   0.720,   0.450,   0.600,       INLI1070
     5              0.500,   0.500,   0.550,   0.410,   0.600,   0.320,       INLI1080
     6              0.650,   0.250,   0.700,   0.200,   0.800,   0.090,       INLI1090
     7              0.900,   0.020,   0.950,   0.010,   1.000,   0.000,       INLI1100
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8              4.000,                                                  INLI1110
9              0.000,   2.990,   0.025,   2.600,   0.050,   2.380,   INLI1120
A              0.075,   2.220,   0.100,   2.060,   0.150,   1.780,   INLI1130
B              0.200,   1.560,   0.250,   1.350,   0.300,   1.170,   INLI1140
C              0.350,   1.000,   0.400,   0.860,   0.450,   0.700,   INLI1150
D              0.500,   0.570,   0.550,   0.460,   0.600,   0.360,   INLI1160
E              0.650,   0.290,   0.700,   0.240,   0.800,   0.090,   INLI1170
F              0.900,   0.020,   0.950,   0.010,   1.000,   0.000/   INLI1180
 DATA CDABT3/  5.000,                                                 INLI1190
1              0.000,   3.320,   0.025,   3.010,   0.050,   2.650,   INLI1200
2              0.075,   2.460,   0.100,   2.270,   0.150,   1.970,   INLI1210
3              0.200,   1.710,   0.250,   1.480,   0.300,   1.260,   INLI1220
4              0.350,   1.080,   0.400,   0.910,   0.450,   0.770,   INLI1230
5              0.500,   0.620,   0.550,   0.510,   0.600,   0.410,   INLI1240
6              0.650,   0.310,   0.700,   0.240,   0.800,   0.110,   INLI1250
7              0.900,   0.030,   0.950,   0.020,   1.000,   0.000,   INLI1260
8              6.000,                                                 INLI1270
9              0.000,   3.720,   0.050,   2.960,   0.100,   2.470,   INLI1280
A              0.150,   2.110,   0.200,   1.840,   0.250,   1.600,   INLI1290
B              0.300,   1.390,   0.350,   1.170,   0.400,   0.990,   INLI1300
C              0.450,   0.840,   0.500,   0.700,   0.550,   0.540,   INLI1310
D              0.600,   0.450,   0.650,   0.340,   0.700,   0.240,   INLI1320
E              0.750,   0.160,   0.800,   0.110,   0.850,   0.060,   INLI1330
F              0.900,   0.030,   0.950,   0.020,   1.000,   0.000/   INLI1340
 DATA CDABT4/  8.000,                                                 INLI1350
1              0.000,   4.250,   0.025,   3.750,   0.050,   3.270,   INLI1360
2              0.075,   3.020,   0.100,   2.760,   0.150,   2.380,   INLI1370
3              0.200,   2.040,   0.250,   1.760,   0.300,   1.520,   INLI1380
4              0.350,   1.300,   0.400,   1.090,   0.450,   0.910,   INLI1390
5              0.500,   0.760,   0.550,   0.600,   0.600,   0.480,   INLI1400
6              0.650,   0.370,   0.700,   0.270,   0.800,   0.130,   INLI1410
7              0.900,   0.040,   0.950,   0.010,   1.000,   0.000,   INLI1420
8             10.000,                                                 INLI1430
9              0.000,   5.000,   0.025,   4.270,   0.050,   3.560,   INLI1440
A              0.075,   3.280,   0.100,   2.990,   0.150,   2.560,   INLI1450
B              0.200,   2.210,   0.250,   1.910,   0.300,   1.630,   INLI1460
C              0.350,   1.390,   0.400,   1.160,   0.450,   0.970,   INLI1470
D              0.500,   0.820,   0.550,   0.660,   0.600,   0.520,   INLI1480
E              0.650,   0.410,   0.700,   0.270,   0.800,   0.140,   INLI1490
F              0.900,   0.040,   0.950,   0.010,   1.000,   0.000/   INLI1500
 DATA CDABT5/16.000,                                                 INLI1510
1              0.000,   5.600,   0.025,   5.000,   0.050,   4.100,   INLI1520
2              0.075,   3.700,   0.100,   3.340,   0.150,   2.910,   INLI1530
3              0.200,   2.500,   0.250,   2.160,   0.300,   1.860,   INLI1540
4              0.350,   1.630,   0.400,   1.360,   0.450,   1.140,   INLI1550
5              0.500,   0.920,   0.550,   0.750,   0.600,   0.580,   INLI1560
6              0.650,   0.440,   0.700,   0.320,   0.800,   0.140,   INLI1570
7              0.900,   0.040,   0.950,   0.010,   1.000,   0.000,   INLI1580
8             20.000,                                                 INLI1590
9              0.025,   4.990,   0.050,   4.500,   0.100,   3.750,   INLI1600
A              0.150,   3.150,   0.200,   2.750,   0.250,   2.380,   INLI1610
B              0.300,   2.040,   0.350,   1.740,   0.400,   1.470,   INLI1620
C              0.450,   1.200,   0.500,   1.000,   0.550,   0.800,   INLI1630
D              0.600,   0.630,   0.650,   0.490,   0.700,   0.360,   INLI1640
E              0.750,   0.250,   0.800,   0.150,   0.850,   0.080,   INLI1650
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     F              0.900,    C.04C,    0.950,    0.010,    1.000,    0.000/   INLI1660
C      DATA COPIED FROM BKL1 (DAT18)                                           INLI1670
       PI = 3.141593                                                           INLI1680
       C = PI / 180.                                                           INLI1690
       DPR = 57.29578                                                          INLI1700
       KBYXIN=C                                                                INLI1710
       CDPRTL=C.0                                                              INLI1720
       ALT=1.                                                                  INLI1730
       ALPHAR=C.                                                               INLI1740
       ARWX = ARW                                                              INLI1750
       CDNRTL=C.0                                                              INLI1760
       A3 = ZAR(12)                                                            INLI1770
       A3 = A3  * 144.                                                         INLI1780
       SREF = A3                                                               INLI1790
       D3 = ZAR(3)                                                             INLI1800
       D1 = D3                                                                 INLI1810
       R1=D1/2.                                                                INLI1820
       IF(KBYXIN .EQ.0) GO TO 4900                                             INLI1830
       XNINLT=ITYPE                                                            INLI1840
       AC=ACA3*A3                                                              INLI1850
       ACPER=AC/XNINLT                                                         INLI1860
       DIAM=SQRT(4.*ACPER/PI)                                                  INLI1870
       STERM=FBLDIV + DIAM                                                     INLI1880
       RN=2.*STERM                                                             INLI1890
 4900  CONTINUE                                                                INLI1900
       R13 =  XTOTAL                                                           INLI1910
       IF ( IOUT.EQ.1) WRITE(6,INPUT)                                          INLI1920
       DO 100 J=1,NRM                                                          INLI1930
       RM=RMV(J)                                                               INLI1940
       IF (  NRM  .LE.  1  )  RM = AMACH                                       INLI1950
       XLE=XLEDGE * D3                                                         INLI1960
       XLEN=XTOTAL -XLE                                                        INLI1970
       IF(KBYXIN .EQ. 1) GO TO 202                                             INLI1980
       IF(ITYPE.NE.2) GO TO 5000                                               INLI1990
       IF(RM.LT.XMRJTO) GO TO 5100                                             INLI2000
       RN=STERM*2.0                                                            INLI2010
       RCN=XINLET + XLDUMP + C.5*XFRNG                                         INLI2020
       TCN=RCN                                                                 INLI2030
       IF(KBYXIN .NE. 2) GO TO 483                                             INLI2040
       XLAM=C.5*D3/EPSR                                                        INLI2050
       RCN=XLEN -0.5*XFRNG                                                     INLI2060
       TCN=RCN                                                                 INLI2070
  483  CONTINUE                                                                INLI2080
       SLEN=0.0                                                                INLI2090
       THKRN=0.05                                                              INLI2100
       RXINN=0.5                                                               INLI2110
       XCPI = XCHECK / D3                                                      INLI2120
       SFN=2.0*RCN*STERM                                                       INLI2130
       CLAM=2.0*ACA3*A3/(57.296*SREF)                                          INLI2140
       GO TO 5300                                                              INLI2150
 5000  IF(RM.LT.XMRJTO) GO TO 5200                                             INLI2160
       CLAINL=C.0                                                              INLI2170
       CLAM=2.0*ACA3*A3/(57.296*SREF)                                          INLI2180
       IF(KBYXIN .EQ.2) GO TO 5040                                             INLI2190
       RCN=XINLET + XLDUMP + C.5*XFRNG + XTIPCL                                INLI2200
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      TCN=RCN - XTIPCL                                                  INLI2210
      SLEN=ATAN(STERM/XTIPCL)                                           INLI2220
      GO TO 5050                                                        INLI2230
 5040 RCN=XLEN -0.5*XFRNG                                               INLI2240
      TCN=RCN                                                           INLI2250
      SLEN=0.0                                                          INLI2260
 5050 CONTINUE                                                          INLI2270
      THKRN=0.05                                                        INLI2280
      RXINN=0.5                                                         INLI2290
      XCPI = XCHECK / D3                                                INLI2300
      SEN=    (RCN + TCN)*STERM                                         INLI2310
      BN =2.*STERM                                                      INLI2320
      ARN=BN*BN/SEN                                                     INLI2330
      GO TO 5300                                                        INLI2340
 5100 CLAM=0.0                                                          INLI2350
      IF(KRYXIN .EQ.2) GO TO 5150                                       INLI2360
      RCN=XINLET + XLDUMP  + XFWDA + 0.5*XFRNG                          INLI2370
      TCN=RCN - XFWDA                                                   INLI2380
      BN=STERM*2.0                                                      INLI2390
      SLEN=0.                                                           INLI2400
      IF ( XFWDA .GT. 0. ) SLEN = ATAN( STERM / XFWDA )                 INLI2410
      GO TO 5160                                                        INLI2420
 5150 CLAM=2.0*ACA3*A3/(57.296*SREF)                                    INLI2430
      RCN=XLEN - 0.5*XFRNG                                              INLI2440
      TCN=RCN                                                           INLI2450
      SLEN=0.0                                                          INLI2460
 5160 CONTINUE                                                          INLI2470
      THKRN=0.05                                                        INLI2480
      RXIWN=0.5                                                         INLI2490
      RXINN=0.5                                                         INLI2500
      XCPI = XCHECK / D3                                                INLI2510
      SEN=0.5*(RCN + TCN)*BN                                            INLI2520
      GO TO 5300                                                        INLI2530
 5200 CLAM=0.0                                                          INLI2540
      CLAI=0.0                                                          INLI2550
      RCN=XINLET + XLDUMP +0.5*XFRNG + XFWDA                            INLI2560
      TCN=RCN-XFWDA                                                     INLI2570
      SLEN=0.                                                           INLI2580
      IF ( XFWDA .GT. 0. ) SLEN = ATAN( STERM / XFWDA )                 INLI2590
      GO TO 5050                                                        INLI2600
 5300 ARN=BN*BN/SEN                                                     INLI2610
C*************** SWEEP ANGLE LIMIT OF 62.5 DEG. ************************INLI2620
C                                                                       INLI2630
      IF(SLEN.GT.1.0908) SLEN = 1.0908                                  INLI2640
      TRN = TCN/RCN                                                     INLI2650
      SVAL = SLEN                                                       INLI2660
      IF (SVAL.EQ.0.0) SVAL=0.01                                        INLI2670
      TANSN = TAN(SVAL)                                                 INLI2680
      TANS2N = TANSN+(TCN-RCN)/BN                                       INLI2690
      ATNS2N = ARN*TANS2N                                               INLI2700
      BETA = SQRT(ABS(RM*RM-1.0))                                       INLI2710
      BARN = BETA*ARN                                                   INLI2720
      BTANSN = BETA/TANSN                                               INLI2730
      ALSRN = 0.                                                        INLI2740
      CNASN = 0.                                                        INLI2750
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      ALPT = 0.                                                          INLI2760
      DEN = 0.                                                           INLI2770
      VMN = RM*SQRT(1.-(SIN(SLEN)**2))                                   INLI2780
      DDELN = ATAN(THKRN/(RXINN+RXINN))                                  INLI2790
      DELNN = DRR*DDELN/COS(SLEN)                                        INLI2800
C                                                                        INLI2810
C*************** LINEAR LIFT DUE TO NACELLES ****************************INLI2820
C                                                                        INLI2830
      CALL LXFT1(ARN,SEN,TRN,ATNS2N,BARN,AICLN,THKRN,RXINN,SLEN,         INLI2840
     1           BTANSN,CNRN,DELNN,CLAN,RM)                              INLI2850
      IF ( IOUT.EQ.1) WRITE(6,CHECK)                                     INLI2860
      IF(RM.GE.1.0.AND.RM.LE.1.65) KM=0.35 + 1.*(RM-1.)                  INLI2870
      IF(RM.GT.1.65.AND.RM.LE.2.1) KM=1.                                 INLI2880
      IF(RM.GT.2.1.AND.RM.LE.3.65) KM=1.-0.515*(RM-2.1)                  INLI2890
      IF(RM.GT.3.65.AND.RM.LE.5.0) KM= .2-.148*(RM-3.65)                 INLI2900
      IF(RM.GT.5.) KM=0.                                                 INLI2910
      KAR=-.2468 + .2463/ARN                                             INLI2920
      CLANI=CLAN/(1. + KM*KAR)                                           INLI2930
      TRNP1 = TRN+1.0                                                    INLI2940
      BARN = 0.0                                                         INLI2950
      IF (RM.NE.1.0) BARN=BARN*TRNP1*(1.0+1.0/BTANSN)                    INLI2960
      RLLN=XCHECK -XFWDA                                                 INLI2970
      IF(RM.GE.XMRJTO) RLLN=XCHECK                                       INLI2980
      DMNN = D3                                                          INLI2990
C                                                                        INLI3000
C*************** CARRYOVER TERMS *****************************************INLI3010
C                                                                        INLI3020
      CALL LXFT2(BTANSN,TRNP1,RCN,DMNN,ARN,RN,BARN,BARN,CLAN,AICLN,      INLI3030
     1           RLLN,CKNB,CKBN,RM)                                      INLI3040
C                                                                        INLI3050
C*************** TOTAL LINEAR NACELLE LIFT ******************************INLI3060
C                                                                        INLI3070
      CLAINL=CLANI*(CKNB + CKBN)  + CLAM                                 INLI3080
      IF(ITYPE.EQ.1) CLAINL = CLAM                                       INLI3090
      I = 3                                                              INLI3100
      IF ( IOUT.EQ.1) WRITE(6,1002) I,XCPI,CLAN,CLAM,CKNB,CKBN,CLAINL    INLI3110
      CLI = 0.                                                           INLI3120
      CNNF = 0.                                                          INLI3130
      CNAAN = 0.                                                         INLI3140
      IV=2                                                               INLI3150
      LINEAR=1                                                           INLI3160
      DW1=0.                                                             INLI3170
      DMW=D3                                                             INLI3180
      DMT=D3                                                             INLI3190
      AHL=XCHECK                                                         INLI3200
      IF(ITYPE .EQ. 1) GO TO 2020                                        INLI3210
      IF(ITYPE.EQ.2) CYBI=CLAM                                           INLI3220
      IF(ITYPE.EQ.2) XCPIY=XCHECK                                        INLI3230
      GO TO 203                                                          INLI3240
  202 CONTINUE                                                           INLI3250
C     BYPASS LIFT HACK ---- USE TLU                                      INLI3260
      CLAIN = 0.                                                         INLI3270
      IF ( ITYPE .LE. 1 ) GO TO 3009                                     INLI3280
      NVAR=3                                                             INLI3290
      NINV(1)=NCLAC                                                      INLI3300
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      NINV(2)=NCLLT                                                    INLI3310
      NINV(3)=NCLMAC                                                   INLI3320
C     LIFT BASED ON 2 SIDE INLETS                                      INLI3330
      ACX = 2. * AC / XNINLT                                           INLI3340
      XLE = XLEDGE * D3                                                INLI3350
      XLEN = XTOTAL - XLE                                              INLI3360
      X(1) = ACX                                                       INLI3370
      X(2)=XLEN                                                        INLI3380
      X(3)=RM                                                          INLI3390
      CALL FASTE(NVAR,NINV,CLINLX(1),X,CLAIN)                          INLI3400
 3009 CONTINUE                                                         INLI3410
      CLAM=2.*ACA3*AC/(57.296*SREF)                                    INLI3420
      CLAINL=CLAIN + CLAM                                              INLI3430
 2020 CONTINUE                                                         INLI3440
                                                                       INLI3450
      CLATWV=0.0                                                       INLI3460
      IF(ITYPE.EQ.1) XCPIY=XCPI                                        INLI3470
      IF(ITYPE.EQ.1) CYPI=0.5*CLAN*(CKBN + CKNB) + CLAM                INLI3480
C.............BOATTAIL GEOMETRY                                        INLI3490
  203 CONTINUE                                                         INLI3500
      CMAN=CLAINL*(XCGD1-XCPI)*57.296                                  INLI3510
      CNBN=CYBI*(XCGD1-XCPIY)*57.296                                   INLI3520
      XBT=FRBT*D1                                                      INLI3530
      DE = SQRT ( 4. * A6A3 * A3 / PI  )                               INLI3540
      DB=DE + FACTOR*(D3-DE)                                           INLI3550
      IF(XBT.GT.TNOZL+1.) XBT=TNOZL+1.                                 INLI3560
      IF(DB.LT.D3)    GO TO 205                                        INLI3570
      DB=D3                                                            INLI3580
      GO TO 207                                                        INLI3590
  205 CONTINUE                                                         INLI3600
      IF(IBTL .EQ. 0) GO TO 206                                        INLI3610
      RL2=XTOTAL-XBT                                                   INLI3620
      TANBT=(D1-DB)*0.5/(XTOTAL-RL2)                                   INLI3630
      IF(TANBT.GE.0.286)   TANBT=0.286                                 INLI3640
C.....MAXIMUM BOATTAIL ANGLE IS 17 DEG.....                           INLI3650
      DB=D1-2.*(XTOTAL-RL2)*TANBT                                      INLI3660
      THETBT=ATAN((D1-DB)/(2.*XBT))                                    INLI3670
      R1=D1/2.                                                         INLI3680
      XTHEBT=R1/TAN(THETBT)                                            INLI3690
      GO TO 207                                                        INLI3700
  206 CONTINUE                                                         INLI3710
      THETBT=0.0                                                       INLI3720
      XBT=0.0                                                          INLI3730
      DB=D1                                                            INLI3740
  207 CONTINUE                                                         INLI3750
C     ADJUST BOATTAIL CDO FOR CHANGE IN NOZ LT                         INLI3760
      RLD=XBT/D3                                                       INLI3770
      RLDB=2.*RLD/BETA                                                 INLI3780
      DD=DB/D3                                                         INLI3790
      DD2=DD*DD                                                        INLI3800
      IF(IBTL.EQ.0) GO TO 760                                          INLI3810
      CALL BLINE(10,21,CDABTE(1),RLDB,DD2,CDA)                         INLI3820
      CDPBTL=.25*CDA*(1./RLD)**2                                       INLI3830
      IF(CDPBTL.LT.0.0) CDPBTL=0.0                                     INLI3840
  760 CONTINUE                                                         INLI3850
```

```
      IF(INIZ.EQ.45) GO TO 1176                                          INLI3860
      AR=(DB**2-DE**2)/D3**2                                             INLI3870
      CALL LINE(10,RM,BASECP(1),CPBASE)                                  INLI3880
      CDBON=-CPBASE*AR*DB/D3                                             INLI3890
      CDBOFF=-CPBASE*DB**3/D3**3                                         INLI3900
      IF ( IOUT.EQ.1) WRITE(6,OUTPUT)                                    INLI3910
      GO TO 100                                                          INLI3920
 1176 CONTINUE                                                           INLI3930
      R3=0.5*D1                                                          INLI3940
      R4=R3 - TB - TB                                                    INLI3950
      SBA= PI* ( R3**2 - R4**2 )                                         INLI3960
      SEB= PI*RBE**2                                                     INLI3970
      SABT=PI* ( RBE + 2*TB + TBL)**2                                    INLI3980
      SAB= SABT - SEB                                                    INLI3990
      PT4PO= 0.0                                                         INLI4000
      X(1)=1.                                                            INLI4010
      X(2)=PT4PO                                                         INLI4020
      X(3)=RM                                                            INLI4030
      NVAR=3                                                             INLI4040
      NINV(1)=NCONE                                                      INLI4050
      NINV(2)=NPRX                                                       INLI4060
      NINV(3)=NRMX                                                       INLI4070
      CALL FASTE(NVAR, NINV, BASEP(1), X, PBPINF)                        INLI4080
      CPBASE=(PBPINF - 1.)/ (0.7*RM**2)                                  INLI4090
      CDBOFF= -CPBASE                                                    INLI4100
      CDBANN=-CPBASE*SBA/SREF                                            INLI4110
      PT4PO= 1.0                                                         INLI4120
      X(1)=2.                                                            INLI4130
      X(2)=PT4PO                                                         INLI4140
      X(3)=RM                                                            INLI4150
      NVAR=3                                                             INLI4160
      NINV(1)=NCONEX                                                     INLI4170
      NINV(2)=NPRXX                                                      INLI4180
      NINV(3)=NRMXX                                                      INLI4190
      CALL FASTE(NVAR, NINV, BASEP(1), X, PBPINF)                        INLI4200
      CPBASE=(PBPINF -1.)/ (0.7*RM**2)                                   INLI4210
      CDBB= -CPBASE* SABT/SREF                                           INLI4220
      CDBASE= CDBANN + CDBB                                              INLI4230
      CDBON=CDBASE                                                       INLI4240
      JJ = 1                                                             INLI4250
      BDBOFF(JJ)=CDBOFF                                                  INLI4260
      BDBON(JJ)=CDBON                                                    INLI4270
  100 CONTINUE                                                           INLI4280
      RETURN                                                             INLI4290
      END                                                                INLI4300


      SUBROUTINE ISEN (TAMB,PAMB,XMINF,TTOT,PTOT)                        ISEN0010
      COMMON /FUNOVR/ MODEL                                              ISEN0020
      COMMON /FAILUR/ KFAIL                                              ISEN0030
      CP(T)=A+B*T+C*T**2+D*T**3+E*T**4                                   ISEN0040
      ENTH(T)=A*T+B/2*T**2+C/3*T**3+D/4*T**4+E/5*T**5                    ISEN0050
      PHI(T)=A*ALOG(T)+B*T+C/2*T*T+D/3*T**3+F/4*T**4                     ISEN0060
      IF(XMINF .LE. 0) GO TO 26                                          ISEN0070
```

```
      GC=32.17                                                          ISEN0080
      R=0.06855                                                         ISEN0090
      A=0.249799                                                        ISEN0100
      B=-0.514602E-04                                                   ISEN0110
      C=0.742775E-07                                                    ISEN0120
      D=-0.277999E-10                                                   ISEN0130
      E=0.312467E-14                                                    ISEN0140
      N=0                                                               ISEN0150
      M=0                                                               ISEN0160
      VELSQ=CP(TAMB)*R/(CP(TAMB)-R)*GC*TAMB*XMINF**2                    ISEN0170
      TGUESS=(1.+.2*XMINF**2)*TAMB                                      ISEN0180
    4 F=VELSQ/2./GC-ENTH(TGUESS)+ENTH(TAMB)                             ISEN0190
      FPR=CP(TGUESS)                                                    ISEN0200
      TNEW=TGUESS+F/FPR                                                 ISEN0210
      IF (ABS(F).LT.1.E-04*VELSQ/64.) GO TO 5                           ISEN0220
      N=N+1                                                             ISEN0230
      IF(N.GT.50) GO TO 50                                              ISEN0240
      TGUESS=TNEW                                                       ISEN0250
      GO TO 4                                                           ISEN0260
    5 IF (ABS(F/FPR).LT.1.E-04*TGUESS) GO TO 6                          ISEN0270
      M=M+1                                                             ISEN0280
      IF(M.GT.50) GO TO 60                                              ISEN0290
      TGUESS=TNEW                                                       ISEN0300
      GO TO 4                                                           ISEN0310
    6 TTOT=TNEW                                                         ISEN0320
      PTOT=EXP(1./R*(PHI(TTOT)-PHI(TAMB))+ALOG(PAMB))                   ISEN0330
      RETURN                                                            ISEN0340
   50 WRITE(6,51)                                                       ISEN0350
      GO TO 26                                                          ISEN0360
   51 FORMAT(37H  FAILURE TO CONVERGE ON F IN 50 TRYS     )             ISEN0370
   60 WRITE(6,61)                                                       ISEN0380
      GO TO 26                                                          ISEN0390
   61 FORMAT(41H  FAILURE TO CONVERGE ON F/FPR IN 50 TRYS    )          ISEN0400
   26  WRITE(6,27) TAMB,PAMB,XMINF                                      ISEN0410
   27  FORMAT(21H  FATAL ERROR IN ISEN  ,3F10.5)                        ISEN0420
      IF ( MODEL  .GT.  0  )  CALL ERROUT                               ISEN0430
      KFAIL = 19                                                        ISEN0440
      RETURN                                                            ISEN0450
      END                                                               ISEN0460


      SUBROUTINE MATLS(N,TEMP,RHO,FTU,FTY,IND)                          MATL0010
      COMMON /CODEXX/ CUNTX(14), NOUT, CUNXX                            MATL0020
      COMMON /MATTYP/ IP(3)                                             MATL0030
      DIMENSION IA(39)                                                  MATL0040
      DIMENSION F(234)                                                  MATL0050
      DIMENSION                                                         MATL0060
     1A1(9),A2(9),B1(9),B2(9),C1(9),C2(9),D1(9),D2(9),E1(9),E2(9),G1(9),MATL0070
     1G2(9),H1(9),H2(9),P1(9),P2(9),Q1(9),Q2(9),R1(9),R2(9),S1(9),S2(9),MATL0080
     1T1(9),T2(9),U1(9),U2(9)                                           MATL0090
      EQUIVALENCE                                                       MATL0100
     1(F(1),A1(1)),(F(10),A2(1)),          (F(19),B1(1)),(F(28),B2(1)),MATL0110
     X(F(37),C1(1)),                                                    MATL0120
     2(F(46),C2(1)),(F(55),D1(1)),(F(64),D2(1)),(F(73),E1(1)),(F(82),   MATL0130
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     3F2(1)),(F(91),G1(1)),(F(100),G2(1)),(F(109),H1(1)),(F(118),H2(1)),MATL0140
     4(F(127),P1(1)),(F(136),P2(1)), (F(145),Q1(1)), (F(154),Q2(1)),     MATL0150
     5(F(163),R1(1)),(F(172),R2(1)), (F(181),S1(1)), (F(190),S2(1)),     MATL0160
     6(F(199),T1(1)),(F(208),T2(1)), (F(217),U1(1)), (F(226),U2(1))      MATL0170
      DATA A1/ 152.99705,-.049888,2.13696E-4,-8.2522E-7,1.52693E-9,      MATL0180
     1         -1.407076E-12,4.665609E-16,0.0,0.283 /                    MATL0190
      DATA A2/ 135.9983,-5.944122E-2,1.454094E-4,-2.73208E-7,1.02257E-10MATL0200
     1,0.0, 0.0, 0.0,          1000./                                    MATL0210
      DATA B1/ 203.7239,-3.100867E-2,-1.25551E-4,5.11357E-7,-7.41407E-10MATL0220
     1,2.861335E-13,0.0,0.0,    0.283/                                  MATL0230
      DATA B2/ 181.2644,-8.300459E-2, 1.89241E-4,-3.3780E-7,1.19098E-10,MATL0240
     1 0.0, 0.0,  0.0 ,        1000./                                    MATL0250
      DATA C1/ 290.3191,-.12987056  ,-7.24945E-5, 1.41215E-6,3.77801E-9,MATL0260
     1 4.048478E-12,-1.623592E-15, 0.0,    0.289 /                     MATL0270
      DATA C2/ 275.6873,-.1133691,  -2.597554E-4,2.86207E-6,-9.20084E-9,MATL0280
     11.4206311E-11,-1.0782391E-14,3.154253E-18,1000. /                 MATL0290
      DATA D1/ 195.3443,-.061816575,-1.637407E-4,1.89322E-6,-7.62791E-9,MATL0300
     11.3905308E-11,-1.1618146E-14,3.576743E-18,.282/                   MATL0310
      DATA D2/ 175.1215,-.06C111575,-1.241584E-4,1.41779E-6,-5.80028E-9,MATL0320
     11.0800203E-11,-9.2362192E-15,2.901658E-18,900./                   MATL0330
      DATA E1/ 66.51792,-.037726844,2.9246608E-4,2.01661E-6,-5.89264E-8,MATL0340
     13.9270274E-10,-1.2484814E-12,2.081114E-15,0.101 /                 MATL0350
      DATA E2/ 59.27372,-.043642571,3.2877813E-4,3.22568E-6,-6.25410E-8,MATL0360
     13.5731961E-10,-1.0335669E-12,1.621736E-15,600./                   MATL0370
      DATA G1/ 34.54856,-.04001656,8.2877353E-5,7.590633E-7,-1.33613E-8,MATL0380
     14.8648100E-11,-6.9477352E-14,3.5370061E-17,0.0639 /               MATL0390
      DATA G2/ 16.10745,-.01C29623,-3.979167E-5,9.029109E-8,-3.57722E-9,MATL0400
     11.6488368E-11,-2.6801702E-14,1.4940091E-17,600./                  MATL0410
      DATA H1/ 145.2341,-.14093739,1.6113261E-5,4.811171E-7,-7.18078E-10MATL0420
     1,2.8841457E-13, C.0, 0.0, 0.160 /                                 MATL0430
      DATA H2/ 136.6050,-.12686628,-4.909786E-5,3.45276E-7,-2.502381E-10MATL0440
     1,0.0,0.C,0.C,100C. /                                              MATL0450
      DATA P1/ 173.6735,-.05684414,8.812214E-5,-2.310598E-7,3.84947E-10,MATL0460
     1 -2.6162994E-13,5.6401134E-17,C.C,0.298 /                         MATL0470
      DATA P2/ 131.1341,-.01158903,-1.285113E-5,6.885753E-9,3.01953E-11,MATL0480
     1 -2.1657085E-14,C.0,0.0,1600./                                    MATL0490
      DATA Q1/ 102.8955,-.13056587,-9.620951E-6,1.057358E-6,-3.66373E-9,MATL0500
     1 6.9954301E-12,-8.4C32004E-15,6.5164281E-18,0.343/                MATL0510
      DATA Q2/ 76.48699,-.06191594,1.3838113E-5,3.737935E-9,-3.41328E-11MATL0520
     1,1.0753036E-14,-1.1906212E-18,0.,2700./                           MATL0530
      DATA R1/ 45.67787,-.00615185,4.7676774E-5,-3.89959E-7,-7.85595E-9,MATL0540
     1 3.3828C28E-11,-2.69604737E-14,0.0,0.065 /                        MATL0550
      DATA R2/ 23.80382,-.01231640,3.4280666E-4,-3.21623E-6,8.633277E-9,MATL0560
     1-7.6568C51E-12, C.0,0.C, 400. /                                   MATL0570
      DATA S1/153.09017,-.03369314,7.1339100E-6,-1.84397E-6,8.241123E-9,MATL0580
     1-1.4201600E-11,9.2309419E-15,0.,0.072/                            MATL0590
      DATA S2/120.51821,.004342844,-1.791805E-5,-2.28520E-6,1.043232E-8,MATL0600
     1-1.8433592E-11,1.2126769E-14,C.0,500./                            MATL0610
C A   AISI 150 PSI STEEL              CODE  1                           MATL0620
C B   AISI 200 PSI STEEL              CODE  2                           MATL0630
C C   300 GR MARAGING STEEL           CODE  3                           MATL0640
C D   17-4 PH STAINLESS               CODE  4                           MATL0650
C E   2014-T6 ALUMINUM                CODE  5                           MATL0660
C G   AZ31B-O MAGNESIUM               CODE  6                           MATL0670
C H   6AL-4V TITANIUM                 CODE  7                           MATL0680
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C P    RENE 41                          CODE  8                                  MATL0690
C Q    WC129Y COLUMBIUM                 CODE  9                                  MATL0700
C R    GLASS FABRIC EPOXY LAMINATE      CODE 10                                  MATL0710
C S    FILAMENT WOUND GLASS EPOXY       CODE 11                                  MATL0720
C T    USER INPUT                       CODE 12                                  MATL0730
C U    USER INPUT                       CODE 13                                  MATL0740
C X1(7S DENSITY 1B/IN**3                                                         MATL0750
C X2(9) MAXIMUM TEMP                                                             MATL0760
      DATA IA/ 4H150P,4HSI S,4HTEEL,4H200P,4HSI S,4HTEEL,4H300M,4HAR S,          MATL0770
     14HTEEL,4H17-4,4H STA,4HNLES,4H2014,4H-T6 ,4HALUM,                          MATL0780
     24HAZ31,4HB-0 ,4H MAG,4H6AL-,4H4V T,4HITAN,4HRENE,4H 41 ,4H    ,            MATL0790
     34HWC12,4H9Y C,4HOLUM,4HGLAS,4H FAB,4HRIC ,4HFIL ,4HWOUN,4HD EX,            MATL0800
     44HUSER,4H INP,4HUT 1,4HUSER,4H INP,4HUT 2/                                 MATL0810
      J=18*(N-1)                                                                 MATL0820
      JMAT =3*(N-1)                                                              MATL0830
      IF(N.GT.13 .OR. N.LT.1) GO TO 25                                           MATL0840
      DO 2  I=1,3                                                                MATL0850
    2 IB(I) =IA(JMAT+I)                                                          MATL0860
      IF(N.LT.12) GO TO 5                                                        MATL0870
      IF(F(J+9).LT..001.OR.F(J+9) .GT.1. .OR.F(J+18).LT.200. .OR.F(J+18)MATL0880
     1.GT. 5000.) GO TO 25                                                       MATL0890
    5 TMAX = F(J+18)                                                             MATL0900
      IF(TEMP.GT. TMAX) GO TO 10                                                 MATL0910
      IF(TEMP.LT.-65.) TEMP= -65.                                                MATL0920
   20 RHO= F(J+9)                                                                MATL0930
      FTU= 0.                                                                    MATL0940
      FTY= C.                                                                    MATL0950
      TT= 1.                                                                     MATL0960
      DO 30 I=1,8                                                                MATL0970
      FTY = FTY + F(J+9+I)*TT                                                    MATL0980
      FTU = FTU+F(J+I)*TT                                                        MATL0990
   30 TT= TT*TEMP                                                                MATL1000
      IF(N.EQ.5) GO TO 34                                                        MATL1010
      IF(N.EQ.9) GO TO 37                                                        MATL1020
   35 FTU =FTU*1000.                                                             MATL1030
      FTY =FTY*1000.                                                             MATL1040
      RETURN                                                                     MATL1050
   34 FTU = FTU   -1.748248E-18*TT +5.838111E-22*TT*TEMP                         MATL1060
      FTY = FTY   -1.308519E-18*TT +4.248255E-22*TT*TEMP                         MATL1070
      GO TO 35                                                                   MATL1080
   37 FTU = FTU -3.23879E-21*TT +9.924589E-25*TT*TEMP-1.702433E-28*TT            MATL1090
     1*TEMP**2 + 1.24839E-32*TT*TEMP**3                                          MATL1100
      GO TO 35                                                                   MATL1110
   10 IF ( NOUT  .GT.  0  )  WRITE(6,15) TEMP, TMAX                              MATL1120
   15 FORMAT(/1X,41HMATERIAL TEMPERATURE GREATER THAN MAXIMUM/                   MATL1130
     11X,F10.1,19H DEGREES REDUCED TO,F10.1,8H DEGREES//)                        MATL1140
      TEMP = TMAX                                                                MATL1150
      GO TO 20                                                                   MATL1160
   25 WRITE(6,26) N                                                              MATL1170
   26 FORMAT(80H ERROR IN MATERIALS SUBROUTINE,REQUESTED DATA NOT AVAILAMATL1180
     1BLE, MATERIAL NUMBER IS , I8)                                              MATL1190
      IND = 1                                                                    MATL1200
      RETURN                                                                     MATL1210
      END                                                                        MATL1220
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      SUBROUTINE PROP1                                                  PRP10010
C     MODES   -1 MIN THRUST                                            PRP10020
C     MODES    0 CEN REQUIRED                                          PRP10030
C     MODES   +1 MAX THRUST                                            PRP10040
      COMMON /FAILUR/ KFAIL                                            PRP10050
      COMMON /ERPPT/ BOMB(4),MUM,IARI(2)                               PRP10060
      COMMON /EXCLUD/ PT2, TT2, PTO, CDA, AOAC, PT2PO                  PRP10070
      COMMON /RJBLOK/ RJ(50)                                           PRP10080
      EQUIVALENCE                                                      PRP10090
     1(RJ( 1),CNM   ),(RJ( 2),ANC   ),(RJ( 3),ANN   ),(RJ( 4),AL    ), PRP10100
     2   (RJ(6), CDB ), ( RJ(7), C1 ),                                 PRP10110
     3(RJ( 9),PT4Y  ),(RJ(10),GAM   ),(RJ(11),A6MAX ),(RJ(12),ACMAX ), PRP10120
     4   ( RJ(13), A6MIN ), ( RJ(14), XMOMR),                          PRP10130
     5(RJ(17),CDC   ),(RJ(18),PCMGN ),                 (RJ(20),ALECLD), PRP10140
     6(RJ(21),A2A3  ),(RJ(22),FARLB ),(RJ(23),IID   ),(RJ(24),BPAR  ), PRP10150
     7                 (RJ(26),TT4   ),(RJ(27),FAR   ),(RJ(28),PM    ), PRP10160
     8   (RJ(29), WF ), ( RJ(30), ANC4 ), ( RJ(31), PT2PCC ),          PRP10170
     9(RJ(33),TO    ),(RJ(34),PO    ),(RJ(35),KDIA  ),(RJ(36),PT4I  ), PRP10180
     X (RJ(37),PT41  ),(RJ(38),PT42  ),(RJ(39),PT43  ),               PRP10190
     1(RJ(40),AM6   ),(RJ(41),AM4   ),(RJ(42),AM2   ),(RJ(43),GAM2  ), PRP10200
     2   ( RJ(44), GAM4 ), ( RJ(45), P6 ), ( RJ(47), AR2 ),           PRP10210
     3(RJ(48),AR4   ),(RJ(49),PT4   ),(RJ(50),WAA3  )                 PRP10220
C  COMMON BLOCK FOR ALTITUDE,TITLE,ID AND FUEL DECKS                   PRP10230
      COMMON /ALTDC/                                                   PRP10240
     1K1,ALT(24),SDTEMP(24),PRESS(24),ID(8)                            PRP10250
      COMMON /FUELXX/                                                  PRP10260
     2K2,KK(15),TT2TAB(15 ),TFAR1(15,15),TTRS1(15,15),TTRS2(15,15),    PRP10270
     X TTRS3(15,15),                                                   PRP10280
     3K3,KL(15),JGAMM,TT4TA(15),TFAR2(15,15),TGAM(15,15),EG(15,15),    PRP10290
     XEC(15,15),                                                       PRP10300
     4K4,KN(15),JP,   TT4TB(15),TFAR3(15,15),RTAB(15,15),FR(15,15),    PRP10310
     XER(15,15),                                                       PRP10320
     5NB1,AAM(24),ANC1(24),FARL(24)                                    PRP10330
C  COMMON BLOCK FOR INLET PERFORMANCE MAP                               PRP10340
      COMMON/INLETX/                                                   PRP10350
     6K8,KPTC(15),ALPHV(15),AAMACH(15,15),AOACC(15,15),PT3PTO(15,15),  PRP10360
     1AOOD(15,15)                                                      PRP10370
      COMMON/RJBAT/CEN1,CEN2,A5A3,A6A3,ACA3,SEC,B11,B12,B13            PRP10380
      COMMON/TRAJX/ CENET,CENRQ,AMACH,ALFI,MODES,IND,FARMAX,TT4MAX,FSLBOPRP10390
     1,ICODE                                                           PRP10400
      COMMON/EXTERN/ AR(20)                                            PRP10410
      EQUIVALENCE (AR(3),D3),(AR(12),A3)                               PRP10420
C     OPT 1    PC MARGIN    MODE = 1                                   PRP10430
C     OPT 2    TT4 MAX      KODE2 = 1                                  PRP10440
C     OPT 3    FAR MAX      MODE = 2                                   PRP10450
C     OPT 4    CEN                                                     PRP10460
C     TABLE 2    TEMP RISE                                             PRP10470
C     TABLE 3    GAMMA                                                 PRP10480
C     TABLE 4    R                                                     PRP10490
C     TABLE 5    BURNER SEVENTY TABLE ( TEMP RISE EFF, LEAN BLOW OUT ) PRP10500
C     TABLE 6    INLET MAP ( PT2PTO,AOAC,CDA)                          PRP10510
      COMMON /CODEXX/II(16)                                            PRP10520
      EQUIVALENCE (II(1),KIND)                                         PRP10530
      EQUIVALENCE   ( II(15), NOUT)                                    PRP10540
       LOGICAL OPT(3)                                                  PRP10550
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      LOGICAL L1,L2,L3,L4                                                    PRP10560
      DIMENSION NUMBER( 6), JVER(7)                                          PRP10570
      DATA NUMBER/'1','2','3OR4','3OR4','5','6'/                             PRP10580
      DATA JVER/'DTRQ','PT4','AM2','AM2*','AOAC','PMAR','CFRQ'/              PRP10590
      NAMELIST /STOP/    ALF1,AMACH,BPAR,PO,      FAR,TT2,      TT4,         PRP10600
     1WAA3,TTO,PTO,AOAC,PT2PO,DTRISE,ANC,MODES,                DTREQ,PT4N,PRP10610
     2T4I,PT2MAR,PT2POC,AM2,AM2NEW,CFNET,CFNRQ,WF,WA,J1,J2,J3,J4,J5,J6,  PRP10620
     3 FARLB,PT2POA                                                         PRP10630
     4  ,AM4,AM6,GAM2,GAM4,CDA,AR2,AR4,ACA3,A5A3,P6PT6,GAM                  PRP10640
     5   ,CFHI,CFLO,WFHI,WFLO,L1,L2,L3,L4                                   PRP10650
      CAMF(Q,R)=(1.+(Q-1.)/2.*R*R)                                           PRP10660
      WFHI = 0.0                                                             PRP10670
      WFLO = 0.0                                                             PRP10680
      IND = 0                                                                PRP10690
      CALL ISEN (TO,PO,AMACH,TT2,PTO)                                        PRP10700
      IF( KFAIL  .GT.  0  )  RETURN                                          PRP10710
   75 TTO=TT2                                                                PRP10720
C  OBTAIN  PRESS RECOVERY,AOAC AND ADDITIVE DRAG                            PRP10730
      CALL TLU2(ALF1,ALPHV,K8,AMACH,AAMACH,KPTC,AOACC,AOAC,IND)              PRP10740
      IF(IND.NE.0) GO TO 415                                                 PRP10750
      CALL TLU22(PT3PTO,PT2POA)                                              PRP10760
      CALL TLU22(ADDD,CDA)                                                   PRP10770
      PT2MAR =(1.-PCMGN/100.)*PT2POA                                         PRP10780
      PT2 = PTO*PT2MAR                                                       PRP10790
      IF(ICODE.NE.0) GO TO 10                                                PRP10800
      A3=.7854*D3**2/144.                                                    PRP10810
      A2A3 = 1.                                                              PRP10820
      L2=.FALSE.                                                             PRP10830
      L3=.FALSE.                                                             PRP10840
      L4=.FALSE.                                                             PRP10850
      OPT(2)=.FALSE.                                                         PRP10860
      OPT(3)=.FALSE.                                                         PRP10870
      IF(TT4MAX.GT.0.) OPT(2) = .TRUE.                                       PRP10880
      IF(FARMAX.GT.0.) OPT(3)=.TRUE.                                         PRP10890
      A5A6=A5A3/A6A3                                                         PRP10900
      A6A5=1./A5A6                                                           PRP10910
      ICODE =1                                                               PRP10920
   10 L2= OPT(2)                                                             PRP10930
      L3=OPT(3)                                                              PRP10940
      L1=.TRUE.                                                              PRP10950
      IXX = 0                                                                PRP10960
      PART=GAM/2.*PO*AMACH**2*A3                                             PRP10970
      AOA3=AOAC*ACA3                                                         PRP10980
      WAA3=SQRT(GAM)*.7765056*PO*AMACH/SQRT(TO)*AOAC*ACA3                    PRP10990
      WA=WAA3*A3                                                             PRP11000
      CA=CDA*PART*ACA3                                                       PRP11010
      RDR=XMOMR*WA*AL/32.174*AMACH*49.04*SQRT(TO)                            PRP11020
      DR=2.*AOA3*PART-RDR                                                    PRP11030
C                                                                            PRP11040
      AOA2=(AOAC*ACA3)/A2A3                                                  PRP11050
      BPAR=WAA3*(1.-AL)/A5A3*(TTO/1000.)**2                                  PRP11060
      CALL TLU1(BPAR,AAM,NB1,ANC1,ANC, IND)                                  PRP11070
      IF(IND.NE.0) GO TO 410                                                 PRP11080
      CALL TLU11(FARL,FARLB)                                                 PRP11090
      IF(FARLB.LE.0.) FARLB = 0.005                                          PRP11100
```

```
      WF = .025 * 3600.*A3 * WAA3 * (1.-AL)                                  PRP11110
      IF(MODES) 15,17,16                                                     PRP11120
   15 FAR= FARLB*FSLBO                                                       PRP11130
      WF = FAR*WA*3600.0*(1.-AL)                                             PRP11140
      L2 = .FALSE.                                                           PRP11150
      GO TO 225                                                              PRP11160
   17 L4 =.TRUE.                                                             PRP11170
      IF( CENRG .LE. 0. ) GO TO 456                                          PRP11180
   16 IF (OPT(3))                                                            PRP11190
     1WF    =FARMAX*3600.*A3*(1-AL)*WAA3                                     PRP11200
      IF(OPT(2))                                                             PRP11210
     1DTREQ=(TT4MAX-TT2)/ANC                                                 PRP11220
  225 PT2PO = PT2MAR                                                         PRP11230
  230 PT2POC=PT2POA                                                          PRP11240
C                                                                            PRP11250
C                                                                            PRP11260
      J5=0                                                                   PRP11270
      J6=0                                                                   PRP11280
  235 PT4I=.91*PT2PO*PO*(TTO/TO)**(GAM/(GAM-1.))                             PRP11290
      FAR=WF/(WA*3600.*(1.-AL))                                              PRP11300
  240 J1=0                                                                   PRP11310
      J2=0                                                                   PRP11320
  245 CALL DTRSET (FAR,TT2,DTRISE,IND)                                       PRP11330
      IF (IND.NE.0) GO TO 395                                                PRP11340
      TT4=TT2+ANC*DTRISE                                                     PRP11350
      IF(.NOT.L3 .AND. L2) GO TO 250                                         PRP11360
      GO TO 260                                                              PRP11370
  250 IF ( ABS(DTRISE-DTREQ)  .LT.  .5 )  GO TO 259                          PRP11380
      IF (J1.GT.50) GO TO 345                                                PRP11390
      J1=J1+1                                                                PRP11400
      FAR=FAR*DTREQ/DTRISE                                                   PRP11410
      IF (OPT(3).AND.FAR.GT.FARMAX) FAR=FARMAX                               PRP11420
      GO TO 245                                                              PRP11430
  259 WF = FAR * 3600. * A3 * ( 1.-AL) * WAA3                                PRP11440
  260 CALL RGAMER (IID,0.0, TT2,GAM2,IND,AR2)                                PRP11450
      IF (IND.NE.0) GO TO 400                                                PRP11460
      CALL RGAMER (IID,FAR, TT4,GAM4,IND,AR4)                                PRP11470
      IF (IND.NE.0) GO TO 400                                                PRP11480
C                                                                            PRP11490
      PT4N=((1.-AL)*(1.+FAR)*WAA3*SQRT(TT4))/(A5A3*CNM*SQRT((32.2*GAM4/APRP11500
     1R4)*((2./(GAM4+1.))**((GAM4+1.)/(GAM4-1.))))))                         PRP11510
      IF (ABS(PT4I-PT4N).LT.2.) GO TO 265                                    PRP11520
      PT4I=PT4N                                                              PRP11530
      IF (J2.EQ.50) GO TO 350                                                PRP11540
      J2=J2+1                                                                PRP11550
      GO TO 245                                                              PRP11560
C                                                                            PRP11570
  265 CAR=CNM*A5A3                                                           PRP11580
      PR=1./CAR                                                              PRP11590
      K=-1                                                                   PRP11600
      CALL MACHNO (PR,GAM4,AM4,K,IND)                                        PRP11610
      IF (IND.NE.0) GO TO 385                                                PRP11620
      AM2=0.1                                                                PRP11630
      ST01=0.                                                                PRP11640
      ST02=0.                                                                PRP11650
```

```
      BB1=AM4*SQRT(GAMF(GAM4,AM4))                                          PRP11660
      BB2=1.-CDB/2.                                                         PRP11670
      BB3=1.+GAM4*AM4*AM4                                                   PRP11680
      BB4=(GAM2-1.)/2.                                                      PRP11690
      BB5=(1.+FAR)*(1.-AL)*SQRT((GAM2*AR4*TT4)/(GAM4*AR2*TT2))              PRP11700
      J3=0                                                                  PRP11710
  270 CONTINUE                                                              PRP11720
      G22=AM2*AM2                                                           PRP11730
      AM2NEW=BB1*(1.+GAM2*G22*BB2)/(BB3*SQRT(1.+BB4*G22))/BB5               PRP11740
      IF (ABS(AM2NEW-AM2)-.0001) 280,280,275                                PRP11750
  275 IF (J3.GT.50) GO TO 355                                               PRP11760
      J3=J3+1                                                               PRP11770
      AA=(AM2NEW-STO1)/(AM2-STO2)                                           PRP11780
      IF (AA.EQ.1.) GO TO 360                                               PRP11790
      Q=AA/(AA-1.)                                                          PRP11800
      IF (Q.GE.1.) Q=.99                                                    PRP11810
      IF (Q.LE.-1.) Q=-.99                                                  PRP11820
      STO1=AM2NEW                                                           PRP11830
      STO2=AM2                                                              PRP11840
      AM2=Q*STO2+(1.-Q)*STO1                                                PRP11850
      GO TO 270                                                             PRP11860
C                                                                           PRP11870
C                                                                           PRP11880
  280 PT2POC=PO/PTO*AMACH/AM2*SQRT(GAM*TT2/GAM2/TO)*(1.+(GAM2-1.)/2.*AM2PRP11890
     1**2)**((GAM2+1.)/2./(GAM2-1.))*AOA2                                   PRP11900
      K=1                                                                   PRP11910
      CALL MACHNO (A6A5,GAM4,AM6,K,IND)                                     PRP11920
      IF (IND.NE.0) GO TO 385                                               PRP11930
      IF (MODES .LT. 0) GO TO 325                                           PRP11940
      IF(L3) GO TO 285                                                      PRP11950
      IF(L2) GO TO 290                                                      PRP11960
      IF(L1) GO TO 300                                                      PRP11970
  325 PT2PO = PT2POC                                                        PRP11980
      P6PT6=GAMF(GAM4,AM6)**(-GAM4/(GAM4-1.))                               PRP11990
      CFINT=(A6A3/(.7*AMACH**2))*(PT4N/PO*ANN*P6PT6*(1.+GAM4*AM6**2)-1.)PRP12000
     1-2.*AOAC*ACA3                                                         PRP12010
      FG=(CFINT+2.*AOA3)*PART                                               PRP12020
      FN=FG-DP-DA                                                           PRP12030
      CFNET=FN/PART                                                         PRP12040
      IF(MODES.NE. 0) GO TO 326                                             PRP12050
  315 IF (ABS(CFNET-CFNRQ).LT..001) GO TO 326                               PRP12060
      IF(IXX.EQ. 0) GO TO 327                                               PRP12070
  316 IF( CFNET .LE. 0.005 ) GO TO 312                                      PRP12080
      IF(CFNET .LT. CFNRQ) GO TO 317                                        PRP12090
      WFHI = WF                                                             PRP12100
      CFHI = CFNET                                                          PRP12110
      IF (WFLO .GT. 0.0) GO TO 318                                          PRP12120
  319 WF = WF*(CFNRQ/CFNET)**.84                                            PRP12130
  320 IF(J6 .GT. 50) GO TO 375                                              PRP12140
      IF( J6 .GT. 40 )  WRITE(6,STOP)                                       PRP12150
      J6=J6+1                                                               PRP12160
      GO TO 417                                                             PRP12170
  317 CFLO = CFNET                                                          PRP12180
      WFLO = WF                                                             PRP12190
      IF(WFHI .LE. 0.0) GO TO 319                                           PRP12200
```

```
318 WF = WFLO +                    (CFNRQ-CFLO)/(CFHI-CFLO)*(WFHI -WFLO)     PRP12210
      GO TO 320                                                             PRP12220
326 SFC=WF/FN                                                               PRP12230
    G22=GAMF(GAM4,AM4)                                                      PRP12240
    T4=TT4/G22                                                              PRP12250
    PS2=(GAMF(GAM2,AM2))**(GAM2/(1.-GAM2))*PTO*PT2POC                       PRP12260
    IF(MODES .EQ. -2) MODES = 0                                             PRP12270
    RJ( 5)=PT2PO                                                           PRP12280
    RJ( 8)=PT2                                                             PRP12290
    RJ(15)=AOAC                                                            PRP12300
    RJ(16)=CDA                                                             PRP12310
    RJ(32)=PTO                                                             PRP12320
    RJ(46)=TT2                                                             PRP12330
    RETURN                                                                  PRP12340
327 IF(CFNET.LT.CFNRQ) GO TO 326                                            PRP12350
    L1 = .FALSE.                                                           PRP12360
    L2 = .FALSE.                                                           PRP12370
    L3 = .FALSE.                                                           PRP12380
    IXX = 1                                                                PRP12390
    GO TO 316                                                              PRP12400
285 IF(L2) GO TO 301                                                        PRP12410
299 IF(.NOT.L1) GO TO 325                                                   PRP12420
    IF(PT2POC .LT. PT2MAR) GO TO 305                                       PRP12430
    L3 = .FALSE.                                                           PRP12440
    GO TO 300                                                              PRP12450
301 IF(TT4 .GT.TT4MAX) GO TO 302                                            PRP12460
    L2 = .FALSE.                                                           PRP12470
    GO TO 299                                                              PRP12480
302 L3 = .FALSE.                                                           PRP12490
    GO TO 250                                                              PRP12500
305 L1 = .FALSE.                                                           PRP12510
    GO TO 325                                                              PRP12520
290 IF(.NOT.L1) GO TO 325                                                   PRP12530
    IF(PT2POC .LT. PT2MAR) GO TO 305                                       PRP12540
    L2 = .FALSE.                                                           PRP12550
    GO TO 300                                                              PRP12560
300 IF (ABS(1.-PT2POC/PT2MAR).LE..001) GO TO 325                            PRP12570
    IF(J5.GT.50) GO TO 370                                                 PRP12580
    J5=J5+1                                                                PRP12590
    IF(L4) GO TO 310                                                       PRP12600
311 WF=WF*((PT2MAR/PT2POC)**2*TT4-TT2)/(TT4-TT2)                            PRP12610
417 IF(WF.LE.0.) GO TO 312                                                  PRP12620
    FAR=WF/(WAA3*A3*3600.*(1.-AL))                                         PRP12630
    IF(OPT(3) .AND. FAR .GT. FARMAX) FAR = FARMAX                          PRP12640
313 WF = FAR*3600.*A3*(1.-AL)*WAA3                                          PRP12650
    GO TO 240                                                              PRP12660
312  IF(FAR .LE. FARLB)  GO TO 451                                          PRP12670
    FAR= FARLB                                                             PRP12680
    GO TO 313                                                              PRP12690
310 P6PT6=GAMF(GAM4,AM6)**(-GAM4/(GAM4-1.))                                 PRP12700
    CFINT=(A6A3/(.7*AMACH**2))*(PT4N/PO*ANN*P6PT6*(1.+GAM4*AM6**2)-1.)PRP12710
   1-2.*AOAC*ACA3                                                          PRP12720
    HG=(CFINT+2.*AOA3)*PART                                                PRP12730
    FN=HG-DR-DA                                                            PRP12740
    CFNET=FN/PART                                                          PRP12750
```

```
      CEN=CENET                                                          PRP12760
      IF(CEN.LT. CENRQ  .OR.PT2POA.GT. PT2POC) GO TO 311                 PRP12770
      L1 = .FALSE.                                                       PRP12780
      GO TO 315                                                          PRP12790
  345 IND=1                                                              PRP12800
      GO TO 380                                                          PRP12810
  350 IND=2                                                              PRP12820
      GO TO 380                                                          PRP12830
  355 IND=3                                                              PRP12840
      GO TO 380                                                          PRP12850
  360 IND=4                                                              PRP12860
      IF (NOUT .NE. 0 ) WRITE (6,520)                                    PRP12870
      GO TO 505                                                          PRP12880
  370 IND=6                                                              PRP12890
      GO TO 380                                                          PRP12900
  375 IND=7                                                              PRP12910
  380 IF (NOUT .NE. 0 ) WRITE (6,525) JVER(IND)                          PRP12920
      GO TO 505                                                          PRP12930
  385 IND=8                                                              PRP12940
      IF (NOUT .NE. 0 ) WRITE (6,530)                                    PRP12950
      GO TO 505                                                          PRP12960
  395 IDEN=NUMBER(2)                                                     PRP12970
      GO TO 435                                                          PRP12980
  400 IDEN=NUMBER(3)                                                     PRP12990
      GO TO 435                                                          PRP13000
  410 IDEN=NUMBER(5)                                                     PRP13010
      GO TO 435                                                          PRP13020
  415 IDEN=NUMBER(6)                                                     PRP13030
  435 IF (NOUT .NE. 0 ) WRITE (6,540) IDEN                               PRP13040
      IF (NOUT .NE. 0 ) WRITE (6,545) BOMB, IARI(MUM)                    PRP13050
      IF (IND.EQ.10) GO TO 440                                           PRP13060
      IF (NOUT .NE. 0 ) RETURN                                           PRP13070
      WRITE (6,550)                                                      PRP13080
  505 IF( NOUT.LE. 1 ) RETURN                                            PRP13090
      WRITE ( 6, STOP )                                                  PRP13100
      CALL PDUMP (ALPHAV,EN,5)                                           PRP13110
      RETURN                                                             PRP13120
  440 IF (NOUT .NE. 0 ) WRITE (6,555)                                    PRP13130
      GO TO 505                                                          PRP13140
  451 IF(MODES .EQ. 0) GO TO 456                                         PRP13150
      IND = 1                                                            PRP13160
      IF (NOUT .NE. 0 ) WRITE (6,452)                                    PRP13170
  452 FORMAT(49H LEAN BLOW OUT PRESSURE RECOVERY EXCEEDS CRITICAL)       PRP13180
      GO TO 505                                                          PRP13190
  456 MODES = -2                                                         PRP13200
      GO TO 15                                                           PRP13210
  520 FORMAT (' IMPROPER SLOPE IN ITERATION TO FIND AM2 ')               PRP13220
  525 FORMAT (' FAILURE TO CONVERGE IN  PROP1 IN THE LOOP FOR ',A4/)     PRP13230
  530 FORMAT ('0FAILURE IN MACHNO WHEN CALLED BY PROP1 ')                PRP13240
  540 FORMAT ('0AN OUT OF TABLE CONDITION EXISTS IN TABLE ',A4,' IN PROPPRP13250
     11 '/)                                                              PRP13260
  545 FORMAT(' 1ST IND VARIABLE=',E12.5,' 2ND IND VARIABLE= ',E12.5, ' SPRP13270
     1UBTABLE =',E10.3,' SUBTABLE SIZE =',F10.3/' THE VARIABLE OUT OF RAPRP13280
     2NGE IS THE ',A4,' INDEPENDENT VARIABLE'/)                          PRP13290
  550 FORMAT (' THE INDEPENDENT VARIABLE IS LARGER THAN THE LARGEST TABLPRP13300
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AD-A048 366 LTV AEROSPACE CORP DALLAS TEX VOUGHT SYSTEMS DIV F/G 15/7
SEATIDE ANALYSIS PROCESS. VOLUME III E. CRUISE MISSILE - CONCEP--ETC(U)
FEB 75 R K MCDONOUGH DAAB09-72-C-0062
UNCLASSIFIED VSD-00.1636-VOL-3E-REV-A NL

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ADA048366



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     1E VALUE'/)                                                                PRP13310
 555 FORMAT (' THE INDEPENDENT VARIABLE IS SMALLER THAN THE SMALLEST TAPRP13320
     1BLE VALUE'/)                                                              PRP13330
      END                                                                       PRP13340



      SUBROUTINE PROPRJ                                                         PPRJ0010
      COMMON /FAILUR/ KFAIL                                                     PPRJ0020
      COMMON /ADDON/ SPPWF, CON,FF(18)                                          PPRJ0030
      COMMON /ERPRT/ BOMB(4),MUM,IARI(2)                                        PPRJ0040
      COMMON /RJTITL/  TITLE(20)                                                PPRJ0050
      COMMON/EXXRJ/ EX(48)                                                      PPRJ0060
      EQUIVALENCE                                                               PPRJ0070
     7(EX(25),C6    ),(EX(26),TINAFT),(EX(27),WRJ   ),(EX(28),XRJ   ),        PPRJ0080
     8(EX(29),TEMPC ),(EX(30),MTLRAM)                                          PPRJ0090
      COMMON/CODEXX/ II(16)                                                     PPRJ0100
C     CODEXX  EXTERNAL  INTEGER ARRAY                                           PPRJ0110
      EQUIVALENCE                                                               PPRJ0120
     1(II( 1),KIND  ),(II( 2),INLET ),(II( 3),ISIZE ),(II( 4),NODP   ),        PPRJ0130
     1(II( 5),KSUS  ),(II( 6),KFM   ),(II(7 ),IBSTIN),                         PPRJ0140
     2(II(13),IEX   ),(II(14),NPASS ),(II(15),NOUT  ),(II(16),IXXN )           PPRJ0150
      COMMON /SUSDAT/ TX(44)                                                    PPRJ0160
      EQUIVALENCE                                                               PPRJ0170
     7(TX(25), SUSMLT),(TX(26),SUSMWT),(TX(27),FMIN  ),(TX(28),DELWT ),        PPRJ0180
     9(TX(33), SUSLT ),(TX(34),SUSWT ),(TX(35),FTUS  ),(TX(36),FTYS  ),        PPRJ0190
     1(TX(37), SMLT  ),(TX(38),SMWT  ),(TX(39),FMINT ),(TX(40),FUSABL)         PPRJ0200
C                                                                               PPRJ0210
      COMMON /LOOPXX/ LOOPRJ,CFNSAV,WTSAV,WSSAV,SLSAV                           PPRJ0220
C                                                                               PPRJ0230
C                                                                               PPRJ0240
      COMMON /DRDAT/ CNMR,PTJ,ANNJ,GAMJNW,ARJ,TTJWEW,AJ03,STJA3,ST2A3,          PPRJ0250
     1 IDREC                                                                    PPRJ0260
      COMMON /RJDAT/ CFNPQ,CFN,  A5A3,A6A3,ACA3,SEC,BOSTWT,BCSTLT,              PPRJ0270
     1 BOSTPP                                                                   PPRJ0280
      COMMON /IPROP/ IND,IMIN,NEWPT,IRJOUT                                      PPRJ0290
      COMMON /EXTERN/ AR (20)                                                   PPRJ0300
      COMMON /INDATA/ CDINL, CLALF,WTINLT                                       PPRJ0310
      EQUIVALENCE                                                               PPRJ0320
     1(AR( 1),PLLT  ),(AR(2 ),PLMASS),(AR( 3),D3    ),(AR( 4),RANGE ),        PPRJ0330
     2(AR( 5),WTTOT ),(AR(6 ),XLTOT ),(AR( 7),VL    ),(AR( 8 ),VECB ),        PPRJ0340
     3(AR( 9),DELVI ),(AR(13),PAYLD)                                            PPRJ0350
      EQUIVALENCE(AR(19),BOO   ),(AR(20),CFSTOR)                                PPRJ0360
      COMMON /TRJDTA/ POINT(10,7)                                               PPRJ0370
      COMMON /RJBLOK/ RJ(50)                                                    PPRJ0380
      EQUIVALENCE                                                               PPRJ0390
     1(RJ( 1),CNM   ),(RJ( 2),ANC   ),(RJ( 3),ANN   ),(RJ( 4),AL    ),        PPRJ0400
     2(RJ( 5),PT2PO ),(RJ( 6),CDB   ),(RJ( 7), C1   ),(RJ( 8),PT2   ),        PPRJ0410
     3(RJ( 9),PT4Y  ),(RJ(10),GAM   ),(RJ(11),A6MAX ),(RJ(12),ACMAX ),        PPRJ0420
     4(RJ(13),A6MIN ),(RJ(14),XMOMR ),(RJ(15),ACAC  ),(RJ(16),CDA   ),        PPRJ0430
     5(RJ(17),DELT4 ),(RJ(18),PCMGN ),(RJ(19),AMACH ),(RJ(20),ALFOLD),        PPRJ0440
     6(RJ(21),A2A3  ),(RJ(22),FARLB ),(RJ(23),IID   ),(RJ(24),BPAR  ),        PPRJ0450
     7(RJ(25),ALF1  ),(RJ(26),TT4   ),(RJ(27),FAR   ),(RJ(28),PM    ),        PPRJ0460
     8(RJ(29),WF    ),(RJ(30),ANC4  ),(RJ(31),PT2POC),(RJ(32),PTC   ),        PPRJ0470
     9(RJ(33),TO    ),(RJ(34),PO    ),(RJ(35),KDIA  ),(RJ(36),PT4I  ),        PPRJ0480
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     X (RJ(37),PT41   ),(RJ(38),PT42   ),(RJ(39),PT43   ),                    PPRJ0490
     1(RJ(40),AM6    ),(RJ(41),AM4    ),(RJ(42),AM2    ),(RJ(43),GAM2   ),  PPRJ0500
     2(RJ(44),GAM4   ),(RJ(45),P6     ),(RJ(46),TT2    ),(RJ(47),AR2    ),  PPRJ0510
     3(RJ(48),AR4    ),(RJ(49),PT4    ),(RJ(50),WAA3   )                     PPRJ0520
C      IMIN= 1  OBTAIN MINIMUM LT/WT FOR SUSTAINER                           PPRJ0530
C      IMIN= 0  OBTAIN LT/WT FOR SUSTAINER WT/LT GIVEN                       PPRJ0540
C   COMMON BLOCK FOR ALTITUDE,TITLE,ID AND FUEL DECKS                        PPRJ0550
       COMMON /ALTDD/                                                       PPRJ0560
     1K1,ALT(24),SDTEMP(24),PRESS(24),ID(8)                                 PPRJ0570
       COMMON /FUELXX/                                                      PPRJ0580
     2K2,KK(15),TT2TAB(15 ),TFAR1(15,15),TTPS1(15,15),TTRS2(15,15),         PPRJ0590
     X TTRS3(15,15),                                                        PPRJ0600
     3K3,KL(15),JCAMM,TT4TA(15),TFAR2(15,15),TGAM(15,15),EG(15,15),         PPRJ0610
     XEG(15,15),                                                            PPRJ0620
     4K4,KN(15),JR,    TT4TB(15),TFAR3(15,15),RTAB(15,15),ER(15,15),        PPRJ0630
     XER(15,15),                                                            PPRJ0640
     5NB1,AAM(24),ANC1(24),FARL(24)                                         PPRJ0650
C   COMMON BLOCK FOR INLET PERFORMANCE MAP                                   PPRJ0660
       COMMON/ INLETX/                                                      PPRJ0670
     6K8,KPTC(15),ALPHV(15),AAMACH(15,15),AOACC(15,15),PT3PTO(15,15),       PPRJ0680
     1ADDD(15,15)                                                           PPRJ0690
       DIMENSION ACSTO(24),A5STO(24),A6STO(24),CFSTO(24),PTSTC(24)          PPRJ0700
       COMMON/PRONG/ ALFTAB,A5OLD,IACMAP,TT4MAX,ACSTO,A5STC,A6STO,          PPRJ0710
     1    CFSTO,PTSTO                                                       PPRJ0720
       COMMON /CODERJ/ IPASS,ICALF,JCOND                                    PPRJ0730
C      JCOND  ERROR INDICATOR                                               PPRJ0740
        NAMELIST /DIAG/   GAM2,AR2,GAM4,AR4,WAA3,FAR,       PT2PO,TT2,      PPRJ0750
     1 PT4,AOA3,AM4,CFN,A5A3,TT4,BPAR,AM2,FARLB,ALF1,IND,PT4I,   A5A3        PPRJ0760
       IRJOUT = 1                                                           PPRJ0770
       A5OLD=2.                                                             PPRJ0780
        KDIA = 0                                                            PPRJ0790
       IND = 0                                                              PPRJ0800
       XPJ=0.                                                               PPRJ0810
       KWHAM=0                                                              PPRJ0820
       LOOP = 1                                                             PPRJ0830
       NOUTZ = NOUT                                                         PPRJ0840
       IF(NOUT.NE.0) WRITE(6,605) NPASS                                     PPRJ0850
  605 FORMAT(5X5HBEGIN,1X,                                                  PPRJ0860
     1                  8HLOOP NO. , I3, 2X6HON CFN /    )                 PPRJ0870
       IF(NEWPT.LT.1) GO TO 100                                             PPRJ0880
       IDREG = 0                                                            PPRJ0890
C                                                                           PPRJ0900
C    DESIGN POINT DATA                                                      PPRJ0910
C                                                                           PPRJ0920
       ALFTAB = 200.                                                        PPRJ0930
       ALFOLD = 200.                                                        PPRJ0940
       A5OLD = 2.                                                           PPRJ0950
       ALF1 =1.                                                             PPRJ0960
       AMACH=POINT(1,2)                                                     PPRJ0970
       HP   =POINT(1,1)                                                     PPRJ0980
       CFNRQ=0.2*(1.+ POINT(1,4))                                           PPRJ0990
       BOSLT=SUSLT                                                          PPRJ1000
       IF(LOOPRJ.GT.0) CFNRQ=CFNSAV                                         PPRJ1010
       TT4MAX = POINT(1,7)                                                  PPRJ1020
       II(16) = 0                                                           PPRJ1030
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      IF(TT4MAX-1.) 95,95,96                                          PPRJ1040
   95 II(16) = 1                                                      PPRJ1050
      FAR = TT4MAX                                                    PPRJ1060
   96 CFSTOR = CFNRQ                                                  PPRJ1070
      AR(16) = AMACH                                                  PPRJ1080
      CALL TLU1(HP,ALT,K1,PRESS,PO,IND)                               PPRJ1090
      IF(IND.NE.0) GO TO 138                                          PPRJ1100
      CALL TLU11(SDTEMP,TO)                                           PPRJ1110
C  OBTAIN  TT2,PTO                                                    PPRJ1120
      CALL ISEN(TO,PO,AMACH,TT2,PTO)                                  PPRJ1130
      IF ( KFAIL .GT. 0 ) RETURN                                      PPRJ1140
      IF(TT4 .LT. TT2) GO TO 2000                                     PPRJ1150
      NEWPT = 0                                                       PPRJ1160
  100 IF(ABS(ALFTAB -ALF1) .LT. .001) GO TO 200                       PPRJ1170
      ALFTAB = ALF1                                                   PPRJ1180
C  OBTAIN  PRESS RECOVERY,ADAC AND ADDITIVE DRAG                      PPRJ1190
      CALL TLU2(ALF1,ALPHV,K8,AMACH,AAMACH,KPTC,AOACC,ACAC,IND)       PPRJ1200
      IF(IND.NE.0) GO TO 2014                                         PPRJ1210
      CALL TLU22(PT3PTO,PT2POA)                                       PPRJ1220
      CALL TLU22(ADDD,CDA)                                            PPRJ1230
      PT2PO  =(1.-PCMGN/100.)*PT2POA                                  PPRJ1240
      PT2 = PTO*PT2PO                                                 PPRJ1250
      IF (ABS(ALFOLD -ALF1) .LT. 1.) GO TO 200                        PPRJ1260
C                                                                     PPRJ1270
C   ACA3 MAP                                                          PPRJ1280
C                                                                     PPRJ1290
C     ACA3 VS  CFN  MAP GENERATION                                    PPRJ1300
C     LOAD TABLE VALUES                                               PPRJ1310
  101 ALFOLD = ALF1                                                   PPRJ1320
      JCOND = 0                                                       PPRJ1330
      KKK= 0                                                          PPRJ1340
      KDIA = 0                                                        PPRJ1350
      ACA3 = 0.05                                                     PPRJ1360
      A5A3 = .05                                                      PPRJ1370
      IACMAP = 0                                                      PPRJ1380
      DELAR =.02                                                      PPRJ1390
      CFNSTO =-50.                                                    PPRJ1400
  105 IF(KIND.EQ.42)GO TO 110                                         PPRJ1410
      CALL RJDES                                                      PPRJ1420
      GO TO 115                                                       PPRJ1430
  110 CALL DRDES                                                      PPRJ1440
  115 IF(IND.NE.0) GO TO 900                                          PPRJ1450
      IF(JCOND .NE. 0) GO TO 120                                      PPRJ1460
      IF(CFN.LT. CFNSTO)  GO TO 120                                   PPRJ1470
      KKK = KKK + 1                                                   PPRJ1480
      IACMAP = KKK                                                    PPRJ1490
      PTSTO(KKK)=PT4                                                  PPRJ1500
      CFSTO(KKK)=CFN                                                  PPRJ1510
      A6STO(KKK)=A6A3                                                 PPRJ1520
      A5STO(KKK)=A5A3                                                 PPRJ1530
      ACSTO(KKK)=ACA3                                                 PPRJ1540
      CFNSTO =  CFN                                                   PPRJ1550
      ACA3 = ACA3 + .1                                                PPRJ1560
      IF(KKK.GT.15) GO TO 26                                          PPRJ1570
      IF(ACA3 .GT. ACMAX) GO TO 120                                   PPRJ1580
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      GO TO 105                                                          PPRJ1590
C     HUNT OUT  ACA3 MAX                                                 PPRJ1600
  120 KKK= 0                                                             PPRJ1610
      JCOND = 0                                                          PPRJ1620
      IF (IACMAP .LT.1) GO TO 26                                         PPRJ1630
      ACA3 = ACSTO(IACMAP  )+ DELAR                                      PPRJ1640
  135 IF(ACA3.GT.ACMAX) GO TO 140                                        PPRJ1650
      IF(KIND.EQ. 42) GO TO 150                                          PPRJ1660
      CALL RJDES                                                         PPRJ1670
  160 IF(IND.NE.0) GO TO 90C                                             PPRJ1680
      IF(JCOND .NE. 0) GO TO 140                                         PPRJ1690
      IF(CFN.LT.CFNSTO) GO TO 140                                        PPRJ1700
      IF(KKK.GT.15) GO TO 26                                             PPRJ1710
      KKK = KKK +1                                                       PPRJ1720
      IF(KKK.EQ.1)IACMAP = IACMAP +1                                     PPRJ1730
      ACSTO(IACMAP) =  ACA3                                              PPRJ1740
      A5STO(IACMAP) =  A5A3                                              PPRJ1750
      CFNSTO = CFN                                                       PPRJ1760
      A6STO(IACMAP) =  A6A3                                              PPRJ1770
      PTSTO(IACMAP)= PT4                                                 PPRJ1780
      CFSTO(IACMAP) =  CFN                                               PPRJ1790
      ACA3 = ACA3 + DELAR                                                PPRJ1800
      GO TO 135                                                          PPRJ1810
  140 JCOND = 0                                                          PPRJ1820
      IF(DELAR.LE..01) GO  TO 190                                        PPRJ1830
      ACA3= ACA3-DELAR*.75                                               PPRJ1840
      DELAR = .005                                                       PPRJ1850
      GO TO 135                                                          PPRJ1860
  150 CALL DRDES                                                         PPRJ1870
      GO TO  160                                                         PPRJ1880
  901 IF(III(10) .EQ. 0) GO TO 2026                                      PPRJ1890
      TT4 = TT4 + DELT4                                                  PPRJ1900
      IF(NOUT.NE.0) WRITE(6,607) TT4                                     PPRJ1910
  607 FORMAT(  / 5X, 11HSTEP TT4 TO, F8.0 /  )                           PPRJ1920
      IF(TT4 .GT. TT4MAX -.1) GO TO 2026                                 PPRJ1930
      CFNRQ = CFNRQ*.9                                                   PPRJ1940
      GO TO 101                                                          PPRJ1950
  190 IF ( NOUT .EQ. 0 ) GO TO 200                                       PPRJ1960
  615 FORMAT(///2X30HSEARCH FOR RAMJET DESIGN - NO. , I3 //    )         PPRJ1970
      WRITE(6,620)                                                       PPRJ1980
  620 FORMAT(//5X,10HACA3 TABLE// 15X4HACA3, 7X3HCFN, 7X4HA5A3,          PPRJ1990
     1      7X4HA6A3, 6X3HPT4      )                                     PPRJ2000
      DO 621 I=1,IACMAP                                                  PPRJ2010
  621 WRITE(6,622)ACSTO(I),CFSTO(I),A5STO(I),A6STO(I),PTSTO(I)           PPRJ2020
  622  FORMAT(10X,4F10.5,F10.2)                                          PPRJ2030
      WRITE(6,629)                                                       PPRJ2040
  629 FORMAT( /// )                                                      PPRJ2050
      IF  ( NOUT  .GT.  1  )  WRITE(6,191)  TT4                          PPRJ2060
  191 FORMAT (///6H TT4=  ,F10.2)                                        PPRJ2070
      IF(NOUT.NE.0) CALL PAGE                                            PPRJ2080
  200 IF(CFNRQ .GT. CFSTO(IACMAP)) GO TO 901                             PPRJ2090
      CALL TLU1(C  NRQ,CFSTO,IACMAP,ACSTO,ACA3,IND)                      PPRJ2100
      IF(IND.NE.  ) TO 2026                                              PPRJ2110
      CALL TLU1(  ,A5A3)                                                 PPRJ2120
      CALL TLU1(  ,A6A3)                                                 PPRJ2130
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      CALL TLULI(PTSTO,PT4I)                                                PPRJ2140
      IF(NOUTZ.LT.0) NOUT=0                                                 PPRJ2150
      BOO = BOSTLT                                                          PPRJ2160
      BZ=BOO                                                                PPRJ2170
      IF(KIND.EQ.44) BOO=XLTOT-SUSLT  -  PLLT                               PPRJ2180
      CALL INLETP                                                           PPRJ2190
      NOUT = NOUTZ                                                          PPRJ2200
      BOO = BZ                                                              PPRJ2210
      IF( IND .NE. 0) GO TO 900                                             PPRJ2220
      CALL CDINLT                                                           PPRJ2230
      IF(IND .NE. 0) GO TO 900                                              PPRJ2240
      KDIA = 1                                                              PPRJ2250
      MINPAR = 0                                                            PPRJ2260
      IPASS =0                                                              PPRJ2270
C                                                                           PPRJ2280
C   BOOSTER AND SUSTAINER SIZING                                            PPRJ2290
C                                                                           PPRJ2300
      SWTOLD = SUSWT                                                        PPRJ2310
      SLTOLD = SUSLT                                                        PPRJ2320
  205 IMIN = 0                                                              PPRJ2330
      NSIZES = 0                                                            PPRJ2340
      IF(IEX.EQ.1) GO TO 207                                                PPRJ2350
      WPJ = 0.                                                              PPRJ2360
  206 PAYLD = WTINLT +PLMASS + SUSWT + WRJ                                  PPRJ2370
      NSIZES = NSIZES+1                                                     PPRJ2380
      IF(NSIZES .GT. 30) GO TO 33                                           PPRJ2390
      IF( (NOUT.NE.0) .AND. (NSIZES.GT.1) ) CALL PAGE                       PPRJ2400
      IF(NOUT.NE.0) WRITE(6,609) NPASS, NSIZES                              PPRJ2410
  609 FORMAT( /  5X, 8HLOOP NO. , I3, 2X6HON CFN /                          PPRJ2420
     1            5X, 8HLOOP NO. , I3, 2X9HON WEIGHT  /  )                 PPRJ2430
  608 CONTINUE                                                              PPRJ2440
      IF(KIND .EQ. 44) GO TO 211                                            PPRJ2450
      IF(ABS(A5OLD/A5A3 -1.0).LT. .1 )GO TO 230                             PPRJ2460
      IF(IEX.EQ.1 .AND. IPASS .GT. 0)  GO TO 230                            PPRJ2470
      IF ( NOUT .NE. 0 ) WRITE(6,3101)                                      PPRJ2480
 3101 FORMAT( /  2X, 26HRECOMPUTE BOOSTER PARTIALS          )               PPRJ2490
      IF( (NOUT.NE.0) .AND. (IEX.NE.1) ) WRITE(6,3102) A5A3, A5OLD          PPRJ2500
 3102 FORMAT( 15X,6HA5A3 =, F10.4/   15X,6HA5OLD=,F10.4     )               PPRJ2510
      NBOU=1                                                                PPRJ2520
      IF(NOUT.NE.0) WRITE(6,617) NBOU                                       PPRJ2530
  617 FORMAT( // 2X,26HBOOSTER PARTIAL - STEP NO.  ,    I3     )           PPRJ2540
      CALL BOOST(DELVI,PAYLD, A6A3,A5A3,0,BOSTPR,BOSTWT,BOSTLT,IND,CON)     PPRJ2550
      IF(IND.NE.0) GO TO 28                                                 PPRJ2560
      PAYDEL = PAYLD +100.                                                  PPRJ2570
      NBOU=2                                                                PPRJ2580
      IF(NOUT.NE.0) WRITE(6,617) NBOU                                       PPRJ2590
      CALL BOOST(DELVI,PAYDEL,A6A3,A5A3,0,PARPR,PARWT,PARLT,IND,XCX)        PPRJ2600
      IF(IND.NE.0) GO TO 28                                                 PPRJ2610
      PARLOR = PARLT                                                        PPRJ2620
      PARWOR = PARWT                                                        PPRJ2630
      A5OLD = A5A3                                                          PPRJ2640
      PARWT = (PARWT-BOSTWT) /100.                                          PPRJ2650
      PARLT = (PARLT-BOSTLT) /100.                                          PPRJ2660
      PARPR = (PARPR-BOSTPR) /100.                                          PPRJ2670
      PLOLD =  PAYLD                                                        PPRJ2680
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      IF(NOUT.NE.0) WRITE(6,615) PARWT, PARLT, PARPR                    PPRJ2690
  615 FORMAT(// 2X,17HCOMPUTED PARTIALS  /  12X8HWEIGHT - ,F10.4 /      PPRJ2700
     1      12X8HLENGTH -, F10.4  /  12X8HWPROP  -, F10.4  )            PPRJ2710
      IF(NOUT.NE.0) CALL PAGE                                           PPRJ2720
      IF ( KWHAM .GT. 0 ) GO TO 235                                     PPRJ2730
      KWHAM=1                                                           PPRJ2740
      XACTL = SUSLT * (SUSWT+100.) / SUSWT                              PPRJ2750
      XAVAIL = XLTOT - PLLT - PARLOR                                    PPRJ2760
      SLOLD = XACTL                                                     PPRJ2770
      DELOLD = XAVAIL - XACTL                                           PPRJ2780
      XACTW = SUSWT + 100.                                              PPRJ2790
      XAVAIW = WTTOT - PARWOR - WTINLT - WRJ - PLMASS                   PPRJ2800
      SWOLD = XACTW                                                     PPRJ2810
      DEWOLD = XAVAIW - XACTW                                           PPRJ2820
      GO TO 235                                                         PPRJ2830
  230 PAYDEL = PAYLD - PLOLD                                            PPRJ2840
      BOSTWT = BOSTWT+ PAYDEL*PARWT                                     PPRJ2850
      BOSTLT = BOSTLT+ PAYDEL*PARLT                                     PPRJ2860
      BOSTPR = BOSTPR+ PAYDEL*PARPR                                     PPRJ2870
      PLOLD = PAYLD                                                     PPRJ2880
  235 IF(IEX .EQ.1) GO TO 236                                           PPRJ2890
      CLT = BOSTLT                                                      PPRJ2900
      BOO = BOSTLT                                                      PPRJ2910
      IF ( NOUT .EQ. 0 ) GO TO 236                                      PPRJ2920
      WRITE(6,3111) BOSTWT, BOSTLT, BOSTPR                              PPRJ2930
 3111 FORMAT( / 5X, 28HBOOSTER SIZED USING PARTIALS       /            PPRJ2940
     1   15X,8HWEIGHT = , F10.1 /   15X,8HLENGTH = , F10.1  /          PPRJ2950
     2      15X,8HPROP.WT= , F10.1      )                              PPRJ2960
  236 IF(ISIZE .EQ.2 ) GO TO 260                                        PPRJ2970
C           LT  INPUT                                                   PPRJ2980
      ACTL = SUSLT                                                      PPRJ2990
      AVAIL = XLTOT - PLLT - BOSTLT                                     PPRJ3000
C     TEST FOR CONVERGENCE ON SUSLT                                     PPRJ3010
      DELNEW = AVAIL - ACTL                                             PPRJ3020
      SLNEW = SUSLT                                                     PPRJ3030
      EPLT = .25                                                        PPRJ3040
C     COMPUTE NEW SUST. LT. SO THAT AVAIL = ACTL                        PPRJ3050
      SUSLX=SLOLD-DELOLD*(SLNEW-SLOLD)/(DELNEW-DELOLD)                  PPRJ3060
  237 FORMAT(  5X9HWT. ITER.   ,I5, 10X5F10.2      )                   PPRJ3070
      DUMSL = ABS ( SUSLT - SUSLX )                                     PPRJ3080
      IF ( DUMSL .LE. EPLT ) GO TO 2240                                 PPRJ3090
      SUSLT = SUSLX                                                     PPRJ3100
      SLOLD = SLNEW                                                     PPRJ3110
      DELOLD = DELNEW                                                   PPRJ3120
 5262 CONTINUE                                                          PPRJ3130
      IF(KIND .EQ. 42) GO TO 261                                        PPRJ3140
      IF( (KIND.EQ.44) .AND. (NOUTZ.LE.0) ) NOUT = 0                    PPRJ3150
      CALL SUSMAS                                                       PPRJ3160
      NOUT=NOUTZ                                                        PPRJ3170
      IF ( KFAIL .GT. C ) RETURN                                        PPRJ3180
  262 IF ( IND .NE. 0 ) GO TO 31                                        PPRJ3190
      IF(SUSWT.LE. SUSMWT) GO TO 31                                     PPRJ3200
      IMIN = -1                                                         PPRJ3210
      MINPAR = 0                                                        PPRJ3220
      IF(KIND.EQ.44) GO TO 2241                                         PPRJ3230
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      CALL  INLETP                                                      PPRJ3240
      IF ( INC .NE. 0 ) GO TO 900                                       PPRJ3250
      GO TO 206                                                         PPRJ3260
 2240 CONTINUE                                                          PPRJ3270
C     TO HERE IF CONVERGED                                              PPRJ3280
      SLOLD = SLNEW                                                     PPRJ3290
      DELOLD = DELNEW                                                   PPRJ3300
      WTOLD = WTINLT                                                    PPRJ3310
      IF(NOUTZ.LT.0) NOUT=0                                             PPRJ3320
      CALL  INLETP                                                      PPRJ3330
      NOUT = NOUTZ                                                      PPRJ3340
      WTNEW = WTINLT                                                    PPRJ3350
C     TEST ON INLET WT CHANGE                                           PPRJ3360
      DELW = WTOLD - WTNEW                                              PPRJ3370
      EPIN = 1.                                                         PPRJ3380
      IF ( ABS(DELW) .LE. EPIN ) GO TO 2241                             PPRJ3390
      IF(LOOP .GT. 2 ) GO TO 2241                                       PPRJ3400
      LOOP = LOOP + 1                                                   PPRJ3410
      GO TO 206                                                         PPRJ3420
 2241 CONTINUE                                                          PPRJ3430
C     TO HERE IF CONV ON INLET WT                                       PPRJ3440
      LOOP = 1                                                          PPRJ3450
      IF ( NOUT .EQ. 0 ) GO TO 2242                                     PPRJ3460
C     CALL SUSMAS AND INLETP FOR PRINT                                  PPRJ3470
      BZ=BOO                                                            PPRJ3480
      IF(KIND.EQ.44) BOO=XRJ                                            PPRJ3490
      CALL  INLETP                                                      PPRJ3500
      BOO = BZ                                                          PPRJ3510
      CALL  SUSMAS                                                      PPRJ3520
 2242 CONTINUE                                                          PPRJ3530
      CALL  CDINLT                                                      PPRJ3540
      IF ( INC .NE. 0 ) GO TO 900                                       PPRJ3550
      SLTOLD = SUSLT                                                    PPRJ3560
      GO TO 299                                                         PPRJ3570
  261  CALL  SDUCER                                                     PPRJ3580
      IF ( KFAIL .GT. 0 ) RETURN                                        PPRJ3590
      GO TO 262                                                         PPRJ3600
  207 CALL  EXRAM                                                       PPRJ3610
      IF ( KFAIL .GT. 0 ) RETURN                                        PPRJ3620
      IF(NOUT.NE.0) CALL PAGE                                           PPRJ3630
      SUSLT=XLTOT-PLLT-XRJ                                              PPRJ3640
      SUSWT=WTTOT-WTINLT-PLMASS-WRJ                                     PPRJ3650
      CLT = XRJ                                                         PPRJ3660
      GO TO 206                                                         PPRJ3670
  211 BOSTWT = 0.                                                       PPRJ3680
      BOSTLT = 0.0                                                      PPRJ3690
      IF(ISIZE.EQ.2) GO TO 5252                                         PPRJ3700
      GO TO 5262                                                        PPRJ3710
C                                                                       PPRJ3720
C     260 WT      INPUT                                                 PPRJ3730
  260 CONTINUE                                                          PPRJ3740
      ACTW = SUSWT                                                      PPRJ3750
      AVAIW = WTTOT - BOSTWT - WTINLT - WRJ - PLMASS                    PPRJ3760
      DELSW = AVAIW - ACTW                                              PPRJ3770
      DEWNEW = DELSW                                                    PPRJ3780
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      SWNEW = SUSWT                                                    PPRJ3790
C     TEST FOR CONVERGENCE                                             PPRJ3800
      EPSW = 1.                                                        PPRJ3810
      SUSWX = SWOLD-DEWOLD*(SWNEW-SWOLD)/(DEWNEW-DEWOLD)               PPRJ3820
      DUMSW = ABS ( SUSWX - SUSWT )                                    PPRJ3830
      IF ( DUMSW .LE. EPSW ) GO TO 2252                                PPRJ3840
      SUSWT = SUSWX                                                    PPRJ3850
C     LOOP ON SUSWT                                                    PPRJ3860
      SWOLD=SWNEW                                                      PPRJ3870
      DEWOLD = DEWNEW                                                  PPRJ3880
      SWTOLD = SUSWT                                                   PPRJ3890
 5252 CONTINUE                                                         PPRJ3900
      IF( (KIND.EQ.44) .AND. (NOUTZ.LE.0) ) NOUT = 0                   PPRJ3910
      IF(KIND .EQ. 42) GO TO 251                                       PPRJ3920
      CALL SUSMAS                                                      PPRJ3930
      NOUT = NOUTZ                                                     PPRJ3940
      IF ( KFAIL .GT. C ) RETURN                                       PPRJ3950
  252 IF ( IND .NE. 0 ) GO TO 31                                       PPRJ3960
      IF(SUSLT.LE. SUSMLT) GO TO 31                                    PPRJ3970
      IMIN = -1                                                        PPRJ3980
      IF(KIND.EQ.44) GO TO 2252                                        PPRJ3990
      CALL INLETP                                                      PPRJ4000
      NOUT = NOUTZ                                                     PPRJ4010
      IF ( IND .NE. 0 ) GO TO 900                                      PPRJ4020
      GO TO 206                                                        PPRJ4030
 2252 CONTINUE                                                         PPRJ4040
      SWOLD=SWNEW                                                      PPRJ4050
      DEWOLD=DEWNEW                                                    PPRJ4060
      WTOLD = WTINLT                                                   PPRJ4070
      IF ( NOUTZ .LT. C ) NOUT = 0                                     PPRJ4080
      BZ=BOO                                                           PPRJ4090
      IF(KIND.EQ.44) BOO=XRJ                                           PPRJ4100
      CALL INLETP                                                      PPRJ4110
      BOO = BZ                                                         PPRJ4120
      NOUT = NOUTZ                                                     PPRJ4130
      WTNEW = WTINLT                                                   PPRJ4140
C     TEST ON INLET WT CHANGE                                          PPRJ4150
      DELW=WTOLD-WTNEW                                                 PPRJ4160
      EPIN=1.                                                          PPRJ4170
      IF( ABS(DELW) .LE. EPIN ) GO TO 2254                             PPRJ4180
      IF(LOOP.GT.2) GO TO 2254                                         PPRJ4190
      LOOP = LOOP + 1                                                  PPRJ4200
      GO TO 206                                                        PPRJ4210
 2254 CONTINUE                                                         PPRJ4220
      LOOP = 1                                                         PPRJ4230
      IF ( NOUT .EQ. 0 ) GO TO 2253                                    PPRJ4240
C     RUN THROUGH SUSMAS AND INLETP FOR PRINT                          PPRJ4250
      BZ=BOO                                                           PPRJ4260
      IF(KIND.EQ.44) BOO=XRJ                                           PPRJ4270
      CALL INLETP                                                      PPRJ4280
      BOO = BZ                                                         PPRJ4290
      CALL SUSMAS                                                      PPRJ4300
 2253 CONTINUE                                                         PPRJ4310
      CALL CDINLT                                                      PPRJ4320
      IF ( IND .NE. 0 ) GO TO 900                                      PPRJ4330
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      MINPAR = 0                                                        PPRJ4340
      GO TO 299                                                         PPRJ4350
  251  CALL SDUCER                                                      PPRJ4360
      IF ( KFAIL .GT. 0 ) RETURN                                        PPRJ4370
      GO TO 252                                                         PPRJ4380
C                                                                       PPRJ4390
C   SIZE ENGINE                                                         PPRJ4400
C                                                                       PPRJ4410
  299 J = 1                                                             PPRJ4420
      CFNLO = 0.                                                        PPRJ4430
      CFNHI = 0.                                                        PPRJ4440
      SLTOLD = SUSLT                                                    PPRJ4450
      SWTOLD = SUSWT                                                    PPRJ4460
  301  IF(KIND .EQ. 42) GO TO 302                                       PPRJ4470
      CALL RJDES                                                        PPRJ4480
      IF(IND.NE.0) GO TO 900                                            PPRJ4490
      GO TO 201                                                         PPRJ4500
  302  CALL DRDES                                                       PPRJ4510
      IF(IND.NE.0) GO TO 900                                            PPRJ4520
  201 TCFN = CFN                                                        PPRJ4530
       IF (ABS(CFN-CFNRQ)-.0003) 240,240,210                            PPRJ4540
  210  IF(J-30) 411,411,2010                                            PPRJ4550
  411 J = J + 1                                                         PPRJ4560
      IF(CFN .LT. CFNRQ) GO TO 300                                      PPRJ4570
      CFNHI = CFN                                                       PPRJ4580
      ACHI = ACA3                                                       PPRJ4590
      IF(CFNLO .GT..001) GO TO 310                                      PPRJ4600
      ACA3 = ACA3 -.02                                                  PPRJ4610
      GO TO 301                                                         PPRJ4620
  300 IF (ACA3.GE.ACMAX) GO TO 2026                                     PPRJ4630
      CFNLO = CFN                                                       PPRJ4640
      ACLO = ACA3                                                       PPRJ4650
      IF(CFNHI .GT..001) GO TO 310                                      PPRJ4660
      ACA3 = ACA3 +0.02                                                 PPRJ4670
  311 IF(ACA3.GT. ACMAX) ACA3 = ACMAX                                   PPRJ4680
      GO TO 301                                                         PPRJ4690
  310 ACA3 = ACLO +(CFNRQ-CFNLO)/(CFNHI-CFNLO)*(ACHI-ACLO)              PPRJ4700
      GO TO 311                                                         PPRJ4710
  241  BOO = XRJ                                                        PPRJ4720
      GO TO 239                                                         PPRJ4730
  240 IF(IEX .EQ.1) GO TO 241                                           PPRJ4740
       BOO = BOSTLT                                                     PPRJ4750
      GO TO 239                                                         PPRJ4760
   31 IF (MINPAR .EQ.1) GO TO 35                                        PPRJ4770
      IF ( ISIZE -2) 42,41,35                                           PPRJ4780
   41 SUSWT = SUSMWT                                                    PPRJ4790
      MINPAR = 1                                                        PPRJ4800
      GO TO 206                                                         PPRJ4810
   42 SUSLT = SUSMLT                                                    PPRJ4820
      MINPAR = 1                                                        PPRJ4830
      GO TO 206                                                         PPRJ4840
  239  SFC = C1 *ACA3 /CFN *AOAC                                        PPRJ4850
      IF(FAR.LE.FARLB) GO TO 2028                                       PPRJ4860
      RETURN                                                            PPRJ4870
C   ERROR OUTPUT                                                        PPRJ4880
```

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C                                                                       PPRJ4890
 2000 IF ( NOUT .EQ. 0 ) GO TO 900                                      PPRJ4900
      WRITE (6,1015) TITLE                                              PPRJ4910
 1015 FORMAT(20X35H ERROR IN PROPRJ        ENCOUNTERED /10X20A4)       PPRJ4920
      WRITE(6,2001)TT2                                                  PPRJ4930
 2001 FORMAT(/10X,32HTT4 IS LESS THAN OR EQUAL TO TT2//10X,4HTT2=,F8.2) PPRJ4940
      GO TO 900                                                         PPRJ4950
 2010 IF ( NOUT .EQ. 0 ) GO TO 900                                      PPRJ4960
      WRITE (6,1015) TITLE                                              PPRJ4970
      WRITE(6,2011)CFN,CFNRQ                                            PPRJ4980
 2011 FORMAT(/10X,26HFAILURE TO CONVERGE ON CFN//10X,4HCFN=,F7.4,4X,    PPRJ4990
     X6HCFNRQ=,F7.4)                                                    PPRJ5000
      GO TO 900                                                         PPRJ5010
 2014 IF (NOUT .EQ. 0 ) GO TO 900                                       PPRJ5020
      WRITE ( 6, 1015 ) TITLE                                           PPRJ5030
      WRITE(6,2015) AMACH, ALF1                                         PPRJ5040
 2015 FORMAT( /10X,34HFAILURE TRYING TO READ INLET MAP  /               PPRJ5050
     110X, 7HAMACH = ,F10.5, 8H ALF1 = ,F10.5 )                         PPRJ5060
  510 IF ( NOUT .EQ. 0 ) GO TO 900                                      PPRJ5070
      WRITE ( 6, 545 ) BOMB, IARI(MUM)                                  PPRJ5080
  545 FORMAT (' 1ST IND VARIABLE=',E12.5,' 2ND IND VARIABLE= ',E12.5,' SPPRJ5090
     1UBTABLE =',F10.3,' SUBTABLE SIZE =',F10.3/' THE VARIABLE OUT OF RAPPRJ5100
     2NGE IS THE ',A4,' INDEPENDENT VARIABLE'/)                         PPRJ5110
      GO TO 900                                                         PPRJ5120
 2026 IF ( NOUT .EQ. 0 ) GO TO 900                                      PPRJ5130
      WRITE ( 6, 1015 ) TITLE                                           PPRJ5140
      WRITE(6,2027) ACSTO(1),CFSTO(1),ACSTO(IACMAP),CFSTO(IACMAP),CFNRQ PPRJ5150
 2027 FORMAT(/10X,31HUNABLE TO FIND CFN MIN ACA3 IS ,F10.5,11H MIN CFN IPPRJ5160
     1S ,F10.5,12H MAX ACA3 IS ,F10.5,11H MAX CFN IS ,F10.5, 6HCFNRQ  , PPRJ5170
     2F10.5)                                                            PPRJ5180
      GO TO 900                                                         PPRJ5190
   38 IF ( NOUT .NE. 0 ) WRITE ( 6, 39 )                                PPRJ5200
   39 FORMAT(45H EXCESSIVE ITERATIONS IN INTERNAL RAMJET LOOP )         PPRJ5210
      GO TO 900                                                         PPRJ5220
 2028 IF ( NOUT .EQ. 0 ) GO TO 900                                      PPRJ5230
      WRITE ( 6, 1015 ) TITLE                                           PPRJ5240
      WRITE(6,2029) FAR,FARLB                                           PPRJ5250
 2029 FORMAT(/10X,35HFAR IS EQUAL TO OR LESS THAN FARLB//10X,4HFAR=,    PPRJ5260
     XF7.4,4X,6HFARLB=,F7.4)                                            PPRJ5270
  900 IND = 1                                                           PPRJ5280
      IF ( NOUT .NE. 0 ) WRITE (6,27) RJ                                PPRJ5290
   27 FORMAT(4F20.7)                                                    PPRJ5300
       CALL PJWT                                                        PPRJ5310
      RETURN                                                            PPRJ5320
   28 IF ( NOUT .NE. 0 ) WRITE ( 6, 29 )                                PPRJ5330
   29 FORMAT(38H ERROR TRYING TO GENERATE BOOSTER DATA )                PPRJ5340
      RETURN                                                            PPRJ5350
   33 IF ( NOUT .NE. 0 ) WRITE ( 6, 34 )                                PPRJ5360
   34 FORMAT(63H EXCESSIVE ITERATIONS TRYING TO DETERMINE BOOST /SUSTAINPPRJ5370
     1 SPLIT    )                                                      PPRJ5380
      RETURN                                                            PPRJ5390
   26 IF ( NOUT .NE. 0 ) WRITE(6,47)IACMAP,KKK,JCOND,ACMAX,CFNSTC,CFN   PPRJ5400
   47 FORMAT(42H IRRECONCILABLE ERROR IN AC MAP GENERATION  /3I4,3F15.5)PPRJ5410
      IND = 1                                                           PPRJ5420
      GO TO 190                                                         PPRJ5430
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   35 IF ( NOUT .NE. 0 ) WRITE(6,36)PLMASS,PLLT,BOSTLT,BCSTWT,SUSMLT,    PPRJ5440
     1    SUSMWT                                                        PPRJ5450
   36 FORMAT(53H PAYLOAD AND BOOSTER PREEMPT EXCESSIVE LENGTH/WEIGHT    /PPRJ5460
     119H DESIGN TERMINATED  ,6F12.4)                                   PPRJ5470
      RETURN                                                            PPRJ5480
  138 IF ( NOUT .NE. 0 ) WRITE( 6, 139 ) HP                             PPRJ5490
  139 FORMAT( 2X,42HERROR TRYING TO OBTAIN ATITUDE DATA,ALT = ,F8.1)    PPRJ5500
      RETURN                                                            PPRJ5510
 2016 IF ( NOUT .EQ. 0 ) RETURN                                         PPRJ5520
      WRITE ( 6, 1015 ) TITLE                                           PPRJ5530
      WRITE(6,2017)                                                     PPRJ5540
 2017 FORMAT(40H ERROR TRYING TO GENERATE SUSTAINER DATA   ///)         PPRJ5550
      RETURN                                                            PPRJ5560
      END                                                               PPRJ5570



      SUBROUTINE SUSMAS                                                 SMAS0010
C     PGM=NUK.CM-CGSM          GM/KM      FIV-EBCD          7/11/73    SMAS0020
      COMMON /COMVLS/ COM(51)                                           SMAS0030
      EQUIVALENCE ( COM(1), WTANK),                                     SMAS0040
     1  (COM(2),VEXIN),                                                 SMAS0050
     2  (COM(3),VREQX),                                                 SMAS0060
     3  (COM(4),GGWX ),                                                 SMAS0070
     4  (COM(5),HPPUMP),                                                SMAS0080
     6  (COM(6),WTFUEL),                                                SMAS0090
     7  (COM(12),KFMX),                                                 SMAS0100
     8  (COM(13),MATTKX)                                                SMAS0110
      COMMON /FAILUR/  KFAIL                                            SMAS0120
C     VERSION 2                                                         SMAS0130
      COMMON /MATTYP/ IR(3)                                             SMAS0140
      COMMON /ERPRT/ BOMB(4),MUM,IARI(2)                                SMAS0150
      COMMON /EXTERN/ AR (20)                                           SMAS0160
      EQUIVALENCE (AR(3),D3)                                            SMAS0170
      DIMENSION WT(15),Z(15),ZW(15),XII(15)                             SMAS0180
      EQUIVALENCE (WT(1),FITNGS),(WT(6),EXINWT)                         SMAS0190
      COMMON /EMPT/ HP,AMACH,ALF1,FARD                                  SMAS0200
      COMMON /RJDAT/ CFNRQ,CFNET,A5A3,A6A3,ACA3,SFC,BOSTWT,BOSTLT,      SMAS0210
     1 BOSTPR                                                           SMAS0220
      COMMON/COLD/PO, C2, A3, CONS, PTO, PTR, TO, TT2                   SMAS0230
      COMMON/INLETX/                                                    SMAS0240
     6K8,KPTC(15),ALPHV(15),AAMACH(15,15),AOACC(15,15),PT3PTO(15,15),   SMAS0250
     1ADDD(15,15)                                                       SMAS0260
      COMMON /ALTDD/                                                    SMAS0270
     1K1,ALT(24),SDTEMP(24),PRESS(24),ID(8)                             SMAS0280
      COMMON /PAKER/ PK(48)                                             SMAS0290
      EQUIVALENCE                                                       SMAS0300
     1                                (PK( 3),X2    ),(PK( 4),X1    ),  SMAS0310
     2(PK( 5),PB    ),(PK( 6),VOLX  ),(PK( 7),GGW   ),(PK( 8),GGFW  ),  SMAS0320
     4(PK( 9),ALINE ),(PK(10),PNF   ),(PK(11),STKFS ),                  SMAS0330
     X(PK(29),WTATH ),(PK(30),SSAFS ),(PK(31),R     ),(PK(32),WCSTB ),  SMAS0340
     X(PK(33),STKEC ),(PK(34),VFMN  ),(PK(35),TFD   ),(PK(36),VOLI  ),  SMAS0350
     X(PK(40),DELEXI),                                                  SMAS0360
     X(PK(41),EXMINW),(PK(42),DELB  ),(PK(43),DELTK ),(PK(44),BLADD ),  SMAS0370
     3(PK(45),VREQ  ),                (PK(47),SHELL ),(PK(48),XCAR  )   SMAS0380
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      COMMON/CODEXX/ II(16)                                                  SMAS0390
C     CODEXX  EXTERNAL INTEGER ARRAY                                         SMAS0400
      EQUIVALENCE                                                            SMAS0410
     1(II( 3),ISIZE ),(II( 6),KFM   ),(II(14),NPASS )                        SMAS0420
      COMMON /IPROP/ IND,IMIN,NEWPT,IRJOUT                                   SMAS0430
      COMMON /SUSDAT/ TX(44)                                                 SMAS0440
      EQUIVALENCE                                                            SMAS0450
     1(TX( 1), EXIN  ),(TX( 2),DRHOF ),(TX( 3),EDR   ),(TX( 4),EEXP  ),     SMAS0460
     2(TX( 5),GGMF   ),(TX( 6),PIDF  ),(TX( 7),PNS   ),(TX( 8),REGD  ),     SMAS0470
     3(TX( 9),RHOB   ),(TX(10),RHOF  ),(TX(11),TFUL  ),(TX(12),RU    ),     SMAS0480
     4(TX(13), SKTWT ),(TX(14),TBLAD ),(TX(15),TNGG  ),(TX(16),TSUS  ),     SMAS0490
     5(TX(17), ULLG  ),(TX(18),TCASEC),(TX(19),TMAX  ),(TX(20),PCC   ),     SMAS0500
     6(TX(21), WDFMAX),(TX(22),XFMB  ),(TX(23),WFC   ),(TX(24),WFMB  ),     SMAS0510
     7(TX(25), SUSMLT),(TX(26),SUSMWT),(TX(27),WCPT  ),(TX(28),DELWT ),     SMAS0520
     8(TX(29), SWTFS ),(TX(30),DELF  ),(TX(31),SWTOLD),(TX(32),SLTOLD),     SMAS0530
     9(TX(33), SUSLT ),(TX(34),SUSWT ),(TX(35),FSU2  ),(TX(36),FSY2  ),     SMAS0540
     1(TX(37), SMLT  ),(TX(38),SMWT  ),(TX(39),FDAJ  ),(TX(40),FUSABL),     SMAS0550
     2(TX(41), RHO   ),(TX(42),RHOINS),(TX(43),MATTK),(TX(44),MATPB)        SMAS0560
C       EXIN   EXTERNAL INSULATION THICKNESS                                 SMAS0570
C       DHROF  BULK DENSITY CHANGE FOR FUEL PER DEG F                        SMAS0580
C       EDR    MAJOR/MINOR AXIS TANK + N2 BOTTLE DOME                        SMAS0590
C       EEXP   EXPULSION EFFICIENCY  E.G. .97                                SMAS0600
C       GGMF   SGG MASS FRACTION KFM = 3    E.G. .1                          SMAS0610
C       PIDF   INJECTOR PRESSURE DROP FRACTION                               SMAS0620
C       PNS    N2 PRESSURE  KFM = 2            PSIA                          SMAS0630
C       REGD   FUEL CONTROLLER PRESSURE DROP  PSIA                           SMAS0640
C       RHOB   BLADDER DENSITY  LB/IN3                                       SMAS0650
C       RHOF   FUEL DENSITY     LB/IN3                                       SMAS0660
C       TFUEL  MAXIMUM FUEL TEMP AT RAMJET IGNITION                          SMAS0670
C       RU     GAS CONSTANT  FT/DEG                                          SMAS0680
C       RHOINS EXTERNAL INSULATION DENSITY                                   SMAS0690
C       TBLAD  BLADDER THICNESS IN                                           SMAS0700
C       TNGG   GAS OUTLET TEMP  DEG R                                        SMAS0710
C       TSUS   MAXIMUM SUSTAINER  TIME  SEC                                  SMAS0720
C       ULLG   ULLAGE REQUIRED  E.G. .05                                     SMAS0730
C       TCASEC MINIMUM TANK THICKNESS                                        SMAS0740
C       TMAX   CASE DESIGN TEMP                                              SMAS0750
C       XFMB   LENGTH FUEL MANAGEMENT BAY                                    SMAS0760
C       FSU2   ULTIMATE TENSILE SAFETY FACTOR E.G. 1.25                      SMAS0770
C       FYU2   YIELD  TENSILE SAFETY FACTOR E.G. 1.15                        SMAS0780
      DATA GAMN2,ZP,ZO,PY /1.401,1.0,1.03,3.14159 /                          SMAS0790
      XIISUS = 0.0                                                           SMAS0800
      XIIMT = 0.0                                                            SMAS0810
      IF (IMIN) 103,700,701                                                  SMAS0820
  701 ACA3  = 0.4                                                            SMAS0830
      CALL TLU1(HP,ALT,K1,PRESS,PO,IND)                                      SMAS0840
      IF (IND .NE. 0 )  GO TO 38                                             SMAS0850
      CALL TLU11(SDTEMP,TO)                                                  SMAS0860
      CALL ISEN(TO,PO,AMACH,TT2,PTO)                                         SMAS0870
      IF ( KFAIL  .GT.  0  )  RETURN                                         SMAS0880
      CALL TLU2(ALF1,ALPHV,K8,AMACH,AAMACH,KPTC,AOACC,AOAC,IND)              SMAS0890
      IF(IND.NE.0) GO TO 2014                                                SMAS0900
      CALL TLU22(PT3PTO,PTR)                                                 SMAS0910
      PCC = PTO*PTR/144.                                                     SMAS0920
      C2=0.918774    *PO*AMACH/SQRT(TO)                                      SMAS0930
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      A3= D3**2/4.* PY/144.                                                  SMAS0940
      CONS =A3*C2*AOAC*FARD                                                  SMAS0950
  700 WDFMAX=CONS*ACA3                                                       SMAS0960
      DELINE = 0.2736*SQRT(WDFMAX) + .04                                     SMAS0970
      ALINE = DELINE **2/4.*PY                                               SMAS0980
      WTLINE = DELINE*0.0178                                                 SMAS0990
      IF(IMIN .LT.1 ) GO TO 103                                              SMAS1000
      IF (PCC .LT. 1. .OR. PCC .GT. 500.) PCC = 500.                         SMAS1010
      CALL MATLS(MATTK,TMAX,RHO,FTU,FTY,IND)                                 SMAS1020
      IF (IND .NE. 0) GO TO 35                                               SMAS1030
      SCLDF = D3-2.*EXIN                                                     SMAS1040
      R = SCLDF/2.                                                           SMAS1050
      SHELL=SCLDF*PY*TCASEC*RHO+D3*PY*EXIN*RHOINS +WTLINE                    SMAS1060
C     MINIMUM LENGTH  TANK                                                   SMAS1070
      SMLT    =SCLDF/EDR                                                     SMAS1080
      DELEXI = D3*PY*EXIN*RHOINS                                             SMAS1090
C     EXTERNAL INSULATION WEIGHT                                             SMAS1100
      EXMINW = DELEXI*SMLT                                                   SMAS1110
      PFS = (PIDF+1.)*PCC                                                    SMAS1120
C     SIZE TANK                                                              SMAS1130
C     FUEL TANK CYLINDRICAL WITH OBLATE SPHEROID ENDS                        SMAS1140
      PNF=REGD+PFS                                                           SMAS1150
      IF(KFM.EQ.4) GO TO 105                                                 SMAS1160
      STKFU=FSU2*PFS*SCLDF/(FTU*2.)                                          SMAS1170
      STKFY=FSY2*PFS*SCLDF/(FTY*2.)                                          SMAS1180
      STKP=AMAX1(STKFU,STKFY)                                                SMAS1190
      TCPRFS=STKP                                                            SMAS1200
C     CYLINDER THICKNESS                                                     SMAS1210
      STKFC=AMAX1(STKP,TCASEC)                                               SMAS1220
      STKFY=FSY2*PFS*.5*EDR/FTY  *.5 *SCLDF                                  SMAS1230
      STKFU=FSU2*PFS*.5*EDR/FTU  *.5 *SCLDF                                  SMAS1240
      STKDP=AMAX1(STKFU,STKFY)                                               SMAS1250
C     DOME THICKNESS                                                         SMAS1260
      STKFS=AMAX1(STKDP,TCASEC)                                              SMAS1270
  106 SEF = (1.-1./(EDR*EDR)) **.5                                           SMAS1280
      SSAFS=(PY*SCLDF**2)/2.+((PY*SCLDF**2)/(4.*EDR**2*SEF))*ALOG((1.        SMAS1290
     1+SEF)/(1.-SEF))                                                        SMAS1300
      SWTFS=STKFS*SSAFS*RHO                                                  SMAS1310
       FITNGS = SWTFS*0.25                                                   SMAS1320
      RB = SCLDF/2.- STKFC                                                   SMAS1330
C     SKIRT/STIFFNER WEIGHT                                                  SMAS1340
      WCSTB = 2.*RHO*(44.1*(R*STKFC)**1.5 + 2.75*R*R*STKFC)                  SMAS1350
      WTATH = PY*SCLDF*STKFC*RHO*SMLT                                        SMAS1360
      SKTWT = WCSTB + WTATH                                                  SMAS1370
      VFMN =PY*(SCLDF-2.*(TBLAD+STKFS))**3/(6.*EDR)                          SMAS1380
      FDAJ =(RHOF-DRHOF*(TFUL-75.))*(1.-ULLG)                                SMAS1390
      WCPT = VFMN*FDAJ*EEXP                                                  SMAS1400
      TFD=  VFMN*FDAJ*(1.-EEXP)                                              SMAS1410
      BLADD = SSAFS*TBLAD *RHOB                                              SMAS1420
C     MINIMUM WT  TANK                                                       SMAS1430
      SMWT=SWTFS +WCSTB +WTATH +BLADD +WCPT + EXMINW +TFD + FITNGS           SMAS1440
C     MINIMUM FUEL AVAILABLE                                                 SMAS1450
C     FUEL /INCH OF CYLINDER                                                 SMAS1460
      VOLI =.7854*(SCLDF-2.*(TBLAD+STKFC))**2                                SMAS1470
      DELF= VOLI*FDAJ                                                        SMAS1480
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C     LB/INCH OF CYLINDER                                              SMAS1490
      DELB  = PY*SCLDF*TBLAD*RHOB                                      SMAS1500
      DELTK = PY*SCLDF*STKFC*RHO +WTLINE                               SMAS1510
      DELWT = DELTK+DELB+DELF+DELEXT                                   SMAS1520
C     SIZE FUEL CONTROL SYSTEM                                         SMAS1530
  103 WFC=10.+.667*WDFMAX                                              SMAS1540
      GO TO(104,450,470,480),KFM                                       SMAS1550
  105 STKFC = TCASEC                                                   SMAS1560
      STKFS = TCASEC                                                   SMAS1570
      GO TO 106                                                        SMAS1580
C  N2 PRESSURE BOTTLE CALCULATIONS                                     SMAS1590
  104  IF (IMIN .EQ. 0 .OR. NPASS .GT. 0) GO TO  42                    SMAS1600
      XEMB = 10.                                                       SMAS1610
      XEOLD = 10.                                                      SMAS1620
      SUSMLT = SMLT + XEMB                                             SMAS1630
      TN = 530.                                                        SMAS1640
      SUSMWT = SMWT + 50.                                              SMAS1650
      IF(ISIZE .EQ. 1) GO TO 40                                        SMAS1660
      WTE = SUSWT - SUSMWT                                             SMAS1670
      XCYL = WTE/DELWT                                                 SMAS1680
      GO TO 41                                                         SMAS1690
   40 XCYL = SUSLT- SUSMLT                                             SMAS1700
   41 IF(XCYL .LT. 0) XCYL = 0.                                        SMAS1710
   42 K=0                                                              SMAS1720
   52 K=K+1                                                            SMAS1730
      IF(K.GT. 30) GO TO 48                                            SMAS1740
      VREQ = VEMN + VOLI*XCYL                                          SMAS1750
      WNB=(1.+(GAMN2-1.)*ZP)/(1.-(PNF*ZO)/(PNS*ZP))                    SMAS1760
      GGFW = WNB*PNF/(ZP*RU*TN)/12. *VREQ                              SMAS1770
      GO TO 780                                                        SMAS1780
C        GAS GENERATOR WEIGHT CALCULATIONS                             SMAS1790
C     LIQUID GAS GENERATOR                                             SMAS1800
  450 CONTINUE                                                         SMAS1810
      VDOTB = WDFMAX / RHOF                                            SMAS1820
      GGPV=1.1*VDOTB*TSUS*PNF/12.                                      SMAS1830
      GGFW = GGPV / (RU*TNGG)                                          SMAS1840
      IF(GGFW.GT.0.5) GO TO 452                                        SMAS1850
      GGWR = .12+(.12-.0)*(GGFW-.5)/(.5-.0)                            SMAS1860
  461 VOLX = 55. + 95.*GGFW                                            SMAS1870
      GO TO 460                                                        SMAS1880
  452 IF(GGFW.GT.1.0) GO TO 453                                        SMAS1890
      GGWR = .180+(.180-.12)*(GGFW-1.)/(1.-.5)                         SMAS1900
      GO TO 461                                                        SMAS1910
  453 IF (GGFW.GT.2.0) GO TO 454                                       SMAS1920
      GGWR = .24+(.24-.18)*(GGFW-2.)/(2.-1.)                           SMAS1930
      GO TO 461                                                        SMAS1940
  454 IF (GGFW.GT.4.0) GO TO 455                                       SMAS1950
      GGWR = .29+(.29-.24)*(GGFW-4.)/(4.-2.)                           SMAS1960
      VOLX = 80. +82.5*GGFW                                            SMAS1970
      GO TO 460                                                        SMAS1980
  455 IF (GGFW.GT.6.0) GO TO 456                                       SMAS1990
      GGWR = .310+(.310-.29)*(GGFW-6.)/(6.-4.)                         SMAS2000
      VOLX =150. +65.*GGFW                                             SMAS2010
      GO TO 460                                                        SMAS2020
  456 GGWR = .340+(.340-.310)*(GGFW-10.)/(10.-6.)                      SMAS2030
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      VOLX =230. + 51.66*GGEW                                          SMAS2040
  460 GGW = GGEW/GGWR*(PNF/400.)**.3                                   SMAS2050
      GO TO 780                                                        SMAS2060
C     SOLID PROPELLANT GAS GENERATOR                                   SMAS2070
  470 CONTINUE                                                         SMAS2080
      VOCTB = WDEMAX / RHOF                                            SMAS2090
      GGPV=1.1*VOCTB*TSUS*PNF/12.                                      SMAS2100
      GGEW = GGPV/(RU*TNGG)                                            SMAS2110
      GGW=GGEW/GGMF                                                    SMAS2120
      VOLX = (GGEW/.06 + (GGW-GGEW)/0.283)/.85                         SMAS2130
      GO TO 780                                                        SMAS2140
C        RAM AIR TURBOPUMP                                             SMAS2150
  480 IF(IMIN .LT. 0) GO TO 702                                        SMAS2160
      HPOUT=(WDEMAX/RHOF)*PNF*.000152                                  SMAS2170
      HPPUMP = HPOUT/.85                                               SMAS2180
      IF(HPPUMP-7.)481,481,482                                         SMAS2190
  481 WPUMP = 2.                                                       SMAS2200
      GO TO 483                                                        SMAS2210
  482 WPUMP = (HPPUMP-7.)*.38 +2.                                      SMAS2220
C  XCAR  CHARACTERISTIC DIMENTION TURBINE DIAMETER                     SMAS2230
  483 XCAR   = 3.625                                                   SMAS2240
      TURWT=3.7+.57*(HPPUMP-7.)                                        SMAS2250
      IF(HPPUMP.LT.7.) TURWT=3.7                                       SMAS2260
      IF(HPPUMP-.65)484,484,485                                        SMAS2270
  484 TURVOL = 36.5                                                    SMAS2280
      GO TO 486                                                        SMAS2290
  485 TURVOL = 36.5 + 14.5*(HPPUMP-.65)                                SMAS2300
  486 SYSWT = 1.2*(TURWT + WPUMP)                                      SMAS2310
      GGW = SYSWT                                                      SMAS2320
      GGEW = 0.                                                        SMAS2330
      VOLX = TURVOL                                                    SMAS2340
  780 CONTINUE                                                         SMAS2350
      CALL EMBPAK                                                      SMAS2360
      IF(IND .NE. 0) GO TO 60                                          SMAS2370
      SUSMLT = SMLT + XEMB                                             SMAS2380
      SUSMWT = SMWT + WEMB                                             SMAS2390
  702 IF(ISIZE .EQ. 1) GO TO 30                                        SMAS2400
      WTE= SUSWT-SUSMWT                                                SMAS2410
      XCYL = WTE/DELWT                                                 SMAS2420
      SUSLT =XCYL + SUSMLT                                             SMAS2430
      GO TO 31                                                         SMAS2440
   30 XCYL = SUSLT- SUSMLT                                             SMAS2450
      SUSWT =XCYL*DELWT + SUSMWT                                       SMAS2460
   31 IF(XCYL .LT. 0) GO TO 25                                         SMAS2470
      FUSABL = WCPT + XCYL*DELF*EEXP                                   SMAS2480
      IF(KEM.NE.1) GO TO 51                                            SMAS2490
      IF (ABS(XEOLD/XEMB -1.).LE. .001) GO TO 51                       SMAS2500
      XEOLD = XEMB                                                     SMAS2510
      IMIN = -1                                                        SMAS2520
      GO TO 52                                                         SMAS2530
   51 WT(1)= SWTFS*0.25                                                SMAS2540
      WT(6)= DELEXI*SUSLT                                              SMAS2550
      TEC  = DELF*XCYL*(1.-EEXP)                                       SMAS2560
      TRAPE = TEC+TEC                                                  SMAS2570
      XIISUS = 0.C                                                     SMAS2580
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      XTIMT = 0.0                                                          SMAS2590
      IF(III(11).EQ.0) GO TO 301                                           SMAS2600
C     ITEM  1   FITTINGS                                                   SMAS2610
      XII(1) = 0.0                                                         SMAS2620
      ZW(1)= C.0                                                           SMAS2630
       Z(1)=0.                                                             SMAS2640
C     ITEM  2   FWD DOME                                                   SMAS2650
      CALL ZELPLL(EDR,RHO,R,0.0,STKFS,0.0,1,XII(2),Z(2),ZW(2))             SMAS2660
      WT(2)= SWTFS/2.                                                      SMAS2670
C     ITEM  3   FWD BLADDER                                                SMAS2680
      RB= R-TBLAD                                                          SMAS2690
      X1= SMLT/2                                                           SMAS2700
      H= X1-TBLAD-STKFS                                                    SMAS2710
      EB =RB/H                                                             SMAS2720
      WT(3)=BLADD/2.                                                       SMAS2730
      CALL ZELPLL(EB,RHOB,RB,0.0,TBLAD, 0.0 ,1,XII(3),Z(3),ZW(3))          SMAS2740
C     ITEM  4   FWD STIFFNER                                               SMAS2750
      WT(4)=WCSTR/2.                                                       SMAS2760
      CALL ZCYLLL(.5,WT(4),R,0.0,  XII(4),Z(4),ZW(4))                      SMAS2770
C     ITEM  5   FWD SKIRT                                                  SMAS2780
      WT(5)=WTATH/2.                                                       SMAS2790
      CALL ZCYLLL(X1,WT(5),R,0.0,XII(5),Z(5),ZW(5))                        SMAS2800
C     ITEM  6   EXTERNAL INSULATION                                        SMAS2810
      D2=D3/2.                                                             SMAS2820
      CALL ZCYLLL(SMLT,EXINWT,D2,0.0,XII(6),Z(6),ZW(6))                    SMAS2830
C     ITEM  7   SIDEWALL CASE                                              SMAS2840
      WT(7) = DELTK*XCYL                                                   SMAS2850
      CALL ZCYLLL(XCYL,WT(7),R,X1,XII(7),Z(7),ZW(7))                       SMAS2860
C     ITEM  8   SIDEWALL BLADDER                                           SMAS2870
      WT(8) = DELB *XCYL                                                   SMAS2880
      CALL  ZCYLLL(XCYL,WT(8),RB,X1,XII(8),Z(8),ZW(8))                     SMAS2890
      X2= X1+XCYL                                                          SMAS2900
C     ITEM  9  AFT SKT                                                     SMAS2910
      WT(9) = WT(5)+XFMB*(DELTK-WTLINE)                                    SMAS2920
      X3=X1+XFMB                                                           SMAS2930
      CALL ZCYLLL(X3,WT(9),R,X2,XII(9),Z(9),ZW(9))                         SMAS2940
C     ITEM 10  AFT STIFFNER                                                SMAS2950
      WT(10)= WT(4)                                                        SMAS2960
      CALL ZCYLLL(.5,WT(10),R,SUSMLT,XII(10),Z(10),ZW(10))                 SMAS2970
C     ITEM 11  AFT DOME                                                    SMAS2980
      WT(11) = WT(2)                                                       SMAS2990
      CALL ZELPLL(EDR,RHO,R,0.0,STKFS,X2,0,XII(11),Z(11),ZW(11))           SMAS3000
C     ITEM 12  AFT BLADDER                                                 SMAS3010
      WT(12) = WT(3)                                                       SMAS3020
      CALL ZELPLL(EB,RHOB,RB,0.,TBLAD,X2,0,XII(12),Z(12),ZW(12) )          SMAS3030
C     ITEM 13  FWD PROPELLANT                                              SMAS3040
      WT(13) = (WCPT + TFD)/2.                                             SMAS3050
      CALL ZELPSS(EDR,FDAJ,RB,C.0,0.0,1,XII(13),Z(13),ZW(13))              SMAS3060
C     ITEM 14  CYL PROPELLANT                                              SMAS3070
      WT(14) =DELF*XCYL                                                    SMAS3080
      CALL ZCYLHH(XCYL,WT(14),RB,0.0,X1,XII(14),Z(14),ZW(14))              SMAS3090
C     ITEM 15  AFT PROPELLANT                                              SMAS3100
      WT(15) =WT(13)                                                       SMAS3110
      CALL ZELPSS(EDR,FDAJ,RB,0.0,X2,0,XII(15),Z(15),ZW(15))               SMAS3120
C     TRAPPED PROPELLANT                                                   SMAS3130
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      CALL ZCYLLL(XCYL,TRAPF,RB,X1,XITP,ZTP,ZWTP)                        SMAS3140
      WTT=0.0                                                           SMAS3150
      ZTT=0.0                                                           SMAS3160
      XITOT=0.0                                                         SMAS3170
      XMOV =0.0                                                         SMAS3180
      XITOE=0.0                                                         SMAS3190
      XMOE = 0.0                                                        SMAS3200
      DO 310 I=1,12                                                     SMAS3210
      WTT=WTT+WT(I)                                                     SMAS3220
  310 ZTT=ZTT+ZW(I)                                                     SMAS3230
      ZEMTY=(ZTT+ZWTP)/(WTT+TRAPF)                                      SMAS3240
      DO 311 I=13,15                                                    SMAS3250
      WTT=WTT+WT(I)                                                     SMAS3260
  311 ZTT=ZTT+ZW(I)                                                     SMAS3270
      ZSUS=  ZTT/WTT                                                    SMAS3280
      DO 312 I=1,12                                                     SMAS3290
      XITOT = XITOT+XII(I)                                              SMAS3300
      XMOV= XMOV+ (ZSUS-Z(I))**2*WT(I)                                  SMAS3310
  312 XMOE= XMOE+ (ZEMTY-Z(I))**2*WT(I)                                 SMAS3320
      XIIMT = XITOT+XMOE+XITP+(ZEMTY-ZTP)**2*TRAPF                      SMAS3330
      DO 313 I=13,15                                                    SMAS3340
      XITOT = XITOT + XII(I)                                            SMAS3350
  313 XMOV= XMOV+ (ZSUS-Z(I))**2*WT(I)                                  SMAS3360
      XIISUS = XITOT +XMOV                                              SMAS3370
  301 BLADWT= DELB*XCYL+ BLADD                                          SMAS3380
      EXINWT= DELEXI*XCYL + EXMINW                                      SMAS3390
      VTANK=VOLT *XCYL +VFMN                                            SMAS3400
      GROFUL = VTANK*FDAJ                                               SMAS3410
      WINRT= SUSWT -GROFUL                                              SMAS3420
      SFMB = SHELL* XFMB                                                SMAS3430
      TKWT = DELTK*XCYL +SWTFS                                          SMAS3440
      TKLT = XCYL + SMLT                                                SMAS3450
      WTANK = SKTWT+FITNGS+TKWT+BLADWT+WFMB                             SMAS3460
      VEXIN=EXINWT/RHOX                                                 SMAS3470
      VREQX=VREQ                                                        SMAS3480
      GGWX=GGW                                                          SMAS3490
      WTFUEL=FUSABL+TRAPF                                               SMAS3500
      KFMX=KFM                                                          SMAS3510
      MATTKX=MATTK                                                      SMAS3520
    6 FORMAT(                                                           SMAS3530
     X10X,20HMOM OF INERTIA FULL ,F10.0 ,2X,19HC.G. FULL          ,F9.3/SMAS3540
     X10X,20HMOM OF INERTIA EMTY ,F10.0 ,2X,19HC.G. EMPTY         ,F9.3)SMAS3550
      IF ( II(15) .EQ. 0 ) RETURN                                       SMAS3560
      WRITE (6,4)                                                       SMAS3570
    4 FORMAT (   ///25X26HRAMJET FUEL SYSTEM SUMMARY//)                 SMAS3580
      IF(II(11).GT. 0)                                                  SMAS3590
     1WRITE(6,6) XIISUS, ZSUS,XIIMT,ZEMTY                               SMAS3600
      WRITE(6,300)IB                                                    SMAS3610
  300 FORMAT(10X,10HMATERIAL   ,3A4/)                                   SMAS3620
      WRITE(6,5) SUSWT,SUSLT,SUSMWT,SUSMLT,D3,TKLT,WFMB,XFMB,GGW,WFC,   SMAS3630
     1SFMB,GGFW,WINRT,TKWT,RHO,STKFC,SKTWT,BLADWT,FITNGS,EXINWT,VTANK,  SMAS3640
     2FDAJ,FUSABL,TRAPF,EXIN,TBLAD                                      SMAS3650
    5 FORMAT(                                                           SMAS3660
     X10X,20HSYSTEM TOTAL WEIGHT ,F10.2,2X,19HSYSTEM TOTAL LENGTH,F9.3/ SMAS3670
     X10X,20HMINIMUM SUS WEIGHT  ,F10.2,2X,19HMINIMUM SUS LENGTH ,F9.2/ SMAS3680
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     X10X,20HDIAMETER             ,F10.2,2X,19HTANK LENGTH        ,F9.2/ SMAS3690
     X10X,20HFUEL MGMT BAY WEIGHT,F10.2,2X,19HFUEL MGMT BAY LENTH,F9.3/ SMAS3700
     X10X,20HEXPULSION SYS WEIGHT,F10.2,2X,19HFUEL CONTROL WEIGHT,F9.2/ SMAS3710
     X10X,20HFMB SHELL WT         ,F10.2,2X,19HPRESSURANT WEIGHT   F9.2//SMAS3720
     X10X,20HSYS TOTAL INERT WT   ,F10.2,2X,19HBARE TANK WEIGHT   ,F9.2/ SMAS3730
     X10X,20HCASE MATL DENSITY    ,F10.4,2X,19HCASE THICKNESS     ,F9.3/ SMAS3740
     X10X,20HSKIRTS AND STENERS   ,F10.2,2X,19HBLADDER WEIGHT     ,F9.2/ SMAS3750
     X10X,20HFITTINGS             ,F10.2,2X,19HEXTERN INS WT,TANK ,F9.2//SMAS3760
     X10X,20HFUEL TANK VOLUME     ,F10.2,2X,19HFUEL ADJUSTED DENS ,F9.5/ SMAS3770
     X10X,20HUSABLE FUEL          ,F10.2,2X,19HUNUSABLE FUEL      ,F9.2//SMAS3780
     X10X,20HEXT INSUL THICKNESS ,F10.3,2X,19HBLADDER THICKNESS   ,F9.3) SMAS3790
      RETURN                                                             SMAS3800
   25 IF ( II(15) .EQ. 0 )    RETURN                                     SMAS3810
      WRITE (6,36) MATTK, MATPB                                          SMAS3820
   36 FORMAT(' ERROR IN SUBROUTINE MATLS ' ,5I2)                         SMAS3830
      RETURN                                                             SMAS3840
   38 IF ( II(15) .EQ. 0 )    RETURN                                     SMAS3850
      WRITE (6,39) HP                                                    SMAS3860
   39 FORMAT(2X,42HERROR TRYING TO OBTAIN ATITUDE DATA,ALT = ,F8.1)      SMAS3870
      RETURN                                                             SMAS3880
   48 IF ( II(15) .EQ. 0 )    RETURN                                     SMAS3890
      WRITE (6,49)                                                       SMAS3900
   49 FORMAT(44H ERROR TRYING TO CONVERGE ON N2 BOTTLE SIZE )            SMAS3910
      GO TO 37                                                           SMAS3920
   60 IF ( II(15) .EQ. 0 )    RETURN                                     SMAS3930
      WRITE (6,61)                                                       SMAS3940
   61 FORMAT(16H ERROR IN SUSMAS  //)                                    SMAS3950
      GO TO 37                                                           SMAS3960
   25 IF ( II(15) .EQ. 0 )    RETURN                                     SMAS3970
      WRITE (6,26)                                                       SMAS3980
   26 FORMAT(2X,51HERROR TANK LENGTH LESS THAN FMB + ELIPTICAL ENDS +1 )SMAS3990
      IND = 1                                                            SMAS4000
   37 IF ( II(15) .EQ. 0 )    RETURN                                     SMAS4010
      WRITE (6,27) TX                                                    SMAS4020
   27 FORMAT(8F15.6)                                                     SMAS4030
      RETURN                                                             SMAS4040
 2014 IF ( II(15) .EQ. 0 )    RETURN                                     SMAS4050
      WRITE (6,2015)  AMACH,ALPHAV                                       SMAS4060
 2015 FORMAT( /10X,34HFAILURE TRYING TO READ INLET MAP  /                SMAS4070
     110X, 7HAMACH = ,F10.5, 8H ALFI = ,F10.5 )                          SMAS4080
      WRITE (6,545) BOMB,IARI(MUM)                                       SMAS4090
  545 FORMAT (' 1ST IND VARIABLE=',E12.5,' 2ND IND VARIABLE= ',E12.5,' SSMAS4100
     1UPTABLE =',F10.3,' SUBTABLE SIZE =',F10.3/' THE VARIABLE OUT OF RASMAS4110
     2NGE IS THE ',A4,' INDEPENDENT VARIABLE'/)                          SMAS4120
      RETURN                                                             SMAS4130
      END                                                                SMAS4140


      SUBROUTINE XALPHA ( NDESPT )                                       XALF0010
C     PGM=NUK.CM-CGSM    RKM/GSM    FIV-EBCD    7/11/73                 XALF0020
C                                                                        XALF0030
C  TEMPORARY MODS. FOR PROPULSION CHECKOUT ARE DENOTED BY--------------XALF0040
C                                                                        XALF0050
      COMMON /FAILUR/ KFAIL                                              XALF0060
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      COMMON /SKINF/ CDSKNF(10), XLBDY, KMANY                          XALF0070
      COMMON /EXTERN/ AR5(5), AR15(15)                                 XALF0080
      COMMON /AERPRO/ CDDES(10), CLADES(10)                            XALF0090
      COMMON/BOAT/CDPBTL,DUM9(9),CDBOAT(10)                            XALF0100
      COMMON/CODEXX/ II(16)                                            XALF0110
      EQUIVALENCE ( II(15), IPRIX )                                    XALF0120
      EQUIVALENCE ( II(13), IEX )                                      XALF0130
      COMMON/EXXRJ/ EX(48)                                             XALF0140
      EQUIVALENCE ( EX(28), XRJ )                                      XALF0150
      COMMON/ALFBLK/ AMACH, A, ALT, GAMRAD, ACCN, ACCT, CDO, Q, SREF,  XALF0160
     1  ACWT, ALPHA, CENREQ, REG, CLALFD                               XALF0170
      COMMON /INDATA/ CDINL,XX,YY                                      XALF0180
      COMMON /BJDAT/ XNZZ(7), BOSTLT, BOSTPR                           XALF0190
      COMMON /SUSDAT/ TX(44)                                           XALF0200
      EQUIVALENCE ( TX(33), SUSLT  )                                   XALF0210
      EQUIVALENCE ( AR5(1), PLLT  )                                    XALF0220
      NAMELIST/XALPH1/ACCN1,ACCT1,ACWT, AEROPT, ALPHD, ALPHD1, ALT1,   XALF0230
     1AMACH1,CDO, CDI, CL, CL1, DGDTDA, GAMDEG, GDT, GDT1, GDTSTR,     XALF0240
     2GTEST, Q, SREF, TGUESS, TTEST, V, VDOT, XL, XL1, DIND, CENREQ,   XALF0250
     3CENTGS                                                           XALF0260
      DATA DEG/57.29578/                                               XALF0270
C  STATEMENT FUNCTION IS SUBSTITUTED FOR FUNCTION SUBPROGRAM           XALF0280
      CTLU( AMACH, ALFDEG, NARG)= CLALFD*ALFDEG                        XALF0290
C                                                                      XALF0300
      AMACH1=AMACH                                                     XALF0310
      ALT1=ALT                                                         XALF0320
      XLTOT = BOSTLT + SUSLT + PLLT                                    XALF0330
      IF(IEX.EQ.1) XLTOT=SUSLT+PLLT+XRJ                                XALF0340
      AR15(1) = XLTOT                                                  XALF0350
      ACCN1=ACCN                                                       XALF0360
      ACCT1=ACCT                                                       XALF0370
      CDI=0.                                                           XALF0380
      DIND=0.                                                          XALF0390
      TTEST=0.                                                         XALF0400
      CENREQ=0.                                                        XALF0410
      CENTGS=0.                                                        XALF0420
      G=32.17405                                                       XALF0430
      R=ALT + 20.89956E6                                               XALF0440
      QS=Q*SREF                                                        XALF0450
      V=AMACH*A                                                        XALF0460
      GDTSTR=ACCN*G/V                                                  XALF0470
      VDOT = ACCT * G                                                  XALF0480
      AM   = ACWT / G                                                  XALF0490
      AIMV = 1. / ( AM * V )                                           XALF0500
C                                                                      XALF0510
C                                                                      XALF0520
C     REMOVE KLINE AND DKLINE                                          XALF0530
      CDO = CDDES(NDESPT)                                              XALF0540
      CDO=CDO-CDBOAT(NDESPT)+CDPBTL                                    XALF0550
      CLALFD = CLADES(NDESPT)                                          XALF0560
      NPM = 1                                                          XALF0570
      CALL INLIFT ( NPM, CLAINL, CDBON  )                              XALF0580
      CLALFD = CLALFD + CLAINL                                         XALF0590
      CDFR =  CDSKNF(NDESPT) *  XLTOT / XLBDY                          XALF0600
      CDO = CDO + CDINL + CDBON + CDFR - CDSKNF(NDESPT )               XALF0610
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      GPAR=L./V*((V**2/R)-G)*COS(GAMRAD)                                  XALF0620
      TPAR = AM * (VDOT + G*SIN(GAMRAD)) + QS * CDO                      XALF0630
      GAMDEG=GAMRAD*DEG                                                  XALF0640
      TGUESS=TPAR                                                        XALF0650
      ALPHA=0.                                                           XALF0660
C                                                                        XALF0670
C  LOOP 600 ITERATES ON REQUIRED CFN                                     XALF0680
      DO 600 I=1,10                                                      XALF0690
C                                                                        XALF0700
C  LOOP 100 ITERATES ON ANGLE OF ATTACK                                  XALF0710
      DO 100 J=1,10                                                      XALF0720
      CL=DTLU(AMACH,ALPHA*DEG,4)                                         XALF0730
      XL=CL*QS                                                           XALF0740
      GDT=AIMV*(TGUESS*SIN(ALPHA)+XL)+GPAR                               XALF0750
      GDTEST=ABS(GDT-GDTSTR)                                             XALF0760
      GTEST=GDTEST*V/G                                                   XALF0770
C  TESTS INPUT NORMAL ACCELERATION AGAINST NORMAL ACCELERATION           XALF0780
C  CALCULATED FROM THE GAMMA DOT OBTAINED BY ITERATING                   XALF0790
C  THE ANGLE OF ATTACK                                                   XALF0800
      IF (GTEST .LE. 1.E-4) GO TO 300                                    XALF0810
C                                                                        XALF0820
C  NEWTON-RAPHSON ITERATION OF ANGLE OF ATTACK FOR GAMMA DOT             XALF0830
      DALPHA=0.001                                                       XALF0840
      ALPHA1=ALPHA + DALPHA                                              XALF0850
      CL1=DTLU(AMACH,ALPHA1*DEG,4)                                       XALF0860
      XL1=CL1*QS                                                         XALF0870
      GDT1=AIMV*(TGUESS*SIN(ALPHA1)+XL1)+GPAR                            XALF0880
      DGDTDA=(GDT1-GDT)/DALPHA                                           XALF0890
      ALPHA=ALPHA+(GDTSTR-GDT)/DGDTDA                                    XALF0900
      ALPHD=ALPHA*DEG                                                    XALF0910
      ALPHD1=ALPHA1*DEG                                                  XALF0920
  100 CONTINUE                                                           XALF0930
      IF(IPRIX.GT.0) WRITE(6,XALPH1)                                     XALF0940
      IF(IPRIX.GT.0) WRITE(6,200)                                        XALF0950
  200 FORMAT(//'SUBROUTINE XALPHA ITERATION FOR ANGLE OF ATTACK FAILED')XALF0960
      GO TO 777                                                          XALF0970
C                                                                        XALF0980
  300 CONTINUE                                                           XALF0990
C  INDUCED DRAG COEFFICIENT = CL * TAN(ALPHA)                            XALF1000
  400 CDI=CL*TAN(ALPHA)                                                  XALF1010
  500 DIND=CDI*QS                                                        XALF1020
      T=(1./COS(ALPHA))*(TPAR+DIND)                                      XALF1030
      CFNREQ=T/QS                                                        XALF1040
      CFNTGS=TGUESS/QS                                                   XALF1050
      TTEST=ABS(CFNREQ-CFNTGS)                                           XALF1060
C                                                                        XALF1070
C  TESTS FOR CONVERGENCE OF CFN REQUIRED                                 XALF1080
      IF (TTEST.LE. 1.E-5) GO TO 800                                     XALF1090
      TGUESS=T                                                           XALF1100
  600 CONTINUE                                                           XALF1110
      IF(IPRIX.GT.0) WRITE(6,XALPH1)                                     XALF1120
      IF(IPRIX.GT.0) WRITE(6,700)                                        XALF1130
  700 FORMAT(//'SUBROUTINE XALPHA ITERATION FOR CFN REQUIRED FAILED')    XALF1140
  777 KFAIL = 13                                                         XALF1150
      RETURN                                                             XALF1160
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  800 CONTINUE                                                          XALF1170
      IF (  IPRIX .GT. 1 ) WRITE(6,XALPH1)                              XALF1180
      RETURN                                                            XALF1190
      END                                                               XALF1200


      SUBROUTINE ADM(KFAIL,KSTEP)                                       ADM 0010
C     COMPUTE AERO TABLES                                               ADM 0020
C     TABLE 1 FOR BOOSTER ON + INLETS FAIRED                            ADM 0030
C     TABLE 2 FOR RAMJET ON  + INLETS OPEN                              ADM 0040
      COMMON /PERF/PE7(7),NLPHA7,P502(502),NAERO(20),IPTYPE(20),P(120)  ADM 0050
      KFAIL = 0                                                         ADM 0060
  101 CONTINUE                                                          ADM 0070
  910 CONTINUE                                                          ADM 0080
      CALL AERMOD(KFAIL,KSTEP)                                          ADM 0090
      RETURN                                                            ADM 0100
      END                                                               ADM 0110


      SUBROUTINE AERMOD ( KFAIL, KSTEP )                                AERM0010
C     PGM=NUK.CMCGSM     GGJ/RKM     FIV/EBCD     9/10/73               AERM0020
      DOUBLE PRECISION CVV, CVVT, CVVW                                  AERM0030
      DOUBLE PRECISION Q, Q1, Q2, A1, A2, ZZT                           AERM0040
      COMMON/AERO/                                                      AERM0050
     1   ATNS4T   ,ATNS4W   ,BTANA    ,BART     ,BARW     ,BAPT     ,   AERM0060
     2   BAPW     ,BAPPT    ,BAPPW    ,BETA     ,BFN      ,CFT      ,   AERM0070
     3   CFW      ,CDB      ,CFB      ,CNANAC   ,CLABT    ,CLAT     ,   AERM0080
     4   CLAW     ,CLTV     ,CKWB     ,CKBW     ,CKBT     ,CKTB     ,   AERM0090
     5   CLATWV   ,D        ,DD       ,DD2      ,DPR      ,DHL      ,   AERM0100
     6   FAFN     ,F        ,FL       ,FR       ,PI       ,RLD      ,   AERM0110
     7   RLDB     ,RBTANA   ,SLETR    ,SLEWR    ,STSREF   ,SWSREF   ,   AERM0120
     8   SKBT     ,SKTB     ,SKBW     ,SKWB     ,TRTP1    ,TRWP1    ,   AERM0130
     9   CFI      ,TANST    ,TANSW    ,TANS4T   ,TANS4W   ,TANS2T   ,   AERM0140
     A   TANS2W   ,XD1B     ,XD1BT    ,XD1T     ,XD1W     ,XNLCMB   ,   AERM0150
     B   XNLCDB   ,ACT      ,ACW      ,XNLCLB   ,BODYL    ,TAILL    ,   AERM0160
     C   WINGL    ,RL1SQR   ,D1SQR    ,FR1      ,FCAP     ,CDPNX    ,   AERM0170
     D   ACAP     ,TN1      ,SPN      ,VPN      ,FAFN1    ,PMN      ,   AERM0180
     E   ANOSE2   ,SWSBN    ,RNOSE2   ,XLINF    ,CR2      ,NCON(3)  ,   AERM0190
     F   CREMAX   ,CRAMAX   ,B2       ,CNVR     ,BI       ,BZ       ,   AERM0200
     G   SV2      ,SLFI     ,SLFZ     ,XVA      ,XVB      ,XVC      ,   AERM0210
     H   CT2      ,CX       ,VOLN     ,VOLBT    ,VOLBOD   ,SWBREF   ,   AERM0220
     I   BRAT     ,ROG                                                  AERM0230
      COMMON/AER2/ CDOB,CDOW,CDOT,CDOON,CDOOFF,CDBON,CDBOFF,CDOI ,ITRIP,AERM0240
     1FRBT,FPB,NAERDX(30)                                               AERM0250
      COMMON /ARINDX/ JJRUN,KKRUN,ARIN(8)                               AERM0260
      COMMON /FIX/ CVV,PM,ALPHAD,ALT                                    AERM0270
      COMMON /FIXUP/ DA,DD12,FIX8(8)                                    AERM0280
      COMMON /SAVTIM/ DSUM6(6)                                          AERM0290
      COMMON /SUMLIF/ DSUM42(420)                                       AERM0300
      COMMON /SUMOUT/ DSUM56(560)                                       AERM0310
      COMMON /TWU/ GPDEG,ALPTRM,CLATRM,DELTRM                           AERM0320
      COMMON /TWX/ RHLTW,VCHAV,VCHDV,CHV1,DYNP,ALINW,CNIAW,WMISX        AERM0330
      COMMON /TWY/ CHAW,CHDW,CNDW,CNDT,CHAT,CHDT,CLP,CLRD,CMD,CMAB,     AERM0340
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     1      CMAT,CMAW,CMADOT,CMDOT                                                  AERM0350
      COMMON /WIV/ SWING,CNA,SWX,STS,SLEW,SLET,D6,SEWFT,SETFT                       AERM0360
      COMMON /AFTAR/ ARVT,TRVT,BVT,RCVT,TCVT,TANSVT                                 AERM0370
     1   , STEVT, GGMIS(7)                                                          AERM0380
      COMMON /BASVAR/ LWOPT, ZXZ19(19)                                              AERM0390
      COMMON/BLKQ/ Q1(20), Q(96), Q2(96),          FRCTN1(42), FRCTN2(90)AERM0400
     1 ,FRCTN3(42)                                                                  AERM0410
      COMMON /BYAIR/ ZR7F,XZML1(20),XZML2(20),SMUK(60),                             AERM0420
     1              COEFL(20),COEFQ(20),CLUK(60),                                  AERM0430
     2              XZMD1(20),XZMD2(20),DMUK(60),                                  AERM0440
     3              COEFD(20,5),COEFDF(20,5),CDOK(20,5,3)                          AERM0450
      COMMON /CODEXX/ KIND, IIKIN(15)                                               AERM0460
      COMMON/DRG/                                                                   AERM0470
     1   D1        ,THETAC    ,FINF      ,RS        ,R1        ,RL1       ,       AERM0480
     2   XCYL      ,XTHEBT    ,XBT       ,RL3       ,ITN       ,AMACW     ,       AERM0490
     3   AMACT     ,THKRT     ,THKRW     ,RL1A      ,IBTL      ,ATCT      ,       AERM0500
     4   ATCW      ,OML       ,ITSECT    ,IWSECT    ,RXINT     ,RXINW     ,       AERM0510
     5   BTANST    ,BTANSW    ,RCW       ,FLTSEW    ,XLENW     ,FLTSET    ,       AERM0520
     6   XLENT     ,QRATIO    ,DN        ,DE        ,D3        ,RCT       ,       AERM0530
     7   NW        ,TCW       ,TCT       ,BT        ,BW        ,ART       ,       AERM0540
     8   ARW       ,TRT       ,TRW       ,SREF      ,DB                           AERM0550
      COMMON /EXTERN/ ZARZ(20)                                                      AERM0560
      COMMON /FORNOW/ NRM, NALT, RMV, ALTV, FRBIX, FACTOR                           AERM0570
      COMMON/LFT/                                                                   AERM0580
     1   ATNS2T    ,ATNS2W    ,SEW       ,SET       ,DMW       ,DMT       ,       AERM0590
     2   RL4       ,RL5       ,ALPHAR    ,RITWV     ,IART      ,ICNTRL    ,       AERM0600
     3   D2      ,RL2                                                              AERM0610
      COMMON /NAERC/ TNOZL,STE,STET,TRAT,SWE,TRAW,DCASE,DECD,ARL6,                  AERM0620
     1    AL5X,XMSX, STEW,XSTA,FSOVCW,FSOVCT, WMISS,SMRL,SMRH, WWING,              AERM0630
     2     IZUMP,IPLUML,NCGUML, THNGL,TNZZL,TLTHEO                                AERM0640
      COMMON /PRINTR/ IKP3(3), IAIR, JKP3(3)                                        AERM0650
      COMMON/ROLL/ RNW,RNT,IARW,BWH,BTH                                             AERM0660
      COMMON /SUREX/ SUR17(17), SVT, SUR7(7)                                        AERM0670
      COMMON /TOVPER/ DUM555(5), SEXITZ,DUM666(66)                                  AERM0680
      COMMON /UPINLT/ PRAMBL(128), XCPI , XCXCGD                                    AERM0690
      COMMON/VERT/ SVTSRF,   BARVT,   TANOVT,   TAN2VT,   TAN4VT,                   AERM0700
     1     ACVT,   ATN2VT,   ATCVT,   AMACVT,   TMACVT,   BTANVT,                 AERM0710
     2    BDCVT,   TRTPV1,  BAPPVT,    BAPVT,   FLVTST,    XLENVT,                AERM0720
     3   CEVT, TRAVT, RXINVT, FSOVVT                                              AERM0730
      COMMON/WLOC/ XD11                                                             AERM0740
      COMMON /XINERT/ ZZX26(45), PANWW, XXZ71(71)  , PANWT, XXZ14(14)               AERM0750
      COMMON /XXXXX/ CLALPB, SREFB                                                  AERM0760
      COMMON/XYZ/CMA,XD1,CMQ                                                        AERM0770
      DIMENSION COEFM(20), COEFX(20)                                                AERM0780
      DIMENSION RMV(20), ALTV(10), ALPHAV(10), NAERO(30)                            AERM0790
      EQUIVALENCE(XMO,RM),(RL6,XLDEGE),(HTOT,BINW),(RNI,RNLDEG),                   AERM0800
     1(AV,XLDIV),(HBLD,HBLDIV),(SDIV,ABLDIV)                                       AERM0810
      EQUIVALENCE (RL3,XLM)                                                         AERM0820
      EQUIVALENCE(DMN,XMF),(AV,XLDIV)                                               AERM0830
    1 FORMAT(//I3, 2X, A6, 6(2H, ,A6, 2H =, E10.3))                                 AERM0840
 1840 FORMAT(1H , 15X,106H T H I S   A N A L Y S I S   I S   L I M I T EAERM0850
     1 D   T O   T H E   F O L L O W I N G   C O N D I T I O N S -/ )               AERM0860
 1841 FORMAT(39X, 47H1.  MACH. NUMBERS 0 TO 0.9, 1.0, AND 1.2 TO 10. )            AERM0870
 1842 FORMAT(39X, 55H2.  ANGLES OF ATTACK LESS THAN OR EQUAL TO 30.0 DEGAERM0880
     1REES )                                                                      AERM0890
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1843 FORMAT(39X, 61H3.  SURFACE LEADING EDGE SWEEPS BETWEEN  0.0 AND 62AERM0900
    1.5 DEGREES )                                                      AERM0910
1844 FORMAT(39X, 54H4.  SURFACE THICKNESS RATIOS LESS THAN OR EQUAL TO AERM0920
    10.1 )                                                             AERM0930
1944 FORMAT(39X, 38H5.  ALTITUDE LIMITED TO 0 TO 100 K FT./)           AERM0940
1845 FORMAT(      10X, 42HC O N F I G U - A T I O N    O P T I O N S,  AERM0950
    1 10X, 13HOPTION CHOSEN/                                           AERM0960
    2 16X, 23HTYPE OF NOSE     (ITN), 25X, 6HITN = , I1/               AERM0970
    3 19X, 22H1 = THREE-FORTHS POWER/19X, 13H2 = L-O HAACK/            AERM0980
    4 19X, 8H3 = CONE/19X, 13H4 = L-V HAACK/                           AERM0990
    5 19X, 17H5 = TANGENT OGIVE  / 19X, 13H6 = SPHERICAL,              AERM1000
    6  / 19X, 16H7 = BLUNTED CONE,  /  19X, 17H8 = BLUNTED OGIVE)     AERM1010
1846 FORMAT(16X, 24HLUG  CONDITION     (ILUG), 23X, 7HILUG = , I1/     AERM1020
    1 19X, 18H0 = LUGS RETRACTED/19X, 17H1 = LUGS STANDING  )          AERM1030
1847 FORMAT(16X, 29HTYPE  OF  BOAT-TAIL     (IBTL), 18X, 7HIBTL = , I1/ AERM1040
    1 19X, 13H1 = PARABOLIC/19X, 8H2 = CONE/19X, 8H3 = NONE  )         AERM1050
1848 FORMAT(16X, 32HWING OR CANARD CONDITION     (NW), 17X, 5HNW = , I1/AERM1060
    1 19X, 21H0 = NO WING OR CANARD/19X, 18H1 = WING OR CANARD)        AERM1070
1849 FORMAT(16X, 30HCONTROL  CONDITION     (ICNTRL), 15X, 9HICNTRL = ,  AERM1080
    1 I1/ 19X, 16H1 = TAIL CONTROL/19X, 16H2 = WING CONTROL/           AERM1090
    2 19X, 18H3 = CANARD CONTROL)                                      AERM1100
1851 FORMAT(16X, A4, 18H  ARRANGEMENT     (, A4, 1H), 20X, A4, 3H = ,  AERM1110
    1 I1 /19X, 25H2 = PLANAR OR + CRUCIFORM/19X,12H3 = TRI-FORM/19X,   AERM1120
    2 15H4 = X CRUCIFORM  )                                            AERM1130
1852 FORMAT(1H , 9X,105HC O N F I G U R A T I O N    D I M E N S I O N AERM1140
    1S    (ALL  LENGTHS  IN  INCHES,  ALL  ANGLES  IN  DEGREES)///10X, AERM1150
    2 5HB O D Y -//20X, 87HCYLINDER          INLET  FORWARD    BOAT-TAIAERM1160
    3L  FORWARD         BASE                    NOZZLE/20X,88HDIAMETER  AERM1170
    4     DIAMETER              DIAMETER              DIAMETER          DAERM1180
    5IAMETER//19X, 4HD1 =,  F6.2,10X, 4HD6 =,  F6.2,  10X 4HD2 =,  F6.2,AERM1190
    610X, 4HD3 =,  F6.2,  10X,4HDN =,  F6.2//)                         AERM1200
1853 FORMAT(57X, 14HTAIL  MOUNTING/59X, 8HDIAMETER//59X, 5HDMT =,      AERM1210
    1  F6.2//)                                                         AERM1220
1854 FORMAT(37X, 14HTAIL  MOUNTING, 26X, 14HWING  MOUNTING/            AERM1230
    1 40X, 8HDIAMETER, 32X, 8HDIAMETER//39X, 5HDMT =, F6.2, 29X,       AERM1240
    2 5HDMW =,  F6.2//)                                                AERM1250
1855 FORMAT(18X, 74HNOSE  LENGTH       INLET  FORWARD    BOAT-TAIL  FORAERM1260
    1WARD    OVERALL  LENGTH/20X, 67HSTATION              STATION       AERM1270
    2      STATION              STATION//18X, 5HRL1 =,  F7.2, 8X, 5HRL6 AERM1280
    3=,  F7.2, 8X, 5HRL2 =,  F7.2, 8X, 5HRL3 =,  F7.2//)              AERM1290
1856 FORMAT(55X, 19HTAIL  LEADING  EDGE/60X, 7HSTATION//58X, 5HRL4 =,  AERM1300
    1  F7.2///)                                                        AERM1310
1857 FORMAT(35X,19HTAIL  LEADING  EDGE, 14X, 31HWING  OR  CANARD  LEADIAERM1320
    *NG  EDGE/                                                         AERM1330
    1 40X, 7HSTATION, 33X, 7HSTATION//38X, 5HRL4 =,  F7.2, 28X, 5HRL5 =AERM1340
    2,  F7.2///)                                                       AERM1350
1858 FORMAT(10X,          A8//21X,4HROOT, 16X, 3HTIP, 14X, 10HEQUIVALENAERM1360
    1T, 10X, 9HNUMBER OF, 9X, 12HLEADING EDGE/20X, 5HCHORD, 15X,       AERM1370
    2 5HCHORD, 16X, 4HSPAN, 15X, 6HPANELS, 14X, 5HSWEEP//              AERM1380
    3 18X, 2HRC, A1, 2H =,  F6.2, 9X, 2HTC, A1, 2H =,  F6.2, 9X, 1HB,  AERM1390
    4 A1, 2H =,  F6.2,10X, 2HRN, A1, 2H =,  F6.2, 7X, 3HSLE, A1, 2H =, AERM1400
    5  F6.2//38X, 9HTHICKNESS, 29X, 13HPOINT OF MAX./40X, 5HRATIO, 33X,AERM1410
    6 9HTHICKNESS//36X, 4HTHKR, A1, 2H =,  F6.3, 27X, 4HRXIN, A1, 2H =,AERM1420
    7   F6.3//)                                                        AERM1430
1859 FORMAT(19X, 39H5 = HORIZONTAL AND VERTICAL STABILIZERS  )          AERM1440
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1860 FORMAT(      42H  L I N E A R     C O E F F I C I E N T S -////      AERM1450
     1            44H MACH. ANGLE OF  ZERO LIFT DRAG  ZERC LIFT D,       AERM1460
     2            44HRAG     TOTAL LIFT        CONTROL       LINEAR ,     AERM1470
     3            44HCENTER                                        /      AERM1480
     4            44H  NO.    ATTACK       POWER OFF         POWER ON,    AERM1490
     5            44H       CURVE SLOPE     EFFECTIVENESS     OF PRE,     AERM1500
     6            44HSSURE                                          ///    AERM1510
     7 F5.1, F8.2, 3X, A6, 2H =, F6.3, 2X, A6, 2H =, F6.3, 2X, A6,       AERM1520
     8 2H =, F6.3, 2X, A6, 2H =, F6.3, 2X, A6, 2H =, F5.2////////        AERM1530
     9            43H      T O T A L     C O E F F I C I E N T S -////   AERM1540
     A            44H MACH. ANGLE OF     TOTAL DRAG       TOTAL DRA,     AERM1550
     B            44HG            TOTAL          CONTROL          TRIM,  AERM1560
     C            44HMED            CONTROL       TOTAL CENTER      /    AERM1570
     D            44H  NO.    ATTACK       POWER OFF         POWER ON,    AERM1580
     E            44H              LIFT           LIFT              LIF,   AERM1590
     F            44HT             DEFLECTION       OF PRESSURE      //)  AERM1600
1861 FORMAT(F5.1, F8.2, 4X, 7HCDOFF =, F6.3, 4X, 6HCDON =, F6.3, 6X,      AERM1610
     1 4HCL =, F5.2, 4X, 3HDCL,  A1, 2H =, F5.2, 3X, 8HCLTRIM =, F6.2,    AERM1620
     2 6X, 1HC, A1, 2H =, F5.1, 4X, 8HTOTXD1 =, F6.2/)                    AERM1630
1875 FORMAT(1H ,18HA L T I T U D E = ,F7.0,3HKFT)                         AERM1640
1876 FORMAT(      16H MACH. NUMBER = , F4.2,  5X, 8HALPHA = , F5.2,       AERM1650
     1 5H DEG., 5X, 11HALTITUDE = , F4.1, 6H K FT., 10X,                  AERM1660
     2 38HL I N E A R     A E R O D Y N A M I C S)                        AERM1670
2950 FORMAT(13H  M A C H  = , F5.2, 2X, 7HSREF = , F7.2, 2X, 5HD1 = ,     AERM1680
     1 F5.2, 2X, 9HXCG/D1 = , F5.2,2X,5HWT = ,F5.0,1X,2HQ=,F7.0  ,2X,     AERM1690
     2 5HHL = ,F5.1,2X,6HSTAIL = ,F5.0,2X,8HSWING = ,F5.0/                AERM1700
     3 20X,9HALFMAX = ,F7.2,2X,8HCNMAX = ,F7.2                            AERM1710
     4                              /45H  L I N E A R     C O E F F I C  AERM1720
     5I E N T S  ---//44H  ALPHA   CDO OFF   CDO ON   CN ALPHA   CN D,     AERM1730
     6 79HELTA   XCP/D1   CMA BODY   CMA TAIL   CMA WING   CMA TOTAL      AERM1740
     7CMQ    CMDT   CMDW/                                                 AERM1750
     8 2X, F5.2, 2F9.3, F10.3, 2F11.3, F8.3,F11.3,F12.3,F11.3,5X,F7.0,    AERM1760
     9 2F7.3/10X,6HCMADOT,2X,6HCMDDOT,3X,3HC1P,2X,7HC1DELTA,              AERM1770
     A 4X,6HCHF/ALF,2X,6HCH/DEL,3X,5HDELTA,6X,3HCMO/                      AERM1780
     B 10X,F6.0,2X,F6.0,1X,F6.2,2X,F6.3,3X,F6.3,2X,F6.3,                  AERM1790
     C 4X,F6.3,5X,F6.3/)                                                  AERM1800
2852 FORMAT(F8.2,F10.3,F13.3,2F11.3,F10.3,F11.3,2F12.3,F9.3,F13.3,F11.3AERM1810
     1)                                                                   AERM1920
2953 FORMAT(16X,14HSKIN CONDITION/16X,22HAERODYNAMICALLY SMOOTH)          AERM1830
C                                                                         AERM1840
C                                                                         AERM1850
C                                                                         AERM1860
C*****NAMELIST INPUT DEFINITIONS                                          AERM1870
C                                                                         AERM1880
      NAMELIST/GEOMET/ D1, D2, D3, D6, DN,                                AERM1890
     1        RL1, RL2, RL3, RL4, RL5, RL6,                               AERM1900
     2 ITN, IBTL , ILUG, NW, J, ICNTRL, ESRK                             AERM1910
     3, ICDON, ICDOF, ICLTF, ICLTN, ICONP, DMAX, DDEL, IPLOT, WT, XIAW, INTYPE  AERM1920
     4, PNOSE, RL1A, ICONDU, BLC1, BLC2, BLC3, PHIG, HCD, WCD, NCD       AERM1930
      NAMELIST/TAIL/ DMT, RCT, TCT, BT, THKRT, RXINT, RNT, SLET, IART,    AERM1940
     1    RHLT,ITSECT,FSOVCT,STETI                                        AERM1950
      NAMELIST/WING/ DMW, RCW, TCW, BW, THKRW, RXINW, RNW, SLEW, IARW,    AERM1960
     1   RHLW,IWSECT,FSOVCW,STEWI,IEPW,THKREP,SLEE,HE                     AERM1970
      NAMELIST/MALPHA/NRM,RMV, NALPHA,ALPHAV, NALT,ALTV,RLCGV             AERM1980
      NAMELIST/INTWO/ RL6A,R7,RL7A,RL7B,RL9,RL10,BINW,DMN,HBLD,XLINE      AERM1990
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      NAMELIST/INCH/ A6, A7, A8, A9, AL4, AL5, RL6, RL7, RL8, RL9,        AERM2000
     1 IBTLC, DR, DL, DB, HLD, DMN, XMLV, XMS, AMFR                       AERM2010
     2 , R6, R7, R8, R9,PLV , DEPT                                        AERM2020
      NAMELIST/POD/ FNPOD,CSTRLT,TCSTRT,AEAB,BSTRUT,XCL,CLSTA,            AERM2030
     1 PODRAD,XLIP,PODCCG,PODTHE,PDLGTH,RLEPOD,THETAB,THETAC              AERM2040
       NAMELIST/INPUT/                                                    AERM2050
     1NAERO, BTH,RXINT, STE, STET, TRT, TRAT, BWH, RXINW, SWE, STET,      AERM2060
     1TRW, TRAW, DCASE, DEOD, DE, THNGL, TNOZL, ARL6, AL5X, XMSX, BRAT,   AERM2070
     2FINE, TLTHEO, STEW, RL4, RL5, FACTOR, RNT, RXINT, RNW, NRM, NALT,   AERM2080
     3ALTV, PANWT, PANWW,        RMV,XSTA,FRBT,FSOVCW,FSOVCT,XCGD1,WMISS  AERM2090
     1        ,SMRL,SMRH,WWING                                            AERM2100
      NAMELIST/WINLOC/ RMLO,XD11,XD1,WWING,WMISS,DCGDX,SMLC,SMRL,         AERM2110
     1CELXW,RL5,XLEW,XD2,XCGD1,SMHI,SMRH,DCPDX,RMHI,RM                    AERM2120
      NAMELIST/FORCES/ALPHAR,CL,DYNP,DI,DZERO,DTOT,VLIFT,ALD,AMLF         AERM2130
C                                                                         AERM2140
      DATA RTOD/ 0.01745329252 /                                          AERM2150
      POLY (X,C0,C1,C2,C3) = X * (X*(C3*X + C2) + C1) + C0                AERM2160
   50 CONTINUE                                                            AERM2170
C********SET CONFIGURATION CODE VALUES******                             AERM2180
      NAEROX(15) = IAIR                                                   AERM2190
      DO 9748 IA = 1, 30                                                  AERM2200
      NAERO(IA) = NAEROX(IA)                                              AERM2210
 9748 CONTINUE                                                            AERM2220
      J = NAERO(15)                                                       AERM2230
      IF ( NRM  .GT.  19  )  NRM = 19                                     AERM2240
      STEVTR = STEVT / 57.296                                             AERM2250
      RL5SAV = RL5                                                        AERM2260
      RL5 = RL5 * .01 * TLTHEO                                            AERM2270
      NTEN = 10                                                           AERM2280
      WMISS=ZARZ(5)                                                       AERM2290
      KINDR = MOD(KIND,NTEN)                                              AERM2300
C     FIX XCGD1                                                           AERM2310
      XCGD1 = 5.                                                          AERM2320
      TNZZL = TNOZL                                                       AERM2330
      PI = 3.141593                                                       AERM2340
      DE = SQRT (   576. * SEXITZ / PI )                                  AERM2350
      DEOD = DE                                                           AERM2360
      ITN = NAERO(1)                                                      AERM2370
      IPTL = NAERO(2)                                                     AERM2380
      ILUG = NAERO(3)                                                     AERM2390
      NW = NAERO(4)                                                       AERM2400
      ICNTRL = NAERO(5)                                                   AERM2410
      IART = NAERO(6)                                                     AERM2420
      IARW = NAERO(7)                                                     AERM2430
      ITSECT=NAERO(10)                                                    AERM2440
      IWSECT=NAERO(11)                                                    AERM2450
      IPLOT = NAERO(16)                                                   AERM2460
      NCGVAR = NAERO(30)                                                  AERM2470
C****** FAIL-SAFE CHECKS                                                  AERM2480
C                                                                         AERM2490
      IF(NAERO(10).EQ.3.AND.FSOVCW.EQ.0.)  FSOVCW = .7                    AERM2500
      IF(NAERO(11).EQ.3.AND.FSOVCT.EQ.0.)  FSOVCT = .7                    AERM2510
      IF(NAERO(11).LT.3) FSOVCT=0.0                                       AERM2520
      IF(NAERO(10).LT.3) FSOVCW=0.0                                       AERM2530
      IF(NAERO(10).EQ.0) NAERO(10) = 1                                    AERM2540
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      IF(NAERO(11).EQ.0) NAERO(11) = 1                                  AERM2550
      RNW = 2.                                                          AERM2560
      IF(IARW.EQ.4) RNW=4.0                                             AERM2570
      PI=3.14159                                                        AERM2580
      DPR = 57.29578                                                    AERM2590
C*********BODY GEOMETRY**********                                       AERM2600
      D1 = DCASE                                                        AERM2610
      RLN = FINE                                                        AERM2620
      RL1 = RLN*D1                                                      AERM2630
      RL2 = TLTHEO                                                      AERM2640
      RL3 = TLTHEO                                                      AERM2650
      D2 = DCASE                                                        AERM2660
      D3 = DCASE                                                        AERM2670
      DLF = DCASE                                                       AERM2680
      DTF = DCASE                                                       AERM2690
      THNGL = TLTHEO -1. -.5 * RCT                                      AERM2700
      RL4 = TLTHEO -1. - RCT                                            AERM2710
      XSTA = TLTHEO -1. - RCVT                                          AERM2720
      RHLT = THNGL                                                      AERM2730
      R1=0.5*D1                                                         AERM2740
      R1SQ=R1*R1                                                        AERM2750
      RS=R1*PRAT                                                        AERM2760
      THETAC=ATAN(1./(FINE + FINE))                                     AERM2770
      CONANG=THETAC*DPR                                                 AERM2780
      TN=CONANG                                                         AERM2790
      SREF = ZAR7(12) * 144.                                            AERM2800
      ANUM = 4.                                                         AERM2810
      IF(IART.EQ.3) ANUM = 3.                                           AERM2820
      XWTV = PANWT/ANUM                                                 AERM2830
      BNUM = 4.                                                         AERM2840
      IF(IARW.EQ.3) BNUM = 3.                                           AERM2850
      IF(NW.EQ.2) BNUM = 2.                                             AERM2860
      XWTW = PANWW/BNUM                                                 AERM2870
      THKRT = TRAT                                                      AERM2880
      THKRW = TRAW                                                      AERM2890
      THKRVT = TRAVT                                                    AERM2900
      DMT = DCASE                                                       AERM2910
      DMNX=0.0                                                          AERM2920
      DMN=DMNX                                                          AERM2930
      IF(NAERO(5) .NE. 3 ) DMW=DCASE                                    AERM2940
      D6 = DCASE                                                        AERM2950
      IF(NAERO(12).EQ.3) DMN = DMNX                                     AERM2960
      XMF = XMSX                                                        AERM2970
      RL6 = AL5X                                                        AERM2980
      RL7A = ARL6                                                       AERM2990
      IF(ITN.LT.4) XLN=FINE*D1                                          AERM3000
      IF ( J .EQ. 1 ) WRITE(6,INPUT)                                    AERM3010
      IF(IBTL.EQ.0) GO TO 206                                           AERM3020
C..............BOATTAIL GEOMETRY                                        AERM3030
      XBT=FRBT*D1                                                       AERM3040
      DB=DEOD+FACTOR*(DCASE-DEOD)                                       AERM3050
      IF(XBT.GT.TNOZL+1.) XBT=TNOZL+1.                                  AERM3060
      IF(DB.LT.DCASE) GO TO 205                                         AERM3070
      DB=DCASE                                                          AERM3080
      GO TO 207                                                         AERM3090
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  205 CONTINUE                                                          AERM3100
      RL2=RL3-XBT                                                       AERM3110
      TANBT=(DCASE-DB)*0.5/(RL3-RL2)                                    AERM3120
      IF(TANBT.GE.0.286)    TANBT=0.286                                 AERM3130
C.....MAXIMUM BOATTAIL ANGLE IS 10 DEG.....                            AERM3140
      THETBT=ATAN((D1-DB)/(2.*XBT))                                     AERM3150
      XTHEBT=R1/TAN(THETBT)                                             AERM3160
      GO TO 207                                                         AERM3170
  206 CONTINUE                                                          AERM3180
      THETBT=0.0                                                        AERM3190
      XBT=0.0                                                           AERM3200
      TANBT=0.0                                                         AERM3210
      THETBT=0.0                                                        AERM3220
      XTHEBT=0.0                                                        AERM3230
      DB=D1                                                             AERM3240
  207 CONTINUE                                                          AERM3250
      RL2=RL3-XBT                                                       AERM3260
      IF(RL4.LE.RL2) DLE = D1                                           AERM3270
      IF(RHLT.LE.RL2) DMT = D1                                          AERM3280
      IF(RHLT.GT.RL2) DMT = D1-(TANBT*(RHLT-RL2))*2.                    AERM3290
  220 CONTINUE                                                          AERM3300
      BTH = BT / 2. + DMT / 2.                                          AERM3310
      STED = STET/57.296                                                AERM3320
      SLET = ATAN(2.*(RCT+.5*BT*TAN(STED)-TCT)/BT)*57.296               AERM3330
      IF(IBTL.EQ.3) DLE = D1                                            AERM3340
      IF(NW.LE.0) GO TO 221                                             AERM3350
      BWH = BW/2. + DCASE/2.                                            AERM3360
      SWED = STEW/57.296                                                AERM3370
      SLEW = ATAN(2.*(RCW+.5*BW*TAN(SWED)-TCW)/BW)*57.296               AERM3380
  221 CONTINUE                                                          AERM3390
      IF(ITN.LE.3) GO TO 1111                                           AERM3400
      IF(ITN.EQ.4) GO TO 1211                                           AERM3410
      IF(ITN.EQ.5) GO TO 1311                                           AERM3420
      IF(ITN.EQ.6) GO TO 1411                                           AERM3430
 1111 RL1A=RL1                                                          AERM3440
      ROG=0.25*D1 + (RL1**2)/D1                                         AERM3450
      GO TO 1412                                                        AERM3460
 1211 RL1A=R1                                                           AERM3470
      GO TO 1412                                                        AERM3480
 1311 RS=BRAT*R1                                                        AERM3490
      RL1=D1/(2.0*TAN(THETAC))                                          AERM3500
      XCAP=RS*(1.0-SIN(THETAC))                                         AERM3510
      YCAP=RS*COS(THETAC)                                               AERM3520
      XNEG=YCAP/TAN(THETAC)                                             AERM3530
      RL1A=RL1-XNEG+XCAP                                                AERM3540
      XLNT=RL1                                                          AERM3550
      XLFRC=RL1-XNEG                                                    AERM3560
      GO TO 1412                                                        AERM3570
 1411 ROG=0.25*D1 +(RL1**2)/D1                                          AERM3580
      RS=BRAT*R1                                                        AERM3590
      RX=ROG-RS                                                         AERM3600
      RX2=RX*RX                                                         AERM3610
      RY=ROG-R1                                                         AERM3620
      RY2=RY*RY                                                         AERM3630
      RR=SQRT(RX2-RY2)                                                  AERM3640
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      ANG=ARCOS(RY/RX)                                                  AERM3650
      XCAPO=RS*(1.-SIN(ANG))                                            AERM3660
      YCAPO=RS*COS(ANG)                                                 AERM3670
      RL1A=RR + RS                                                      AERM3680
 1412 CONTINUE                                                          AERM3690
      FAEN1=(RL3-RL1)/RL1A                                              AERM3700
      DNOSE=RL1-RL1A                                                    AERM3710
      FCAP=RS/R1                                                        AERM3720
      IF(ITN.EQ.4) XLN=0.5*D1                                           AERM3730
      IF(ITN.EQ.4) FCAP=1.0                                             AERM3740
      IF(ITN.EQ.4) BRAT=1.0                                             AERM3750
      IF(ITN.GE.4) CALL RLTGED                                          AERM3760
      XCYL=RL3-RL1A-XBT-DNOSE                                           AERM3770
      IF(ITN.EQ.1) GO TO 441C                                           AERM3780
      IF(ITN.EQ.2) GO TO 416                                            AERM3790
      IF(ITN.EQ.3) GO TO 401                                            AERM3800
      IF(ITN.EQ.4) GO TO 402                                            AERM3810
      IF(ITN.EQ.5) GO TO 415                                            AERM3820
      IF(ITN.EQ.6) GO TO 4411                                           AERM3830
C*****COMPUTE VOLUME OF CONE******                                      AERM3840
  4C1 VOLC=0.25*PI*D1*D1*RL1 /3.0                                       AERM3850
      VOLN=VOLC                                                         AERM3860
      GO TO 440                                                         AERM3870
  4C2 VOLS=2.*PI*R1**3/3.                                               AERM3880
      VOLN=VOLS                                                         AERM3890
      GO TO 440                                                         AERM3900
  416 VOLVK=0.5*PI*R1*R1*RL1                                            AERM3910
      VOLN=VOLVK                                                        AERM3920
      GO TO 440                                                         AERM3930
  415 VOLFC=((PI*D1*D1/12.0)/(XLNT**2))*(XLNT**3-XNEG**3)               AERM3940
      VOLSP=PI*RS*RS*XCAP-0.3333*PI*XCAP**3                             AERM3950
      VOLBC=VOLSP+VOLFC                                                 AERM3960
      VOLN=VOLBC                                                        AERM3970
      GO TO 440                                                         AERM3980
C*****COMPUTE VOLUME OF OGIVE NOSE FROM NOSE TANGENCY POINT TO CYLINDER AERM3990
C     TANGENCY POINT****                                                AERM4000
 4411 XLN=RL1A                                                          AERM4010
C***COMPUTE RADIUS OF OGIVE***                                          AERM4020
      ROG=(R1**2+ XLN*(XLN-2.*RS))/(2.*R1-2.*RS)                        AERM4030
      ROG2=ROG*ROG                                                      AERM4040
C****TANGENCY POINT OF SPHERE***                                        AERM4050
      XTANP=XLN-RS + (RS*(XLN-RS))/(ROG-RS)                             AERM4060
      YTANP=(RS*(ROG-R1))/(ROG-RS)                                      AERM4070
      XTANP2=XTANP*XTANP                                                AERM4080
      XLNT=SQRT(D1*ROG-0.25*D1*D1)                                      AERM4090
      PHIMAX=ARSIN(XLNT/ROG)                                            AERM4100
      PHI=ARSIN(XTANP/ROG)                                              AERM4110
      TERMA=SIN(PHI)*(2. + COS(PHI)**2)/3.                              AERM4120
      TERMB=COS(PHIMAX)*(SIN(PHI)*COS(PHI) + PHI)                       AERM4130
      TERMC=COS(PHIMAX)*COS(PHIMAX)*SIN(PHI)                            AERM4140
      VOLOGF=(PI*ROG**3)*(TERMA - TERMB + TERMC)                        AERM4150
      VOLSPH=PI*RS*RS*(XLN-XTANP)-0.333*PI*(XLN**3-XTANP**3)            AERM4160
      VOLN=VPN                                                          AERM4170
      GO TO 440                                                         AERM4180
 4410 XLNT=SQRT(D1*ROG-0.25*D1*D1)                                      AERM4190
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      FRNT=XLNT/D1                                                          AERM4200
      TERM1=1.-R1/ROG                                                       AERM4210
      TERM2=TERM1*TERM1                                                     AERM4220
      TERM3=XLNT/ROG                                                        AERM4230
      VOLN=PI*ROG**3*(TERM3*TERM2/3. + 2.*TERM3/3.                          AERM4240
     1-ARSIN(TERM3)*TERM1)                                                  AERM4250
      GO TO 440                                                             AERM4260
C****COMPUTE CYLINDRICAL SECTION VOLUME****                                 AERM4270
  440 VOLCYL=0.25*PI*D1*D1*XCYL                                             AERM4280
C****COMPUTE CONICAL BOATTAIL VOLUME****                                    AERM4290
      IF(IBTL.EQ.0) GO TO 450                                               AERM4300
      VOLBT=((PI*D1*D1/12.)/(XTHEBT**2))*(XTHEBT**3-(XTHEBT-XBT)**3)        AERM4310
      GO TO 451                                                             AERM4320
  450 CONTINUE                                                              AERM4330
      VOLBT=0.0                                                             AERM4340
  451 VOLBOD=VOLN +VOLCYL + VOLBT                                           AERM4350
      IF(NAERO(8).EQ.0) NAERO(8) = 1                                        AERM4360
      IF(NAERO(9).EQ.0) NAERO(9) = 1                                        AERM4370
      ITSECT = NAERO(10)                                                    AERM4380
      IWSECT = NAERO(11)                                                    AERM4390
      INTYPE = 0                                                            AERM4400
      IF(NAERO(12).EQ.1) INTYPE=21                                          AERM4410
      IF(NAERO(12).EQ.2) INTYPE=22                                          AERM4420
      IF(NAERO(12).EQ.3) INTYPE=11                                          AERM4430
      IF(NAERO(12).EQ.4) INTYPE = 4                                         AERM4440
      IF(NAERO(12).EQ.5) INTYPE = 5                                         AERM4450
      ICONDU = NAERO(13)                                                    AERM4460
      ISZ = NAERO(14)                                                       AERM4470
      J = NAERO(15)                                                         AERM4480
      ICDON = NAERO(17)                                                     AERM4490
      IFPW = NAERO(26)                                                      AERM4500
      IBTLC = NAERO(22)                                                     AERM4510
      ICONP = NAERO(21)                                                     AERM4520
      ICLTN = NAERO(20)                                                     AERM4530
      ICLTF = NAERO(19)                                                     AERM4540
      ICDOF = NAERO(18)                                                     AERM4550
C                                                                           AERM4560
C                                                                           AERM4570
C*****BEGIN ALTITUDE LOOP                                                   AERM4580
C                                                                           AERM4590
      ISWT=-1                                                               AERM4600
      ILIM=0                                                                AERM4610
   77 CONTINUE                                                              AERM4620
      IF ( KSTEP  .NE.  2 )  GO TO 1174                                     AERM4630
      DO 1173 IJ = 1, NPM                                                   AERM4640
      XZML1(IJ)=RMV(IJ)                                                     AERM4650
      XZML2(IJ)=RMV(IJ)                                                     AERM4660
      XZMD1(IJ)=RMV(IJ)                                                     AERM4670
      XZMD2(IJ)=RMV(IJ)                                                     AERM4680
 1173 CONTINUE                                                              AERM4690
 1174 CONTINUE                                                              AERM4700
      IF ( KSTEP  .GT.  2 )  GO TO 699                                      AERM4710
 1183 CONTINUE                                                              AERM4720
      IF ( J .EQ. 0 ) GO TO 9021                                            AERM4730
 9021 CONTINUE                                                              AERM4740
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      DO 100 KK = 1, NALT                                                AERM4750
      KKRUN=KK                                                           AERM4760
      IALT=KK                                                            AERM4770
      COEFD(1,KK) = ALTV(KK)                                             AERM4780
      COEFDF(1,KK)= ALTV(KK)                                             AERM4790
      ALT=ALTV(KK)                                                       AERM4800
      ALT = ALT / 1000.                                                  AERM4810
C                                                                        AERM4820
C*****BEGIN MACH NUMBER LOOP                                             AERM4830
C                                                                        AERM4840
      DO 200 JJ=1,NRM                                                    AERM4850
      JJRUN = JJ                                                         AERM4860
      ALPHA = 0.                                                         AERM4870
      ALPHAR = 0.                                                        AERM4880
      ANETDA = 0.                                                        AERM4890
      ACNAAW = 0.                                                        AERM4900
      ACLTWV = 0.                                                        AERM4910
      ADCNW = 0.                                                         AERM4920
      ACNWB = 0.                                                         AERM4930
      ACNVW = 0.                                                         AERM4940
      ACLWV = 0.                                                         AERM4950
      ACLWB = 0.                                                         AERM4960
      ACLBW = 0.                                                         AERM4970
      ACLW = 0.                                                          AERM4980
      CLAT = C.                                                          AERM4990
      CNA = 0.                                                           AERM5000
      CN = 0.                                                            AERM5010
      CMAB = 0.                                                          AERM5020
      CMAT = 0.                                                          AERM5030
      CMAW = 0.                                                          AERM5040
      CMA = 0.                                                           AERM5050
      CDBCLT = 0.0                                                       AERM5060
      IF(ISWT.LT.0)  RM=RMV(JJ)                                          AERM5070
      PATS = 2116.6-76.3568*ALT+1.08896*ALT**2-7.1106E-3*ALT**3+         AERM5080
     1       1.7613E-5*ALT**4                                            AERM5090
      QRATIO = 1.                                                        AERM5100
      DYNP=0.7*PATS*RM**2                                                AERM5110
      IF(NAERO(12).GT.3) PL = 1.                                         AERM5120
      IF(NAERO(12).GT.3) XML = RM                                        AERM5130
      IF(NAERO(5).NE.3) GO TO 335                                        AERM5140
      QRATIO = PL/DYNP                                                   AERM5150
      IF(QRATIO.EQ.0.) QRATIO = 1.                                       AERM5160
  335 CONTINUE                                                           AERM5170
      NFIVE = NAERO(5)                                                   AERM5180
      IF(NAERO(5).EQ.3) NAERO(5) = 2                                     AERM5190
      ISNTRL = ICNTRL                                                    AERM5200
      IF(ICNTRL.EQ.3) ICNTRL = 2                                         AERM5210
      XMACH = RM                                                         AERM5220
  340 SREF=0.25*PI*D1**2                                                 AERM5230
      PA=SREF                                                            AERM5240
      ITRIP = 2                                                          AERM5250
      IF(RM.LE..9) ITRIP = -1                                            AERM5260
      IF(RM.EQ.1.) ITRIP = 0                                             AERM5270
      IF(RM.GE.1.2) ITRIP = 1                                            AERM5280
      ALPHAO = 0.                                                        AERM5290
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      IF(J.EQ.1) WRITE(6,1876) RM, ALPHAO, ALT                          AERM5300
      FR=RL1/D1                                                         AERM5310
      FRB    = (RL3 - (RL1 - RL1A))/D1                                  AERM5320
      DML=RM/FR                                                         AERM5330
      DHL = DMT                                                         AERM5340
      IF(ICNTRL.EQ.2) DHL = DMW                                         AERM5350
      RLD=XBT/D1                                                        AERM5360
      I = 1                                                             AERM5370
      IF(J.EQ.1) WRITE(6,1) I, Q1(1), Q( 7), SREF   , Q(13), FR        , AERM5380
     1  Q(21), FRB    , Q( 1), DML   ,  Q(92), DHL   , Q( 2), RLD       AERM5390
      RLDB = 0.                                                         AERM5400
      BETA = SQRT(ABS(RM**2-1.))                                        AERM5410
      IF(RM.GE.1.1) RLDB=2.*RLD/BETA                                    AERM5420
      IF((RM.GE.1.1).OR.(RM.LE.1.0)) GO TO 343                          AERM5430
      BETA = SQRT(ABS(1.1**2 - 1.) )                                    AERM5440
      RLDB = 2.*RLD/BETA                                                AERM5450
  343 CONTINUE                                                          AERM5460
      FA = (RL3-RL1)/D1                                                 AERM5470
      DA = RL3 / 120.                                                   AERM5480
      D=DB+DA+DA                                                        AERM5490
      DD=DB/DCASE                                                       AERM5500
      I = 2                                                             AERM5510
      IF(J.EQ.1) WRITE(6,1) I, Q1(1), Q(57), RLDB   , Q( 5), BETA      , AERM5520
     1 Q(93), FA, Q(10), DA, Q(14), D, Q(3), DD                         AERM5530
      DD2 = DD**2                                                       AERM5540
      DD12 = (D/D1) **2                                                 AERM5550
      FAFN = FA/FR                                                      AERM5560
      BFN = BETA/FR                                                     AERM5570
      I = 3                                                             AERM5580
      IF(J.EQ.1) WRITE(6,1) I, Q1(1), Q(4), DD2, Q(9), DD12,            AERM5590
     1 Q(94), FAFN, Q(95), BFN                                          AERM5600
C                                                                       AERM5610
C******** TAIL VARIABLES ***************************************************AERM5620
C                                                                       AERM5630
C***** LEADING EDGE SWEEP CAN NEVER BE LESS THAN 0.1 DEGREE **********  AERM5640
      SVAL = SLET                                                       AERM5650
      IF(SLET.EQ.0.0) SVAL = 0.1                                        AERM5660
      SLETR = SVAL/DPR                                                  AERM5670
      TANST = TAN(SLETR)                                                AERM5680
      STETR = STET/DPR                                                  AERM5690
      TANOT = TAN(STETR)                                                AERM5700
      TANS2T = (RCT-TCT)/BT + TANOT                                     AERM5710
      TANS4T = 1.5*(RCT-TCT)/BT + TANOT                                 AERM5720
      ACT = (TCT+RCT)/2.                                                AERM5730
      IF ( IART  .EQ.  1  )  RNT = 2.                                   AERM5740
      ST = RNT*ACT*BT/2.                                                AERM5750
      I = 4                                                             AERM5760
      IF(J.EQ.1) WRITE(6,1) I, Q1(1), Q2(3), SLETR, Q2(4), TANST, Q2(5),AERM5770
     1 TANS2T, Q2(6), TANS4T, Q2(9), ACT   , Q2(10), ST                 AERM5780
      STSREF = ST/SREF                                                  AERM5790
      SET = 2.*ST/RNT                                                   AERM5800
      STAIL = SET/2.0                                                   AERM5810
      BART = BETA*ART                                                   AERM5820
      I = 5                                                             AERM5830
      IF(J.EQ.1) WRITE(6,1) I, Q1(1), Q2(15), ART, Q2(16), BART, Q2(11),AERM5840
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     1 STSREF, Q2(17), THKRT, Q2(13), RXINT, Q2(14), SET                    AERM5850
       ATNS2T = ART*TANS2T                                                  AERM5860
       ATNS4T = ART*TANS4T                                                  AERM5870
       ATCT = ART*THKRT                                                     AERM5880
       AMACT = .6666*(RCT+TCT-RCT*TCT/(RCT+TCT))                            AERM5890
       TMACT = THKRT*RCT/AMACT                                              AERM5900
       ATCT = ART*TMACT                                                     AERM5910
   350 CONTINUE                                                             AERM5920
       BTANST = BETA/TANST                                                  AERM5930
       BDCT = BETA*DMT/RCT                                                  AERM5940
       TRT = TCT/RCT                                                        AERM5950
       TRTP1 = 1.+TRT                                                       AERM5960
       I = 6                                                                AERM5970
       IF(J.EQ.1) WRITE(6,1) I, Q1(1), Q2(7), ATNS2T, Q2(8), ATNS4T,        AERM5980
      1 Q2(18), BTANST, Q2(19), BDCT, Q2(20), TRTP1                         AERM5990
       BAPPT = .25*ART*TRTP1*TANST                                          AERM6000
       BAPT = 0.                                                            AERM6010
       IF(RM.NE.1) BAPT = BART*TRTP1*(1.+1./BTANST)                         AERM6020
       I = 7                                                                AERM6030
       IF(J.EQ.1) WRITE(6,1) I, Q1(1), Q2(22), BAPT, Q2(21), BAPPT, Q(43)AERM6040
      1, TRT, Q2(18), BTANST                                                AERM6050
       FLTSET = FSOVCT*RCT                                                  AERM6060
       XLENT = RXINT*RCT                                                    AERM6070
       BTANSW = 0.                                                          AERM6080
       ALSRT = 0.                                                           AERM6090
       ALSRW = 0.                                                           AERM6100
       CNAST = 0.                                                           AERM6110
       ALPT = 0.                                                            AERM6120
       ALPW = 0.                                                            AERM6130
       ACE = 0.                                                             AERM6140
       SWEPSR = 0.                                                          AERM6150
       IF (RM.LE.1.) GO TO 410                                              AERM6160
       IF (BTANST.LE.1.) GO TO 410                                          AERM6170
       IF (NAERO(8).EQ.2) GO TO 410                                         AERM6180
   410 IF (NW.NE.1) GO TO 480                                               AERM6190
C                                                                           AERM6200
C******** WING VARIABLES ***************************************************AERM6210
C                                                                           AERM6220
C***** LEADING EDGE SWEEP CAN NEVER BE LESS THAN 0.1 DEGREE **********     AERM6230
       IF(IART.NE.1) GO TO 9887                                             AERM6240
       SVTSRF=SVT/SREF                                                      AERM6250
       BARVT=BETA*ARVT                                                      AERM6260
       TANOVT=TAN(STEVTR)                                                   AERM6270
       TAN2VT=0.5*(RCVT - TCVT)/BVT + TANOVT                                AERM6280
       TAN4VT=0.75*(RCVT - TCVT)/BVT + TANOVT                               AERM6290
       ACVT=(TCVT + RCVT)/2.                                                AERM6300
       ATN2VT=ARVT*TAN2VT                                                   AERM6310
       ATN4VT=ARVT*TAN4VT                                                   AERM6320
       ATCVT=ARVT*THKRVT                                                    AERM6330
       AMACVT=0.6666*(RCVT + TCVT -RCVT*TCVT/(RCVT+TCVT))                   AERM6340
       TMACVT=THKRVT*RCVT/AMACVT                                            AERM6350
       ATCVT=ARVT*TMACVT                                                    AERM6360
       BTANVT=BETA/TANSVT                                                   AERM6370
       BDCVT=BETA*DMT/RCVT                                                  AERM6380
       TRTPV1=1.0 + TRVT                                                    AERM6390
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      BAPPVT=0.25*ARVT*TRTPV1*TANSVT                                    AERM6400
      BAPVT=0.0                                                         AERM6410
      IF(RM.NE.1.)BAPVT=BARVT*TRTPV1*(1.+1./BTANVT)                     AERM6420
      FLVTST=FSOVVT*RCVT                                                AERM6430
      XLENVT=RXINVT*RCVT                                                AERM6440
 9887 CONTINUE                                                          AERM6450
      SVAL = SLEW                                                       AERM6460
      IF(SLEW.EQ.C.C) SVAL = 0.1                                        AERM6470
      SLEWR = SVAL/DPR                                                  AERM6480
      TANSW = TAN(SLEWR)                                                AERM6490
      STEWP = STEW/DPR                                                  AERM6500
      TANOW = TAN(STEWP)                                                AERM6510
      TANS2W = (RCW-TCW)/BW + TANOW                                     AERM6520
      TANS4W = 1.5*(RCW-TCW)/BW + TANOW                                 AERM6530
      I = 8                                                             AERM6540
      IF(J.EQ.1) WRITE(6,1) I, Q1(1), Q2(21), BAPPT, Q2(22), BAPT,      AERM6550
     1 Q2(23), SLEWR, Q2(24), TANSW, Q2(25), TANS2W, Q2(26), TANS4W     AERM6560
      ACW = (TCW+RCW)/2.                                                AERM6570
      SW = RNW*ACW*BW/2.                                                AERM6580
      SWSREF = SW/SREF                                                  AERM6590
      SFW = 2.*SW/RNW                                                   AERM6600
      SWING = SFW/2.0                                                   AERM6610
      I = 9                                                             AERM6620
      IF(J.EQ.1) WRITE(6,1) I, Q1(1), Q2(33), RXINW , Q2(34), SFW,      AERM6630
     1 Q2(29), ACW, Q2(30), SW, Q2(31), SWSREF, Q2(37), THKRW           AERM6640
C                                                                       AERM6650
  411 BARW = BETA*ARW                                                   AERM6660
      ATNS2W = ARW*TANS2W                                               AERM6670
      ATNS4W = ARW*TANS4W                                               AERM6680
      ATCW = ARW*THKRW                                                  AERM6690
      AMACW = .6666*(RCW+TCW-RCW*TCW/(RCW+TCW))                         AERM6700
      TMACW = THKRW*RCW/AMACW                                           AERM6710
      ATCW = ARW*TMACW                                                  AERM6720
  420 CONTINUE                                                          AERM6730
      BTANSW = BETA/TANSW                                               AERM6740
      I = 10                                                            AERM6750
      IF(J.EQ.1) WRITE(6,1) I, Q1(1), Q2(27), ATNS2W, Q2(28), ATNS4W,   AERM6760
     1 Q2(35), ARW, Q2(36), BARW,                Q2(38), BTANSW         AERM6770
      BDCW = BETA*DMW/RCW                                               AERM6780
      TRW = TCW/RCW                                                     AERM6790
      TRWP1 = 1.+TRW                                                    AERM6800
      BAPPW = .25*ARW*TRWP1*TANSW                                       AERM6810
      BAPW = 0.                                                         AERM6820
      IF(RM.NE.1) BAPW = BARW*TRWP1*(1.+1./BTANSW)                      AERM6830
      I = 11                                                            AERM6840
      IF(J.EQ.1) WRITE(6,1) I, Q1(1), Q2(39), BDCW, Q2(40), TRWP1,      AERM6850
     1 Q2(41), BAPPW, Q2(42), BAPW, Q(43), TRT, Q(47), TRW              AERM6860
      FLTSEW = FSOVCW*RCW                                               AERM6870
      XLENW = RXINW*RCW                                                 AERM6880
      ALSRW = 0.                                                        AERM5890
      CNASW = 0.                                                        AERM6900
      ALPW = 0.                                                         AERM6910
      IF (RM.LE.1.) GO TO 480                                           AERM6920
      IF (BTANSW.LE.1.) GO TO 480                                       AERM6930
      IF (NAERO(9).EQ.2) GO TO 480                                      AERM6940
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  480 CONTINUE                                                          AERM6950
C                                                                       AERM6960
      CALL DRAG ( ALT, RM, KSTEP, CDOB, CDOS )                         AERM6970
      CALL LIFT(RM,CNA,KSTEP)                                           AERM6980
      IF ( KSTEP .EQ. 1 ) CDOB = 0.0                                    AERM6990
      PRAMPL(128) = CNA                                                 AERM7000
      IF(ISWT) 920,770,775                                              AERM7010
  920 CONTINUE                                                          AERM7020
      COEFM(JJ)=CMA                                                     AERM7030
      COEFX(JJ)=XD1                                                     AERM7040
      COEFQ(JJ) = CNA /  DPR                                            AERM7050
      COEFL(JJ)=CNA  /   DPR                                            AERM7060
      IF ( KINDB .EQ. 3 ) COEFL(JJ) = COEFL(JJ) + CLALPB                AERM7070
      JJJJ = JJ + 1                                                     AERM7080
      COEFDF(JJJJ,KK) = CDOS                                            AERM7090
      COEFD (JJJJ,KK) = CDOB                                            AERM7100
      DZERO=CDOON*DYNP*SREF/144.                                        AERM7110
C*****BEGIN ALPHA LOOP*******                                           AERM7120
      NALPHA = 1                                                        AERM7130
      ALPHAV(1) = 0.0                                                   AERM7140
      DO 2000 LL=1,NALPHA                                               AERM7150
      ALPHAR=ALPHAV(LL)/57.3                                            AERM7160
      CL=CNA*ALPHAR                                                     AERM7170
      DI=CL*TAN(ALPHAR)*DYNP*SREF/144.                                  AERM7180
      DTOT=DZERO + DI                                                   AERM7190
      VLIFT=CL*DYNP*SREF/144.                                           AERM7200
      ALD=VLIFT/DTOT                                                    AERM7210
      AMLF=VLIFT/WMISS                                                  AERM7220
      IF ( J .EQ. 1 ) WRITE(6,FORCES)                                   AERM7230
 2000 CONTINUE                                                          AERM7240
  200 CONTINUE                                                          AERM7250
      IF ( J .EQ. 0 ) GO TO 9160                                        AERM7260
      CALL PAGE                                                         AERM7270
 9158 FORMAT(   ///   )                                                AERM7280
      WRITE(6,9158)                                                     AERM7290
      WRITE(6,9150)                                                     AERM7300
 9150 FORMAT(17X3HALT, 6X4HMACH, 2X 8HCDO-SUST, 1X9HCDO-BOOST,          AERM7310
     1   7X3HCLA  //  )                                                AERM7320
 9156 FORMAT(10X,F10.0)                                                 AERM7330
 9157 FORMAT(20X,F10.2, 3F10.3 )                                        AERM7340
      WRITE (6, 9156 ) ALTV(KK)                                         AERM7350
      DO 9350 ISAX= 1, NRM                                              AERM7360
      ISA = ISAX + 1                                                    AERM7370
      WRITE(6,9157) RMV(ISAX),COEFDF(ISA,KK), COEFD(ISA,KK), COEFQ(ISAX)AERM7380
 9350 CONTINUE                                                          AERM7390
 9160 CONTINUE                                                          AERM7400
  100 CONTINUE                                                          AERM7410
  699 CONTINUE                                                          AERM7420
      IF ( KSTEP .LT. 3 ) GO TO 1184                                    AERM7430
      RMLO = 0.8                                                        AERM7440
      RM=RMLO                                                           AERM7450
      ISWT=0                                                            AERM7460
      GO TO 1183                                                        AERM7470
  770 IF(ILIM.NE.0) GO TO 771                                           AERM7480
      DCPDX=XD11 - XD1                                                  AERM7490
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      DCGDX=WWING/WMISS                                                  AERM7500
  771 SMLO=XCGD1 -XD1                                                    AERM7510
      IF(ILIM.NE.0) GO TO 772                                            AERM7520
      IF((SMRL-SMLO).GE.-.1) GO TO 5000                                  AERM7530
      DELXW=(SMRL-SMLO)/(DCGDX-DCPDX)                                    AERM7540
      GO TO 5010                                                         AERM7550
 5000 DELXW=0.0                                                          AERM7560
 5010 XLEW= RL5 + DELXW*D1                                               AERM7570
  772 WRITE(6,WINLOC)                                                    AERM7580
      RMHI=2.0                                                           AERM7590
       PM=RMHI                                                           AERM7600
      ISWT=1                                                             AERM7610
      GO TO 77                                                           AERM7620
  775 IF(ILIM.NE.0) GO TO 6800                                           AERM7630
      DCPDX=XD11-XD1                                                     AERM7640
      XD2=XD1 + DELXW*DCPDX                                              AERM7650
      XCGD1=XCGD1 + DCGDX*DELXW                                          AERM7660
  776 SMHI=XCGD1- XD2                                                    AERM7670
      IF(ILIM.NE.0) GO TO 6800                                           AERM7680
      IF((SMRH-SMHI).GE.-.1) GO TO 6600                                  AERM7690
      DELXW=(SMRH-SMHI)/(DCGDX-DCPDX)                                    AERM7700
      GO TO 6610                                                         AERM7710
 6600 DELXW=0.0                                                          AERM7720
 6610 XLEW=XLEW + DELXW*D1                                               AERM7730
      XLEWL=0.0                                                          AERM7740
      IF((RCW + XLEW).GT.(TLTHEO-RCT-6.)) GO TO 6700                     AERM7750
      GO TO 6800                                                         AERM7760
 6700 XLEWL=TLTHEO-RCT-6.0-RCW                                           AERM7770
      DELXW=XLEWL-XLEW                                                   AERM7780
      XLEW=XLEWL                                                         AERM7790
      XCGD1=XCGD1 + DELXW*DCGDX/D1                                       AERM7800
      XD1=XD1 + DELXW*DCPDX                                              AERM7810
      ILIM=1                                                             AERM7820
      XD2=XD2 + DELXW*DCPDX/D1                                           AERM7830
      SMHI=XCGD1-XD2                                                     AERM7840
      GO TO 699                                                          AERM7850
 6800 CONTINUE                                                           AERM7860
      IF ( J .NE. 1 ) GO TO 400                                          AERM7870
      WRITE(6,WINLOC)                                                    AERM7880
      IF(ILIM.EQ.1) WRITE(6,9000)                                        AERM7890
 9000 FORMAT(10X,23H MOST AFT WING LOCATION    )                        AERM7900
      WRITE (6,9001) XLEW                                                AERM7910
 9001 FORMAT ( 10X17HWING LOCATION AT     , F6.2, 4H IN.    )           AERM7920
 1184 CONTINUE                                                           AERM7930
      IF ( J .NE. 1 ) GO TO 400                                          AERM7940
      CALL WRTOUT('MACH NUM',RMV,20,1,1,NRM,1,1)                         AERM7950
      CALL WRTOUT('ALT-KFT.',ALTV,10,1,1,NALT,1,1)                       AERM7960
      CALL WRTOUT('ALPHA   ',ALPHAV,10,1,1,NALPHA,1,1)                   AERM7970
      CALL WRTOUT('CDO-PON ',COEFD,20,5,1,NRM,NALT,1)                    AERM7980
      CALL WRTOUT('CDO-POFF',COEFDF,20,5,1,NRM,NALT,1)                   AERM7990
      CALL WRTOUT('CLALPHA ',COEFL,20,1,1,NRM,1,1)                       AERM8000
      CALL WRTOUT('CMALPHA ',COEFM,20,1,1,NRM,1,1)                       AERM8010
      CALL WRTOUT('CPLOC   ',COEFX,20,1,1,NRM,1,1)                       AERM8020
      CALL WRTOUT('CMQ     ',COEFQ,20,1,1,NRM,1,1)                       AERM8030
  400 CONTINUE                                                           AERM8040
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      RL5 = RL5SAV                                                          AERM8050
      RETURN                                                                AERM8060
      END                                                                   AERM8070


      SUBROUTINE DRAG( ALT,PM,KSTEP,CDOB,CDOS )                             DRAG0010
C     PGM=NUK.CMCGSM     GGJ/RKM     FIV/EBCD     9/10/73                   DRAG0020
      DOUBLE PRECISION Q,Q1,Q2,A1,A2,ZZT,CVV,CVVT,CVVW                      DRAG0030
      DIMENSION COEFD(20,5)                                                 DRAG0040
      DIMENSION BASECP(20)                                                  DRAG0050
      DIMENSION RMV(20), ALTV(10), ALPHAV(10), NAERO(30)                    DRAG0060
      COMMON /BOAT/ CDLUMP,CDPBTL,DUM18(18)                                 DRAG0070
      COMMON/AERO/                                                          DRAG0080
     1    ATNS4T    ,ATNS4W    ,BTANA     ,BART      ,BARW      ,BAPT      ,  DRAG0090
     2    BAPW      ,BAPPT     ,BAPPW     ,BETA      ,BFN       ,CFT       ,  DRAG0100
     3    CFW       ,CDB       ,CFB       ,CNANAC    ,CLABT     ,CLAT      ,  DRAG0110
     4    CLAW      ,CLTV      ,CKWB      ,CKBW      ,CKBT      ,CKTB      ,  DRAG0120
     5    CLATWV    ,D         ,DD        ,DD2       ,DPR       ,DHL       ,  DRAG0130
     6    FAFN      ,F         ,FL        ,FR        ,PI        ,RLD       ,  DRAG0140
     7    RLDB      ,RBTANA    ,SLETR     ,SLEWR     ,STSREF    ,SWSREF    ,  DRAG0150
     8    SKBT      ,SKTB      ,SKBW      ,SKWB      ,TRTP1     ,TRWP1     ,  DRAG0160
     9    CFI       ,TANST     ,TANSW     ,TANS4T    ,TANS4W    ,TANS2T    ,  DRAG0170
     A    TANS2W    ,XD1B      ,XD1BT     ,XD1T      ,XD1W      ,XNLCMB    ,  DRAG0180
     B    XNLCDB    ,ACT       ,ACW       ,XNLCLB    ,BODYL     ,TAILL     ,  DRAG0190
     C    WINGL     ,RL1SQR    ,D1SQR     ,FR1       ,FCAP      ,CDPNX     ,  DRAG0200
     D    ACAP      ,TN1       ,SPN       ,VPN       ,FAFN1     ,PMN       ,  DRAG0210
     E    ANOSE2    ,SWSBN     ,RNOSE2    ,XLINF     ,CR2       ,NCCN(3)   ,  DRAG0220
     F    CREMAX    ,CRAMAX    ,B2        ,CNVR      ,BI        ,BZ        ,  DRAG0230
     G    SV2       ,SLEI      ,SLEZ      ,XVA       ,XVB       ,XVC       ,  DRAG0240
     H    CT2       ,CX        ,VOLN      ,VOLBT     ,VOLBOD    ,SWPREF    ,  DRAG0250
     I    BRAT      ,ROG                                                    DRAG0260
      COMMON/AERZ/ CDOB,CDOW,CDOT,CDOON,CDOOFF,CDBCN,CDBCFF,CDXX ,ITRIP,DRAG0270
     1ERBT,FPB                                                              DRAG0280
     2    , NAERO                                                           DRAG0290
      EQUIVALENCE ( NAERO(3), ILUG )                                        DRAG0300
      COMMON /AFTAR/ ARVT, AFT13(13)                                        DRAG0310
      EQUIVALENCE ( AFT13(5), TANSVT )                                      DRAG0320
      EQUIVALENCE ( AFT13(3), RCVT )                                        DRAG0330
      COMMON/ARINDX/ JJ,ARIN(9)                                             DRAG0340
      COMMON/BASDRG/ BASEP(59)                                              DRAG0350
      COMMON/BDTAB/ NCONF,NPRX,NRMX,NCCNFX,NPRXX,NRMXX                      DRAG0360
      COMMON/BLKQ/ Q1(20), Q(96), Q2(96),          FRCTN1(42), FRCTN2(90)DRAG0370
     1 ,FRCTN3(42)                                                          DRAG0380
      COMMON/CODEXX/ KIND,ITYPE,ZIGY(14)                                    DRAG0390
      COMMON/DRG/                                                           DRAG0400
     1    D1        ,THETAC    ,FINE      ,RS        ,R1        ,RL1       ,  DRAG0410
     2    XCYL      ,XTHEBT    ,XBT       ,RL3       ,ITN       ,AMACW     ,  DRAG0420
     3    AMACT     ,THKRT     ,THKRW     ,RL1A      ,IBTL      ,ATCT      ,  DRAG0430
     4    ATCW      ,DML       ,ITSECT    ,IWSECT    ,RXINT     ,RXINW     ,  DRAG0440
     5    BTANST    ,BTANSW    ,RCW       ,FLTSEW    ,XLENW     ,FLTSET    ,  DRAG0450
     6    XLENT     ,QRATIO    ,DN        ,DE        ,D3        ,RCT       ,  DRAG0460
     7    NW        ,TCW       ,TCT       ,BT        ,BW        ,ART       ,  DRAG0470
     8    APW       ,TRT       ,TRW       ,SREF      ,DB                   DRAG0480
      COMMON /EXTERN/ ZARZ(20)                                              DRAG0490
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      COMMON/GOBOL/ WARD(78)                                                    DRAG0500
      EQUIVALENCE (WARD(73),TR), (WARD(74), TB)                                 DRAG0510
      COMMON/INDATA/ CDOI, CLALF,WEIGHT                                         DRAG0520
      COMMON/INDATX/ ZAP(23)                                                    DRAG0530
      COMMON/INSERT/ INS19(19), RBE, INS10(10), TBL, INS2(2)                    DRAG0540
      COMMON /LET/ XLET10(10), IART, XLF3(3)                                    DRAG0550
      COMMON/NAERO/ NAZ6(6), DCASE, NAZ18(18)                                   DRAG0560
      COMMON/OUTPI/ OUTP(15), OUTDUM(20)                                        DRAG0570
      EQUIVALENCE (OUTP(1), CDSKIN)                                             DRAG0580
      EQUIVALENCE (OUTP(2), CDPDIV) , (OUTP(3), CDCOWL),                        DRAG0590
     1 (OUTP(5), CDFDIV), (OUTP(6), CDFFWD)                                     DRAG0600
      EQUIVALENCE (OUTP(4), CDPAFT)                                             DRAG0610
      EQUIVALENCE ( OUTP(15), CDPFWD )                                          DRAG0620
      COMMON/RJDAT/ RJD4(4),ACA3,RJD2(2), XLBST,FIZLX                           DRAG0630
      COMMON/SAVTIM/ KCLA,SAVT(5)                                               DRAG0640
      COMMON/SUMOUT/ BODCD(20), XINCD(20), WNGCD(20), TAILCD(20),               DRAG0650
     1 TAXLCD(20), FRICCD(20), CDOONA(20), CDOOFA(20), CDPNAR(20),              DRAG0660
     2CDFXR1(20), CDFXR2(20), CDBTAR(20), CDLAR(20), BDRCN(20),                 DRAG0670
     3CDPBOD(20), BLDVAR(20), CDCWL(20), FRGCD(20), CDPINX(20),                 DRAG0680
     4 CDPINT(20), CDPWAR(20), CDHTAR(20), CDVTAR(20), CDTLAR(20),              DRAG0690
     5CDPLSA(20), BDROFF(20), CDPTAR(20), CDPOFA(20)                            DRAG0700
      COMMON/TOVPER/ DUM(5), SEXIT,DUMX(5), ZA(4), EXTRA(57)                    DRAG0710
      EQUIVALENCE ( DUM(4), BEXIT )                                             DRAG0720
      COMMON/VERT/ SVTSRF,   BARVT,   TANOVT,   TAN2VT,   TAN4VT,               DRAG0730
     1      ACVT,   ATN2VT,   ATCVT,   AMACVT,   TMACVT,   BTANVT,             DRAG0740
     2    BDCVT,   TRTPV1,  BAPPVT,    BAPVT,   FLVTST,    XLENVT,             DRAG0750
     3   CFVT, TRAVT, RXINVT, FSOVVT                                            DRAG0760
      EQUIVALENCE ( THKRVT, TRAVT )                                             DRAG0770
      COMMON/ZZZ/CDP51(20),CDP50(20),CDP53(28),CDNOG(58),CDNCO(58),             DRAG0780
     1CDPN5(44),CDPM1(52),CDNVK(58),CDABT6(430),FLRM7(22),CDP70(228),           DRAG0790
     2CDP71(228),CDSPHR(30)                                                     DRAG0800
      NAMELIST/BUG/CDPN,CDPBTL,CFB,CDL,CDOB,CDPW,CFW,CDOW,                      DRAG0810
     1CDPT,CFT,CDOT,CDBOFF,CDBON,CDOON,CDOOFF                                   DRAG0820
      NAMELIST /NAMVER/   CDOVT,  CDPVT,                                        DRAG0830
     1             SVTSRF,   BARVT,   TANOVT,   TAN2VT,   TAN4VT,             DRAG0840
     1      ACVT,   ATN2VT,   ATCVT,   AMACVT,   TMACVT,   BTANVT,            DRAG0850
     2    BDCVT,   TRTPV1,  BAPPVT,    BAPVT,   FLVTST,    XLENVT,            DRAG0860
     3   CFVT, TRAVT, RXINVT, FSOVVT                                            DRAG0870
      NAMELIST/DOG/THKRW,THKRT,STSREF,SWSREF,ITSECT,IWSECT                      DRAG0880
122 FORMAT(//I3, 2X, 6H  AERO, 2H, ,                                            DRAG0890
     1    6H  CDPN, 2H =, E10.3, 2H, , 6HCDPBTL, 2H =, E10.3, 2H, ,            DRAG0900
     2    6H   CFB, 2H =, E10.3, 2H, , 6H   CDL, 2H =, E10.3, 2H, ,            DRAG0910
     3                                  6H  CDOB, 2H =, E10.3)                 DRAG0920
123 FORMAT(//I3, 2X, 6H  AERO, 2H, ,                                            DRAG0930
     1    6H CDWM2, 2H =, E10.3, 2H, , 6H   CDA, 2H =, E10.3, 2H, ,            DRAG0940
     2    6H ALSRT, 2H =, E10.3, 2H, , 6H  ALPT, 2H =, E10.3, 2H, ,            DRAG0950
     3    6H CNAST, 2H =, E10.3)                                               DRAG0960
124 FORMAT(//I3, 2X, 6H  AERO, 2H, ,                                            DRAG0970
     1    6H    TN, 2H =, E10.3, 2H, , 6HCDPBT1, 2H =, E10.3, 2H, ,           DRAG0980
     2    6H CDPT1, 2H =, E10.3, 2H, , 6H CDPW1, 2H =, E10.3,2H, ,            DRAG0990
     3 9H  THCBT =,E10.3)                                                       DRAG1000
125 FORMAT(//I3, 2X, 6H  AERO, 2H, ,                                            DRAG1010
     1    6H  CDPW, 2H =, E10.3, 2H, , 6H   CFW, 2H =, E10.3, 2H, ,            DRAG1020
     2    6H  CDOW, 2H =, E10.3, 2H, , 6H  CDPT, 2H =, E10.3, 2H, ,            DRAG1030
     3    6H   CFT, 2H =, E10.3, 2H, , 6H  CDOT, 2H =, E10.3)                  DRAG1040
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  126 FORMAT(//13, 2X, 6H  AERO, 2H, ,                                    DRAG1050
     1    6HCDBOFF, 2H =, E10.3, 2H, , 6H CDBON, 2H =, E10.3, 2H, ,      DRAG1060
     2    6H  CDOI, 2H =, E10.3, 2H, , 6H CDOON, 2H =, E10.3, 2H, ,      DRAG1070
     3    6HCDOOFF, 2H =, E10.3)                                         DRAG1080
      DATA BASECP/                                                       DRAG1090
     1       C.0, -.137, 0.8, -.137, 0.9, -.145, 1.0, -.195, 1.2, -.191,DRAG1100
     1    1.5, -.172, 2.0, -.141, 3.0, -.092, 4.0, -.065, 5.0, -.048/   DRAG1110
      POLY (X,C0,C1,C2,C3) = X * (X*(C3*X + C2) + C1) + C0               DRAG1120
C     TAKE OUT LATER                                                     DRAG1130
      JJ = 1                                                             DRAG1140
      XNINLT=ITYPE                                                       DRAG1150
      J = NAERO(15)                                                      DRAG1160
      IF ( IART .EQ. 1 ) ATN4VT = ARVT * TAN4VT                          DRAG1170
      IF ( J .EQ. 1 ) WRITE(6,DOG)                                       DRAG1180
C****************** FRICTION DRAG *** ALL MACH NUMBERS ******************DRAG1190
C                                                                        DRAG1200
      CALL FRCTN(ALT,FCFB,FCFT,FCFW,SWEPSR,RM)                           DRAG1210
      CDPBD = 0.                                                         DRAG1220
      FL = 0.                                                            DRAG1230
      CDA = 0.                                                           DRAG1240
      CDPBTL = 0.                                                        DRAG1250
      CDPT = 0.                                                          DRAG1260
      CDPW = 0.                                                          DRAG1270
      CDPBT1 = 0.                                                        DRAG1280
      CDPW1 = 0.                                                         DRAG1290
      CFI = 0.                                                           DRAG1300
      CDPVT=0.0                                                          DRAG1310
      CDPV1=0.0                                                          DRAG1320
      BODCD(JJ)=CFB                                                      DRAG1330
      WNGCD(JJ)=CFW                                                      DRAG1340
      TAILCD(JJ)=CFT                                                     DRAG1350
      TAXLCD(JJ)=CFTT                                                    DRAG1360
  400 CONTINUE                                                           DRAG1370
      IF(ITN.EQ.3)              TN = ATAN(1./(FR+FR))*DPR                DRAG1380
      IF(ITN.LE.2.OR.ITN.GT.3) TN = ASIN(FR/(.25+FR*FR))*DPR             DRAG1390
      IF(ITRIP) 500, 510, 610                                            DRAG1400
C                                                                        DRAG1410
C****************** DRAG CALCULATIONS FOR M.LE.0.9 **********************DRAG1420
C                                                                        DRAG1430
  500 IF(ITN.EQ.4) GO TO 501                                             DRAG1440
      CDPN =  CFB*(1.5/FRB**1.5+7./FRB**3)                               DRAG1450
      GO TO 502                                                          DRAG1460
  501 CALL LINE(15,RM,CDSPHR(1),CDPN)                                    DRAG1470
  502 CDOT = CFT*(1.+2.*THKRT+100.*THKRT**4)                             DRAG1480
      CDOVT=CFVT*(1.0 + 2.0*THKRVT + 100.0*THKRVT**4)                    DRAG1490
      IF ( IART  .NE.  1  )  CDOVT = 0.                                  DRAG1500
      CDPVT=CDOVT-CFVT                                                   DRAG1510
      IF ( IART  .NE.  1  )  CDPVT = 0.                                  DRAG1520
  506 IF(NW.EQ.1) CDOW = CFW*(1.+2.*THKRW+100.*THKRW**4)                 DRAG1530
      CDPT = CDOT-CFT                                                    DRAG1540
      IF(NW.EQ.1) CDPW = CDOW-CFW                                        DRAG1550
  508 GO TO 890                                                          DRAG1560
C                                                                        DRAG1570
C****************** DRAG CALCULATIONS FOR M = 1.0 ***********************DRAG1580
C                                                                        DRAG1590
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  510 IF(ITN.GT.4) GO TO 540                                          DRAG1600
      IF(ITN.EQ.4) GO TO 545                                          DRAG1610
      IF(ITN.EQ.3) GO TO 520                                          DRAG1620
      CALL LINE(10,TN,CDP50(1),CDPN)                                  DRAG1630
      GO TO 550                                                       DRAG1640
  520 CALL LINE(10,TN,CDP51(1),CDPN)                                  DRAG1650
      GO TO 550                                                       DRAG1660
  540 CONTINUE                                                        DRAG1670
      FR1=RL1A/D1                                                     DRAG1680
      CDPN   = FR1*(FR1*(-.0021*FR1 + .038) - .210) + .408            DRAG1690
      GO TO 550                                                       DRAG1700
  545 CALL LINE(15,RM,CDSPHR(1),CDPN)                                 DRAG1710
  550 CONTINUE                                                        DRAG1720
      THDBT = 0.0                                                     DRAG1730
      IF (IBTL.NE.0) THDBT = ATAN((1.-DD)/(RLD+RLD))                  DRAG1740
      IF(IBTL.EQ.0) GO TO 580                                         DRAG1750
      IF(IBTL.NE.0) GO TO 560                                         DRAG1760
  560 NPTS = 14                                                       DRAG1770
  570 CALL LINE(NPTS, DD2,CDP53(1),CDPBT1)                            DRAG1780
      CDPBTL = 0.0                                                    DRAG1790
      IF ( THDBT  .LE.  0.0  )  GO TO 580                             DRAG1800
      CDPBTL = (CDPBT1*8.0)/(RLD*RLD*THDBT*DPR)                       DRAG1810
  580 IF(ILUG.EQ.1) FL = 18.6                                         DRAG1820
      IF(NAERO(8).EQ.1) GO TO 590                                     DRAG1830
  585 CONTINUE                                                        DRAG1840
  590 CALL LINE(26, ATNS4T,CDPM1(1), CDPT1)                           DRAG1850
      CDPT = CDPT1*ATCT*STSREF                                        DRAG1860
      IF(IART.NE.1) GO TO 593                                         DRAG1870
      CALL LINE(26,ATN4VT,CDPM1(1),CDPV1)                             DRAG1880
      CDPVT =CDPV1*ATCVT*SVTSRF                                       DRAG1890
  593 IF(NAERO(9).EQ.1) GO TO 594                                     DRAG1900
  586 CONTINUE                                                        DRAG1910
  594 IF(NW.EQ.0) GO TO 600                                           DRAG1920
      CALL LINE(26, ATNS4W,CDPM1(1), CDPW1)                           DRAG1930
      CDPW = CDPW1*ATCW*SWSREF                                        DRAG1940
  600 I = 12                                                          DRAG1950
      IF(J.EQ.1) WRITE(6,124) I, TN, CDPBT1, CDPT1, CDPW1,THDBT       DRAG1960
      GO TO 890                                                       DRAG1970
C                                                                     DRAG1980
C***************** DRAG CALCULATIONS FOR M.GE. 1.2 *******************DRAG1990
C                                                                     DRAG2000
  610 CONTINUE                                                        DRAG2010
      IF ( J .EQ. 1 ) WRITE(6,DOG)                                    DRAG2020
C                                                                     DRAG2030
C*************** MACH NO. 4.000 USES SUPERSONIC ROUTINES    **********DRAG2040
C                                                                     DRAG2050
      IF (RM.LE.4.) GO TO 620                                         DRAG2060
  620 GO TO (670, 640, 650, 720, 725, 725),ITN                        DRAG2070
  640 CALL LINE(29,DML,CDNVK(1),CDWM2)                                DRAG2080
      GO TO 700                                                       DRAG2090
  650 CALL LINE(29,DML,CDNCO(1),CDWM2)                                DRAG2100
      GO TO 700                                                       DRAG2110
  670 CALL LINE(29,DML,CDNOG(1),CDWM2)                                DRAG2120
  700 CONTINUE                                                        DRAG2130
      CDPN = CDWM2/RM**2                                              DRAG2140
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      GO TO 730                                                          DRAG2150
  720 IF(ITN.EQ.4) CALL LINE(15,RM,CDSPHR(1),CDPN)                       DRAG2160
      GO TO 730                                                          DRAG2170
  725 CONTINUE                                                           DRAG2180
      CDWM2 = 0.                                                         DRAG2190
      CALL        BLTWD(RM,CDPN)                                         DRAG2200
  730 IF (IBTL.EQ.0) GO TO 760                                           DRAG2210
      IF(IBTL.NE.0) GO TO 750                                            DRAG2220
  750 CALL BLINE(10, 21,CDABT6(1),RLDB,DD2, CDA)                         DRAG2230
      CDPBTL = .25*CDA*(1./BLD)**2                                       DRAG2240
      IF(CDPBTL.LT.0.0)CDPBTL=0.0                                        DRAG2250
  760 CONTINUE                                                           DRAG2260
      IF(ILUG.EQ.1) CALL LINE(11, RM,FLRM7(1), FL)                       DRAG2270
      IF(FL.LT.0.) FL = 0.                                               DRAG2280
      IF(ITSECT.NE.1)GO TO 770                                           DRAG2290
      CDPT = THKRT*THKRT/(BETA*(RXINT-RXINT*RXINT))*STSREF               DRAG2300
      IF (BTANST.LT.1.0) CDPT=THKRT*THKRT/(TANST*(RXINT-RXINT*RXINT))    DRAG2310
     1*STSREF                                                            DRAG2320
      IF(IART.NE.1) GO TO 770                                            DRAG2330
      CDPVT=THKRVT*THKRVT/(BETA*(RXINVT-RXINVT*RXINVT))*SVTSRF           DRAG2340
      IF(BTANVT.LT.1.0) CDPVT=THKRVT*THKRVT/(TANSVT*(RXINVT-RXINVT       DRAG2350
     1*RXINVT))*SVTSRF                                                   DRAG2360
  770 CONTINUE                                                           DRAG2370
      IF(ITSECT.NE.2) GO TO 780                                          DRAG2380
      CDPT = THKRT*THKRT*5.333/BETA*STSREF                               DRAG2390
      IF(BTANST.LT.1.0) CDPT = THKRT*THKRT*5.333/TANST*STSREF            DRAG2400
      IF(IART.NE.1) GO TO 780                                            DRAG2410
      CDPVT=THKRVT*THKRVT*5.333/BETA*SVTSRF                              DRAG2420
      IF(BTANVT.LT.1.)CDPVT=THKRVT*THKRVT*6.333/TANSVT*SVTSRF            DRAG2430
  780 CONTINUE                                                           DRAG2440
      IF(ITSECT.NE.3) GO TO 820                                          DRAG2450
      AKONS=RCT*(RCT-FLTSET)/(XLENT*(RCT-XLENT-FLTSET))                  DRAG2460
      CDPT=THKRT*THKRT*AKONS/BETA*STSREF                                 DRAG2470
      IF(BTANST.LT.1.) CDPT=THKRT*THKRT*AKONS/TANST*STSREF               DRAG2480
      IF(IART.NE.1) GO TO 820                                            DRAG2490
      AKONSV=RCVT*(RCVT-FLVTST)/(XLENVT*(RCVT-XLENVT-FLVTST))            DRAG2500
      CDPVT=THKRVT*THKRVT*AKONSV/BETA*SVTSRF                             DRAG2510
      IF(BTANVT.LT.1.)CDPVT=THKRVT*THKRVT*AKONSV/TANSVT*SVTSRF           DRAG2520
  820 CONTINUE                                                           DRAG2530
      IF(NW.NE.1) GO TO 880                                              DRAG2540
      IF(IWSECT.NE.1) GO TO 830                                          DRAG2550
      CDPW = THKRW*THKRW/(BETA*(RXINW-RXINW*RXINW))*SWSREF               DRAG2560
      IF(BTANSW.LT.1.0) CDPW = THKRW*THKRW/(TANSW*(RXINW-RXINW*RXINW))   DRAG2570
     1 *SWSREF                                                           DRAG2580
  830 CONTINUE                                                           DRAG2590
      IF(IWSECT.NE.2) GO TO 840                                          DRAG2600
      CDPW = THKRW*THKRW*5.333/BETA*SWSREF                               DRAG2610
      IF(BTANSW.LT.1.0) CDPW = THKRW*THKRW*5.333/TANSW*SWSREF            DRAG2620
  840 CONTINUE                                                           DRAG2630
      IF(IWSECT.NE.3) GO TO 860                                          DRAG2640
      AKONS = RCW*(RCW-FLTSEW)/(XLENW*(RCW-XLENW-FLTSEW))                DRAG2650
      CDPW = THKRW*THKRW*AKONS/BETA*SWSREF                               DRAG2660
      IF(BTANSW.LT.1.0) CDPW = THKRW*THKRW*AKONS/TANSW*SWSREF            DRAG2670
  860 CONTINUE                                                           DRAG2680
      IF ( J .EQ. 1 ) WRITE(6,DCG)                                       DRAG2690
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  880 CONTINUE                                                          DRAG2700
      I = 13                                                            DRAG2710
      IF(J.EQ.1) WRITE(6,123) I, CDWM2, CDA, ALSRT, ALPT, CNAST         DRAG2720
  950 CONTINUE                                                          DRAG2730
      CDPHT=0.0                                                         DRAG2740
      IF(IART.EQ.1)  CDPHT=CDPT                                         DRAG2750
      CDPNAR(JJ)=CDPN                                                   DRAG2760
      CDLAR(JJ)=CDL                                                     DRAG2770
      CDPWAR(JJ)=CDPW                                                   DRAG2780
      CDHTAR(JJ)=CDPHT                                                  DRAG2790
      CDVTAR(JJ)=CDPVT                                                  DRAG2800
      CDTLAR(JJ)=CDPT                                                   DRAG2810
      CDPLS=CDPW + CDPT + CDPVT                                         DRAG2820
      CDPLSA(JJ)=CDPLS                                                  DRAG2830
      CDBTAR(JJ)=CDPBTL                                                 DRAG2840
C                                                                       DRAG2850
C****************** LUG PRESSURE DRAG *** ALL MACH. NUMBERS ************DRAG2860
C                                                                       DRAG2870
      CDL = FL/SREF                                                     DRAG2880
C                                                                       DRAG2890
      CDFL1=0.0                                                         DRAG2900
      CDFL2=0.0                                                         DRAG2910
  900 CONTINUE                                                          DRAG2920
      CDFXR1(JJ)=CDFL1                                                  DRAG2930
      CDFXR2(JJ)=CDFL2                                                  DRAG2940
C                                                                       DRAG2950
C****************** TOTAL BODY DRAG *** ALL MACH. NUMBERS **************DRAG2960
C                                                                       DRAG2970
      CDOB = CDPN+CDPBTL+CFB+CDL                                        DRAG2980
      CDOB=CDOB + CDFL1 + CDFL2                                         DRAG2990
      CDPBOD(JJ)=CDOB-CFB                                               DRAG3000
      I = 14                                                            DRAG3010
      IF(J.EQ.1) WRITE(6,122) I, CDPN, CDPBTL, CFB, CDL,       CDOB     DRAG3020
C                                                                       DRAG3030
C****************** TOTAL WING DRAG *** ALL MACH. NUMBERS **************DRAG3040
C                                                                       DRAG3050
      CDOW=CDPW + CFW                                                   DRAG3060
C                                                                       DRAG3070
C                                                                       DRAG3080
C****************** TOTAL TAIL DRAG *** ALL MACH. NUMBERS **************DRAG3090
C                                                                       DRAG3100
  903 CONTINUE                                                          DRAG3110
      CDOT = CDPT+CFT                                                   DRAG3120
C                                                                       DRAG3130
C****************** BASE PRESSURE DRAG (POWER ON/POWER OFF) ************DRAG3140
C                                                                       DRAG3150
      CDOVT = 0.0                                                       DRAG3160
      IF(IART.NE.1) GO TO 906                                           DRAG3170
      CDOVT=CDPVT + CFVT                                                DRAG3180
  906 CONTINUE                                                          DRAG3190
      IF ( KSTEP  .LE.  1  )  GO TO 915                                 DRAG3200
      KSYS = 1                                                          DRAG3210
      NTEN = 10                                                         DRAG3220
      KINDB = MOD(KIND,NTEN)                                            DRAG3230
      IF ( KINDB .NE. 3 ) GO TO 8497                                    DRAG3240
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      CALL BDCSTD( RM, ALT, CDBST )                                      DRAG3250
      CDBON = CDBST                                                      DRAG3260
      CDBOFF = CDBON                                                     DRAG3270
      GO TO 1177                                                         DRAG3280
 8497 CONTINUE                                                           DRAG3290
      EXIT = PEXIT                                                       DRAG3300
  908 CONTINUE                                                           DRAG3310
      CDBON=0.0                                                          DRAG3320
      CDBOFF=0.0                                                         DRAG3330
      IF ( KSTEP  .LE.  1  )  GO TO 1177                                 DRAG3340
      DE = SQRT ( 576. * EXIT / PI )                                     DRAG3350
      AR = ( DB**2 - DE**2 ) / D1**2                                     DRAG3360
      CALL LINE(10,RM,BASECP(1),CPBASE)                                  DRAG3370
      CDBOFF=-CPBASE*DB**3/D1**3                                         DRAG3380
      CDBON=-CPBASE*AR*DB/D1                                             DRAG3390
 1177 CONTINUE                                                           DRAG3400
      BDBOFF(JJ)=CDBOFF                                                  DRAG3410
      BDBON(JJ)=CDBON                                                    DRAG3420
      I = 15                                                             DRAG3430
      IF(J.EQ.1) WRITE(6,125) I, CDBW, CFW, CDOW, CDPT, CFT, CDOT        DRAG3440
C                                                                        DRAG3450
  910 CONTINUE                                                           DRAG3460
      CDOI=0.0                                                           DRAG3470
      IF ( KSTEP  .LE.  1  )  GO TO 1199                                 DRAG3480
      IF  (  KIND  .LT.  30  )  GO TO 1199                               DRAG3490
      ZAP(23)=ALT*1000.                                                  DRAG3500
      ZASAV = ZARZ(16)                                                   DRAG3510
      ZARZ(16) = RM                                                      DRAG3520
      CALL CDINLT                                                        DRAG3530
      FBGCD(JJ)=CDBAFT/ACA3                                              DRAG3540
      CDCWL(JJ)=CDCOWL/ACA3                                              DRAG3550
      BLDVAR(JJ)=CDBDIV/ACA3                                             DRAG3560
      CDBINL=CDBDIV + CDBAFT + CDCOWL + CDBFWD                           DRAG3570
      CDBINX(JJ)=CDBINL                                                  DRAG3580
      CDBINT(JJ)=CDBINL*XNINLT                                           DRAG3590
      XINCD(JJ)=CDSKIN * XNINLT                                          DRAG3600
      ZARZ(16)=  ZASAV                                                   DRAG3610
      CDFTOT=CFB + CFW + CFT + CFVT+ (CDSKIN + CDFDIV + CDFFWD)*XNINLT   DRAG3620
      FRICCD(JJ)=CDFTOT                                                  DRAG3630
 1199 CONTINUE                                                           DRAG3640
  966 CONTINUE                                                           DRAG3650
C                                                                        DRAG3660
C****************** TOTAL ZERO LIFT DRAG (POWER ON) *** ALL MACH. NUMBERDRAG3670
C                                                                        DRAG3680
      CDOON=CDOB + CDOT +CDOW + CDOI + CDOVT + CDBON                     DRAG3690
C                                                                        DRAG3700
C****************** TOTAL ZERO LIFT DRAG (POWER OFF) *** ALL MACH. NUMBEDRAG3710
C                                                                        DRAG3720
      CDOOFF = CDOON-CDBON+CDBOFF                                        DRAG3730
  977 CONTINUE                                                           DRAG3740
      IF ( KSYS  .GT.  1  )  GO TO 920                                   DRAG3750
      CDOB = CDOON                                                       DRAG3760
  915 CONTINUE                                                           DRAG3770
      KSYS = 2                                                           DRAG3780
      EXIT = SEXIT                                                       DRAG3790
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      GO TO 908                                                          DRAG3800
  920 CONTINUE                                                           DRAG3810
      CDOS = CDOON                                                       DRAG3820
      I = 16                                                             DRAG3830
      IF(J.EQ.1) WRITE(6,126) I, CDBOFF, CDBON, CDOI, CDOCN, CDOCFF      DRAG3840
      IF ( J .EQ. 1 ) WRITE(6,BUG)                                       DRAG3850
      IF ( J  .EQ.  1  )  WRITE ( 6, NAMVER )                            DRAG3860
      CDPTOT= CDPN + CDPW + CDPT + CDPVT + CDFL1 + CDFL2 + CDPBTL        DRAG3870
     1 + CDBON + CDPINL*XNINLT + CDL                                     DRAG3880
      CDPTAR(JJ)=CDPTOT                                                  DRAG3890
      CDPOFF=CDPTOT - CDBON + CDBOFF                                     DRAG3900
      CDPOFA(JJ)=CDPOFF                                                  DRAG3910
      CDOONA(JJ)=CDOON                                                   DRAG3920
      CDOOFA(JJ)=CDOOFF                                                  DRAG3930
      RETURN                                                             DRAG3940
      END                                                                DRAG3950


      SUBROUTINE INLIFX ( NRM, CLAINL, CDBON )                           INLI0010
C   NUK.CM-CGSM  R.K.MCDONOUGH  FIV/EBCD   10/18/73                      INLI0020
      COMMON /AERZ/ AZU11(11), NAERO(30)                                 INLI0030
C     PGM=NUK.CM-CGSM    GGJ/RKM   FIV-EBCD   7/11/73                  INLI0040
C     GLINT ANOMALY                                                      INLI0050
      REAL*4  KAR,KM                                                     INLI0060
      DIMENSION BASECP(20)                                               INLI0070
      COMMON /INSERT/ ZX17(17), TNOZL,  ZX15(15)                         INLI0080
      COMMON /FORNOW/ NRZ,NALT,RMV(20),ALTV(10),FRBT,FACTOR              INLI0090
      COMMON /INCOMM/XLDUMP,XFFRNG,XINLET,XTIPCL,STERM,TNC               INLI0100
      EQUIVALENCE  (  XFFRNG, XFWDA  )                                   INLI0110
      COMMON /EXTERN/ZAR(20)                                             INLI0120
      EQUIVALENCE   (ZAR(17), XMRJTO ),(ZAR(6),XTOTAL)                   INLI0130
      EQUIVALENCE ( XCPI, PRAMBL(129)      )                             INLI0140
      EQUIVALENCE(PRAMBL(99), CMAN), (PRAMBL(100), CNBN)                 INLI0150
      COMMON /CODEXX/ INIZ,ITYPE, I14(14)                                INLI0160
      COMMON /INDATX/ZX9(9),XCHECK,XFRNG, ZX12(12)                       INLI0170
      COMMON /RJDAT/ ZX3(3),A6A3,ACA3, ZX4(4)                            INLI0180
      COMMON /BASVAR/ ZA7(7), SWI, STI, ARW, ZA10(10)                    INLI0190
      COMMON /UPINLT/  PRAMBL(129) , XCGD1                               INLI0200
      COMMON /ALFBLK/   AMACH, AMEX13(13)                                INLI0210
      COMMON/LFT/                                                        INLI0220
     1   ATNS2T   ,ATNS2W   ,SEW      ,SET      ,DMW      ,DMT      ,    INLI0230
     2   RL4      ,RL5      ,ALPHAR   ,RITWV    ,IART     ,ICNTRL   ,    INLI0240
     3   D2       ,RL2                                                  INLI0250
      COMMON/DRG/                                                        INLI0260
     1   D1       ,THETAC   ,FINE     ,RS       ,R1       ,RL1      ,    INLI0270
     2   XCYL     ,XTHEBT   ,XBT      ,RL3      ,ITN      ,AMACW    ,    INLI0280
     3   AMACT    ,THKRT    ,THKRW    ,RL1A     ,IBTL     ,ATCT     ,    INLI0290
     4   ATCW     ,DML      ,ITSECT   ,IWSECT   ,RXINT    ,RXINW    ,    INLI0300
     5   BTANST   ,BTANSW   ,RCW      ,FLTSEW   ,XLENW    ,FLTSET   ,    INLI0310
     6   XLENT    ,QRATIO   ,DN       ,DE       ,D3       ,RCT      ,    INLI0320
     7   NW       ,TCW      ,TCT      ,BT       ,BW       ,ART      ,    INLI0330
     8   ARWX     ,TRT      ,TRW      ,SREF     ,DB                       INLI0340
      COMMON/AERO/                                                       INLI0350
     1   ATNS4T   ,ATNS4W   ,BTANA    ,BART     ,BARW     ,BAPT     ,    INLI0360
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     2    BAPW      ,BAPPT     ,BAPPW     ,BETA      ,BFN       ,CFT       ,    INLI0370
     3    CFW       ,CDB       ,CFB       ,CNANAC    ,CLABT     ,CLAT      ,    INLI0380
     4    CLAW      ,CLTV      ,CKWB      ,CKBW      ,CKBT      ,CKTB      ,    INLI0390
     5    CLATWV    ,D         ,DD        ,DD2       ,DPR       ,DHL       ,    INLI0400
     6    FAFN      ,F         ,FL        ,FR        ,PI        ,RLD       ,    INLI0410
     7    RLDB      ,RBTANA    ,SLETR     ,SLEWR     ,STSREF    ,SWSREF    ,    INLI0420
     8    SKBT      ,SKTB      ,SKBW      ,SKWB      ,TRTP1     ,TRWP1     ,    INLI0430
     9    CFI       ,TANST     ,TANSW     ,TANS4T    ,TANS4W    ,TANS2T    ,    INLI0440
     A    TANS2W    ,XD1B      ,XD1BT     ,XD1T      ,XD1W      ,XNLCMB    ,    INLI0450
     B    XNLCFB    ,ACT       ,ACW       ,XNLCLB    ,BODYL     ,TAILL     ,    INLI0460
     C    WINGL     ,RL1SQR    ,D1SQR     ,FRL       ,FCAP      ,CDPNX     ,    INLI0470
     D    ACAP      ,TN1       ,SPN       ,VPN       ,FAFN1     ,PMN       ,    INLI0480
     E    ANOSE2    ,SWSBN     ,RNOSE2    ,XLINE     ,CR2       ,NCON(3)   ,    INLI0490
     F    CPEMAX    ,CRAMAX    ,B2        ,CNVR      ,BI        ,BZ        ,    INLI0500
     G    SV2       ,SLEI      ,SLEZ      ,XVA       ,XVB       ,XVC       ,    INLI0510
     H    CT2       ,CX        ,VOLN      ,VOLBT     ,VOLBOD    ,SWBREF    ,    INLI0520
     I    BRAT      ,ROG                                                        INLI0530
      COMMON/CHK/CON1,KAR,KM                                                   INLI0540
      NAMELIST/CHECK/ ARN,SFN,TRN,ATNS2N,BARN,AICLN,THKRN,RXINN,               INLI0550
     1SLEN,BTANSN,CNRN,DELNN,      CON1,KM,KAR                                INLI0560
      NAMELIST/OUTPUT/BN,RCN,TCN,SLEN,XCPI,CLAM,ARN,                           INLI0570
     1CDBOFF,CLATWV,RM,CLAIWV,CMAN,CNBN                                        INLI0580
      NAMELIST/INPUT/XMRJTO,STERM,XINLET,XLDUMP,XFRNG,XTOTAL,D3,               INLI0590
     1AGA3,A3,SREF,XTIPCL,ITYPE,XFWDA,XD1T,CLAT,     RMV,D1,XCHECK,           INLI0600
     2SET,FRBT,BT,TRT,TNOZL,FACTOR,A6A3,XCGD1,ART                              INLI0610
1002 FORMAT(//I3, 2X, 6HINTWOD, 2H, ,                                          INLI0620
     1     6H  XCPI, 2H =, E10.3, 2H, , 6H  CLAN, 2H =, E10.3, 2H, ,           INLI0630
     2     6H  CLAM, 2H =, E10.3, 2H, , 6H  CKNB, 2H =, E10.3, 2H, ,           INLI0640
     3     6H  CKBN, 2H =, E10.3, 2H, , 6HCLAINL, 2H =, E10.3)                 INLI0650
      DATA BASECD/                                                             INLI0660
     1        0.0, -.137, 0.8, -.137, 0.9, -.145, 1.0, -.195, 1.2, -.191,     INLI0670
     1      1.5, -.172, 2.0, -.141, 3.0, -.092, 4.0, -.065, 5.0, -.048/       INLI0680
      PI = 3.141593                                                            INLI0690
      C = PI / 180.                                                            INLI0700
      DPR = 57.29578                                                           INLI0710
      ALT=1.                                                                   INLI0720
      ALPHAR=C.                                                                INLI0730
      ARWX = ARW                                                               INLI0740
      CDNBTL=C.0                                                               INLI0750
      A3 = ZAR(12)                                                             INLI0760
      IOUT = NAERO(15)                                                         INLI0770
      A3 = A3  * 144.                                                          INLI0780
      SREF = A3                                                                INLI0790
      D3 = ZAR(3)                                                              INLI0800
      D1 = D3                                                                  INLI0810
      R1=D1/2.                                                                 INLI0820
      RL3 =  XTOTAL                                                            INLI0830
      IF ( IOUT.EQ.1) WRITE(6,INPUT)                                           INLI0840
      DO 100 J=1,NRM                                                           INLI0850
      RM=RMV(J)                                                                INLI0860
      IF (  NRM  .LE.  1  ) RM = AMACH                                         INLI0870
      IF(ITYPE.NE.2) GO TO 5000                                                INLI0880
      IF(RM.LT.XMRJTO) GO TO 5100                                              INLI0890
      BN=STERM*2.0                                                             INLI0900
      RCN=XINLET + XLDUMP + 0.5*XFRNG                                          INLI0910
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      TCN=RCN                                                          INLI0920
      SLEN=0.0                                                         INLI0930
      THKRN=0.05                                                       INLI0940
      RXINN=0.5                                                        INLI0950
      XCPI = XCHECK / D3                                               INLI0960
      SEN=2.0*RCN*STERM                                                INLI0970
      CLAM=2.0*ACA3*A3/(57.296*SREF)                                   INLI0980
      GO TO 5300                                                       INLI0990
 5000 IF(RM.LT.XMRJTO) GO TO 5200                                      INLI1000
      CLAINL=0.0                                                       INLI1010
      CLAM=2.0*ACA3*A3/(57.296*SREF)                                   INLI1020
      RCN=XINLET + XLDUMP + 0.5*XFRNG + XTIPCL                         INLI1030
      TCN=RCN - XTIPCL                                                 INLI1040
      SLEN=ATAN(STERM/XTIPCL)                                          INLI1050
 5050 CONTINUE                                                         INLI1060
      THKRN=0.05                                                       INLI1070
      RXINN=0.5                                                        INLI1080
      XCPI = XCHECK / D3                                               INLI1090
      XFLUMM = ( XTOTAL - XINLET - XLDUMP - XFRNG ) / D3               INLI1100
      IF ( ITYPE .EQ. 1 .AND. RM.GT.XMRJTO ) XCPI = XFLUMM             INLI1110
      SEN=    (RCN + TCN)*STERM                                        INLI1120
      BN =2.*STERM                                                     INLI1130
      ARN=BN*BN/SEN                                                    INLI1140
      GO TO 5300                                                       INLI1150
 5100 CLAM=0.0                                                         INLI1160
      RCN=XINLET + XLDUMP  + XFWDA + 0.5*XFRNG                         INLI1170
      TCN=RCN - XFWDA                                                  INLI1180
      BN=STERM*2.0                                                     INLI1190
      SLEN=0.0                                                         INLI1200
      IF(XFWDA.GT.0.0) SLEN=ATAN(STERM/XFWDA)                          INLI1210
      THKRN=0.05                                                       INLI1220
      RXIWN=0.5                                                        INLI1230
      RXINN=0.5                                                        INLI1240
      XCPI = XCHECK / D3                                               INLI1250
      SEN=0.5*(RCN + TCN)*BN                                           INLI1260
      GO TO 5300                                                       INLI1270
 5200 CLAM=0.0                                                         INLI1280
      CLAI=0.0                                                         INLI1290
      RCN=XINLET + XLDUMP +0.5*XFRNG + XFWDA                           INLI1300
      TCN=RCN-XFWDA                                                    INLI1310
      SLEN=0.0                                                         INLI1320
      IF(XFWDA.GT.0.0) SLEN=ATAN(STERM/XFWDA)                          INLI1330
      GO TO 5050                                                       INLI1340
 5300 ARN=BN*BN/SEN                                                    INLI1350
C*************** SWEEP ANGLE LIMIT OF 62.5 DEG. ************************INLI1360
C                                                                      INLI1370
      IF(SLEN.GT.1.0908) SLEN = 1.0908                                 INLI1380
      TRN = TCN/RCN                                                    INLI1390
      SVAL = SLEN                                                      INLI1400
      IF (SVAL.EQ.0.0) SVAL=0.01                                       INLI1410
      TANSN = TAN(SVAL)                                                INLI1420
      TANS2N = TANSN+(TCN-RCN)/BN                                      INLI1430
      ATNS2N = ARN*TANS2N                                              INLI1440
      BETA = SQRT(ABS(RM*RM-1.0))                                      INLI1450
      BARN = BETA*ARN                                                  INLI1460
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      BTANSN = BETA/TANSN                                                    INLI1470
      ALSEN = 0.                                                             INLI1480
      CNASN = 0.                                                             INLI1490
      ALPT = 0.                                                              INLI1500
      DEN = 0.                                                               INLI1510
      VMN = RM*SQRT(1.-(SIN(SLEN)**2))                                       INLI1520
      DDELN = ATAN(THKRN/(RXINN+RXINN))                                      INLI1530
      DELNN = DPR*DDELN/COS(SLEN)                                            INLI1540
C                                                                            INLI1550
C*************** LINEAR LIFT DUE TO NACELLES ****************************INLI1560
C                                                                            INLI1570
      CALL LIFT1(ARN,SEN,TRN,ATNS2N,BARN,AICLN,THKRN,RXINN,SLEN,             INLI1580
     1           BTANSN,CNRN,DELNN,CLAN,RM)                                  INLI1590
      IF ( IOUT.EQ.1) WRITE(6,CHECK)                                         INLI1600
      IF(RM.GE.1.0.AND.RM.LE.1.65) KM=0.35 + 1.*(RM-1.)                      INLI1610
      IF(RM.GT.1.65.AND.RM.LE.2.1) KM=1.                                     INLI1620
      IF(RM.GT.2.1.AND.RM.LE.3.65) KM=1.-0.515*(RM-2.1)                      INLI1630
      IF(RM.GT.3.65.AND.RM.LE.5.0) KM= .2-.148*(RM-3.65)                     INLI1640
      IF(RM.GT.5.) KM=0.                                                     INLI1650
      KAR=-.2468 + .2463/ARN                                                 INLI1660
      CLANI=CLAN/(1. + KM*KAR)                                               INLI1670
      TRNP1 = TRN+1.0                                                        INLI1680
      BAPN = 0.0                                                             INLI1690
      IF (RM.NE.1.0) BAPN=BARN*TRNP1*(1.0+1.0/BTANSN)                        INLI1700
      RLLN=XCHECK -XFWDA                                                     INLI1710
      IF(RM.GE.XMRJTO) RLLN=XCHECK                                           INLI1720
      DMNN = D3                                                              INLI1730
C                                                                            INLI1740
C*************** CARRYOVER TERMS *****************************************INLI1750
C                                                                            INLI1760
      CALL LIFT2(BTANSN,TRNP1,RCN,DMNN,ARN,BN,BAPN,BARN,CLAN,AICLN,          INLI1770
     1           RLLN,CKNB,CKBN,RM)                                          INLI1780
C                                                                            INLI1790
C*************** TOTAL LINEAR NACELLE LIFT ******************************INLI1800
C                                                                            INLI1810
      CLAINL=CLANI*(CKNB + CKBN)  + CLAM                                     INLI1820
      IF(ITYPE.EQ.1) CLAINL = CLAM                                           INLI1830
      IF ( ITYPE  .EQ.  1  )  CLAINL  =  CLAM                                INLI1840
      I = 3                                                                  INLI1850
      IF ( IOUT.EQ.1) WRITE(6,1002) I,XCPI,CLAN,CLAM,CKNB,CKBN,CLAINL        INLI1860
      CLI = 0.                                                               INLI1870
      CNNF = 0.                                                              INLI1880
      CNAAN = 0.                                                             INLI1890
      IV=2                                                                   INLI1900
      LINEAR=1                                                               INLI1910
      CWI=0.                                                                 INLI1920
      CMW=D3                                                                 INLI1930
      CMT=D3                                                                 INLI1940
      AHL=XCHECK                                                             INLI1950
      IF(ITYPE.EQ.1) GO TO 202                                               INLI1960
      IF(ITYPE.EQ.2) CYBI=CLAM                                               INLI1970
      IF(ITYPE.EQ.2) XCPIY=XCHECK                                            INLI1980
      GO TO 203                                                              INLI1990
  202 CONTINUE                                                               INLI2000
      CLATWV=0.0                                                             INLI2010
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      IF(ITYPE.EQ.1) XCPIY=XCPI                                          INLI2020
      IF(ITYPE.EQ.1) CYBI=0.5*CLAN*(CKBN + CKNB) + CLAM                  INLI2030
C.............BOATTAIL GEOMETRY                                          INLI2040
  203 CONTINUE                                                           INLI2050
      CMAN=CLAINL*(XCGD1-XCPI)*57.296                                    INLI2060
      CNBN=CYBI*(XCGD1-XCPIY)*57.296                                     INLI2070
      XBT=FRBT*D1                                                        INLI2080
      DE = SQRT ( 4. * A6A3 * A3 / PI  )                                 INLI2090
      DB=DE + FACTOR*(D3-DE)                                             INLI2100
      IF(XBT.GT.TNOZL+1.) XBT=TNOZL+1.                                   INLI2110
      IF(DB.LT.D3)    GO TO 205                                          INLI2120
      DB=D3                                                              INLI2130
      IBTL=0                                                             INLI2140
      GO TO 207                                                          INLI2150
  205 CONTINUE                                                           INLI2160
      IF(IBTL.EQ.0) GO TO 206                                            INLI2170
      RL2=XTOTAL-XBT                                                     INLI2180
      TANBT=(D1-DB)*0.5/(XTOTAL-RL2)                                     INLI2190
      IF(TANBT.GE.0.286)   TANBT=0.286                                   INLI2200
      IF(TANBT.LT.0.0525) GO TO 206                                      INLI2210
C.........MAXIMUM BOATTAIL ANGLE IS 17 DEG.....                          INLI2220
      DB=D1-2.*(XTOTAL-RL2)*TANBT                                        INLI2230
      THETBT=ATAN((D1-DB)/(2.*XBT))                                      INLI2240
      R1=D1/2.                                                           INLI2250
      XTHEBT=R1/TAN(THETBT)                                              INLI2260
      GO TO 207                                                          INLI2270
  206 CONTINUE                                                           INLI2280
      IBTL=0                                                             INLI2290
      THETBT=0.0                                                         INLI2300
      XBT=0.0                                                            INLI2310
      DB=D1                                                              INLI2320
  207 CONTINUE                                                           INLI2330
      AR=(DB**2-DE**2)/D3**2                                             INLI2340
      CALL LINE(10,RM,BASECP(1),CPBASE)                                  INLI2350
      CDBON=-CPBASE*AR*DB/D3                                             INLI2360
      CDBOFF=-CPBASE*DB**3/D3**3                                         INLI2370
      IF ( IOUT.EQ.1) WRITE(6,OUTPUT)                                    INLI2380
  100 CONTINUE                                                           INLI2390
      RETURN                                                             INLI2400
      END                                                                INLI2410


      SUBROUTINE LIFT(RM,CNA,KSTEP)                                      LIFT0010
C     PGM=NUK.CMCGSM      GGJ/RKM      FIV/EBCD      9/10/73             LIFT0020
      DOUBLE PRECISION Q,Q1,Q2,A1,A2,ZZT,CVV,CVVT,CVVW                   LIFT0030
      COMMON/AA/CP37AL(45),CP314A(45),CP27AL(45),CP214A(45),XCPBFN(36),  LIFT0040
     4XCPBPP(36),XCP74(133),XCP64(45),XCP65(45),XCP75(133),CNA21(90),    LIFT0050
     5CNA22(78),CNA23(105),CNA24(77),VOLRA(78),EKERB(34)                 LIFT0060
     A,CNA72(152),CNA73(152)                                             LIFT0070
      COMMON/AERO/                                                       LIFT0080
     1   ATNS4T    ,ATNS4W    ,BTANA     ,BART      ,BARW      ,BAPT     ,  LIFT0090
     2   BAPW      ,BAPPT     ,BAPPW     ,BETA      ,BFN       ,CFT      ,  LIFT0100
     3   CFW       ,CDB       ,CFB       ,CNANAC    ,CLABT     ,CLAT     ,  LIFT0110
     4   CLAW      ,CLTV      ,CKWB      ,CKBW      ,CKBT      ,CKTB     ,  LIFT0120
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5    CLATWV    ,D         ,DD        ,DD2       ,DPR       ,DHL       ,    LIFT0130
6    FAFN      ,F         ,FL        ,FR        ,PI        ,RLD       ,    LIFT0140
7    RLDB      ,RBTANA    ,SLETR     ,SLEWR     ,STSREF    ,SWSREF    ,    LIFT0150
8    SKBT      ,SKTB      ,SKBW      ,SKWB      ,TRTP1     ,TRWP1     ,    LIFT0160
9    CFI       ,TANST     ,TANSW     ,TANS4T    ,TANS4W    ,TANS2T    ,    LIFT0170
A    TANS2W    ,XD1B      ,XD1BT     ,XD1T      ,XD1W      ,XNLCMB    ,    LIFT0180
B    XNLCDB    ,ACT       ,ACW       ,XNLCLB    ,BODYL     ,TAILL     ,    LIFT0190
C    WINGL     ,RL1SQR    ,D1SQR     ,FR1       ,FCAP      ,CDPNX     ,    LIFT0200
D    ACAP      ,TN1       ,SPN       ,VPN       ,FAFN1     ,PMA       ,    LIFT0210
E    ANOSE2    ,SWSBN     ,RNOSE2    ,XLINF     ,CR2       ,NCCN(3)   ,    LIFT0220
F    CPFMAX    ,CRAMAX    ,B2        ,CNVR      ,BI        ,BZ        ,    LIFT0230
G    SV2       ,SLET      ,SLEZ      ,XVA       ,XVB       ,XVC       ,    LIFT0240
H    CT2       ,CX        ,VOLN      ,VOLBT     ,VOLBOD    ,SWBREF    ,    LIFT0250
I    BRAT      ,BOG                                                        LIFT0260
 COMMON/AERZ/ CDOB,CDOW,CDOT,CDOON,CDOOFF,CDBON,CDBOFF,CDOI ,ITRIP,LIFT0270
1ERRT,ERR,NAERO                                                          LIFT0280
 COMMON /ALFBLK/ AMUNCH, AMEX(13)                                        LIFT0290
 COMMON/ARINDX/ JJ,ARIN(9)                                               LIFT0300
 COMMON/BLKQ/ Q1(20), Q(96), Q2(96),          FRCTN1(42), FRCTN2(90)LIFT0310
1 ,FRCTN3(42)                                                            LIFT0320
 COMMON /CODEXX/ KIND, IIKI(15)                                          LIFT0330
 COMMON/DELTA/DELALP,CMDW,CMDT                                           LIFT0340
 COMMON/DRG/                                                             LIFT0350
1    D1        ,THETAC    ,FINE      ,RS        ,R1        ,RL1       ,    LIFT0360
2    XCYL      ,XTHEBT    ,XBT       ,RL3       ,ITN       ,AMACW     ,    LIFT0370
3    AMACT     ,THKRT     ,THKRW     ,RL1A      ,IBTL      ,ATCT      ,    LIFT0380
4    ATCW      ,DML       ,ITSECT    ,IWSECT    ,RXINT     ,RXINW     ,    LIFT0390
5    BTANST    ,BTANSW    ,RCW       ,FLTSEW    ,XLENW     ,FLTSET    ,    LIFT0400
6    XLENT     ,QRATIO    ,DN        ,DE        ,D3        ,RCT       ,    LIFT0410
7    NW        ,TCW       ,TCT       ,BT        ,BW        ,ART       ,    LIFT0420
8    ARW       ,TRT       ,TRW       ,SREF      ,DB                        LIFT0430
 COMMON/EXTERN/ ARR(20)                                                  LIFT0440
 EQUIVALENCE(ARR(5), WMISS)                                              LIFT0450
 COMMON/FIXUP/ DA, DD12,FIX8(8)                                          LIFT0460
 COMMON/HING/RHLTXX,RHLW                                                 LIFT0470
 COMMON/LFT/                                                             LIFT0480
1    ATNS2T    ,ATNS2W    ,SEW       ,SET       ,DMW       ,DMT       ,    LIFT0490
2    RL4       ,RL5       ,ALPHAR    ,RITWV     ,IART      ,ICNTRL    ,    LIFT0500
3    D2     ,RL2                                                         LIFT0510
 COMMON/NAERC/ RNA6(6), DCASE, RNA15(15), RHLT, RNA2(2)                  LIFT0520
 COMMON/ROLL/ RNW,RNT,IARW,BWH,BTH                                       LIFT0530
 COMMON/SAVTIM/ KCLA,SAVT(5)                                             LIFT0540
 COMMON/SUMLIF/CNANOS(20),CNAF1(20),CNAB1(20),CNAF2(20),CNAB2(20),       LIFT0550
1CNABT(20), CNAPD(20),CLAWAR(20), CLAWBA(20), CLABCC(20),                LIFT0560
2CLWBAR(20), CLATAR(20), CLATBA(20), CLATCO(20), CLAWVA(20),             LIFT0570
3 CLTWAR(20), CLATOT(20), CLDUMX(80)                                     LIFT0580
 COMMON/TWU/ GPDEG,ALPTRM,CLATRM,DELTRM                                  LIFT0590
 COMMON/TWX/ RHLTW,VCHAV,VCHDV,CHVI,DYNP,ALINW,CNINW,WMISX               LIFT0600
 COMMON/TWY/CHAW,CHDW,CNDW,CNDT,CHAT,CHDT,CLP,CLRD,CMO,CMAB,CMAT,        LIFT0610
1 CMAW,CMADOT,CMDDOT                                                     LIFT0620
 COMMON/UPINLT/ PRAMBL(128), XCPI, XCGD1                                 LIFT0630
 COMMON/VERT/ SVTSRF,   BARVT,   TANOVT,   TAN2VT,   TAN4VT,             LIFT0640
1     ACVT,   ATN2VT,   ATCVT,   AMACVT,   TMACVT,   BTANVT,             LIFT0650
2    BDCVT,   TRTPV1,  BAPPVT,    BAPVT,   FLVTST,    XLENVT,           LIFT0660
3   CFVT, TRAVT, RXINVT, FSOVVT                                          LIFT0670
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      COMMON/VORLOC/ FSUPER(57),FSUB(57)                                LIFT0680
      COMMON/WLOC/ XD11                                                 LIFT0690
      COMMON/YAWC/ CNR,CNBETA,CYBETA                                    LIFT0700
       COMMON/XXX/ AIC60(301),AIC61(301),CNR66(90),CNR67(42),           LIFT0710
     1XSR46(26),ANL47(28),ANL48(30),ANL49(30),SKK17(85),XAC78(219),     LIFT0720
     2XAC79(219),XACC18(85),XAC271(50),XAC28(177),XAC291(6)             LIFT0730
      COMMON/XYZ/CMA,XD1,CMQ                                            LIFT0740
      EQUIVALENCE(PRAMBL(99), CMAN), (PRAMBL(100), CNBN)                LIFT0750
      DIMENSION RMV(20), ALTV(10), ALPHAV(10), NAERO(30)                LIFT0760
      NAMELIST/FLRBUG/ CNAFL1, CNAFL2,CNABY,FLROUT,NFLR,KFLR,NINV,NVAR, LIFT0770
     1 CNABPD,CNANOS,CNAF1,CNAB1,CNAF2,CNAB2,CNABT                      LIFT0780
     2,PCASE,SREF,CNAAB,X                                               LIFT0790
      NAMELIST/BUG/D3,D2,BTL,VBSL,SBASE,SREF,ALPHAR,VOLN,VOLRAT,        LIFT0800
     1 RBTON, CNANAC,CNABTL,VSBL,CPRAT,XD18,RLD,D,RL2,XD1BTL            LIFT0810
      NAMELIST/SLCM/    TERMA,TERMB,TERMC,TERMD,TERME,TERMF,TERMG,      LIFT0820
     1TERMH,TERMI,CNR,CNBETA,CYBETA                                     LIFT0830
      NAMELIST/ROLL/ BW,RCW,TCW,DMW,ARMYW,PKRW,DMT,BT,RCT,TCT,          LIFT0840
     1 PKRT,CLAW,CLAT,CLPW,CLPT,CLAAWV,CLP,SPANR,CMQ,PK,PKK,            LIFT0850
     2 PKRTD,TPT,SKTB,RNT,RNW,CMADOT,ARMYT,XQTMT,XQTMW                  LIFT0860
    1 FORMAT(//I3, 2X, A6, 6(2H, ,A6, 2H =, F10.3))                     LIFT0870
  110 FORMAT(//I4, 1X, 6H  AERO, 2H, ,                                  LIFT0880
     1     6H   DNM, 2H =, E10.3, 2H, , 6H CNNMD, 2H =, E10.3, 2H, ,    LIFT0890
     2     6H CMNMD, 2H =, E10.3, 2H, , 6H  CDDI, 2H =, E10.3, 2H, ,    LIFT0900
     3     6H CNIED, 2H =, E10.3, 2H, , 6H  CHID, 2H =, E10.3)          LIFT0910
  127 FORMAT(//I3, 2X, 6H  AERO, 2H, ,                                  LIFT0920
     1     6H  CMAB, 2H =, E10.3, 2H, , 6H  CMAT, 2H =, E10.3,  2H, ,   LIFT0930
     2     6H  CMAW, 2H =, E10.3, 2H, , 6H   CMA, 2H =, E10.3,  2H, ,   LIFT0940
     3     6H   CMQ, 2H =, E10.3, 2H, , 6H  CMDI, 2H =, E10.3, 2H, /    LIFT0950
     413X,6H  CLRD, 2H =, E10.3, 2H, , 6H PKRTD, 2H =, E10.3, 2H, ,     LIFT0960
     5     6H   CMI, 2H =, E10.3)                                       LIFT0970
 6025 FORMAT(//I3, 2X, 6H  AERO, 2H, ,                                  LIFT0980
     1     6HDELTRD, 2H =, E10.3, 2H, , 6H CNTDT, 2H =, E10.3, 2H, ,    LIFT0990
     2     6H  CNDT, 2H =, E10.3, 2H, , 6H  DNMT, 2H =, E10.3)          LIFT1000
 6026 FORMAT(//I3, 2X, 6H  AERO, 2H, ,                                  LIFT1010
     1     6HDELTRD, 2H =, E10.3, 2H, , 6H CNTDW, 2H =, E10.3, 2H, ,    LIFT1020
     2     6H  CNDW, 2H =, E10.3, 2H, , 6H  DNMW, 2H =, E10.3)          LIFT1030
      POLY (X,C0,C1,C2,C3) = X * (X*(C3*X + C2) + C1) + C0              LIFT1040
C     TAKE OUT LATER                                                    LIFT1050
      JJ = 1                                                            LIFT1060
      D3SV=D3                                                           LIFT1070
      D3=DB                                                             LIFT1080
      J = NAERO(15)                                                     LIFT1090
      CNABTL = 0.                                                       LIFT1100
      RBTON = 0.                                                        LIFT1110
      IF(IBTL.EQ.0) GO TO 950                                           LIFT1120
      ADD = D3/D2                                                       LIFT1130
      VBSL = POLY (ADD,.339,.312,.501,-.152)                            LIFT1140
  940 CONTINUE                                                          LIFT1150
      SBASE = PI *(D3/2.)**2                                            LIFT1160
      BTL = RL3 - RL2                                                   LIFT1170
      VBT = VBSL * BTL * SBASE * (D2/D3)**2                             LIFT1180
      VOLRAT = VBT * (1.-SBASE/SREF)/VOLN                               LIFT1190
      CALL PLINE (6,6,VOLRA(1),ALPHAR,VOLRAT,RBTON)                     LIFT1200
  950 CONTINUE                                                          LIFT1210
C                                                                       LIFT1220
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      IF(ITRIP) 960, 970, 980                                          LIFT1230
  960 CONTINUE                                                         LIFT1240
C********************* M.LE.0.9 *** BODY LIFT  (NOSE AND CYLINDER) ******LIFT1250
C                                                                      LIFT1260
      CALL LINE(17, ERR, EKERR(1),EK)                                  LIFT1270
      CNANAC = (EK+EK)/DPR                                             LIFT1280
C                                                                      LIFT1290
C******************* M.LE. 0.9 *** BODY LIFT  (BOAT-TAIL)***************LIFT1300
C                                                                      LIFT1310
      CNABTL = RRTON * CNANAC                                          LIFT1320
      I = 17                                                           LIFT1330
      IF(J.EQ.1) WRITE(6,1) I, Q1(1), Q(6), EK, Q(8), CNANAC, Q(12),   LIFT1340
     1 CNABTL, Q(21), ERR                                              LIFT1350
      IF ( J  .EQ. 1  )  WRITE(6,BUG)                                  LIFT1360
      GO TO 1020                                                       LIFT1370
  970 CONTINUE                                                         LIFT1380
C                                                                      LIFT1390
C******************* M = 1.0 *** BODY LIFT  (NOSE AND CYLINDER) *********LIFT1400
C                                                                      LIFT1410
      CNANAC = .042                                                    LIFT1420
C                                                                      LIFT1430
C******************* M = 1.0 *** BODY LIFT  (BOAT-TAIL) *****************LIFT1440
C                                                                      LIFT1450
      CNABTL = RRTON * CNANAC                                          LIFT1460
      I = 18                                                           LIFT1470
      IF(J.EQ.1) WRITE(6,1) I, Q1(1), Q(8), CNANAC, Q(10), DA, Q(14), D,LIFT1480
     1 Q(9), DD12, Q(12), CNABTL                                       LIFT1490
      GO TO 1020                                                       LIFT1500
  980 CONTINUE                                                         LIFT1510
C******************* M .GE. 1.2 *** BODY LIFT  (NOSE AND CYLINDER) ******LIFT1520
C                                                                      LIFT1530
      CALL LIFT4(BFN, CNANAC,RM)                                       LIFT1540
      BNA = 0.                                                         LIFT1550
      IF(IBTL.EQ.0) GO TO 1010                                         LIFT1560
C                                                                      LIFT1570
C******************* M .GE. 1.2 *** BODY LIFT  (BOAT-TAIL) *************LIFT1580
C                                                                      LIFT1590
      IF(RLDB.GE.4.75) GO TO 990                                       LIFT1600
      BNA=-(0.1*RLDB**2-0.9*RLDB-0.01)                                 LIFT1610
      GO TO 1000                                                       LIFT1620
  990 BNA= 2.0                                                         LIFT1630
 1000 CNABTL = -BNA*(1.0-DD2)/DPR                                      LIFT1640
 1010 CONTINUE                                                         LIFT1650
      I = 19                                                           LIFT1660
      IF(J.EQ.1) WRITE(6,1) I, Q1(1), Q(8), CNANAC, Q(11), BNA, Q(12), LIFT1670
     1 CNABTL                                                          LIFT1680
 1020 CONTINUE                                                         LIFT1690
C                                                                      LIFT1700
C******************* LINEAR LIFT DUE TO THE TAIL ... (ALL MACH NUMBERS) *LIFT1710
C                                                                      LIFT1720
      IF(NAERO(8).EQ.2) GO TO 1025                                     LIFT1730
      CALL LIFT1(ART,SET,TRT,ATNS2T,BART,AICLT,THKRT,RXINT,SLETR,RTANST,LIFT1740
     1   CNRT,DELNT,CLAT,RM)                                           LIFT1750
C                                                                      LIFT1760
C******************* LINEAR LIFT DUE TO THE WING ... (ALL MACH NUMBERS) *LIFT1770
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C                                                                       LIFT1780
 1025 CONTINUE                                                          LIFT1790
      CLAW = C.0                                                        LIFT1800
      AICLW = 0.0                                                       LIFT1810
      IF (NW.NE.1) GO TO 1030                                           LIFT1820
      IF(NAERO(9).EQ.2) GO TO 1030                                      LIFT1830
      CALL LIFT1(ARW,SEW,TRW,ATNS2W,BARW,AICLW,THKRW,RXINW,SLEWR,BTANSW,LIFT1840
     1   CNRW,DELNW,CLAW,RM)                                            LIFT1850
      CLAW = CLAW*QRATIO                                                LIFT1860
                CLXW=CLAW*PI*D1**2/4./SREF                              LIFT1870
      CLAWAR(JJ)=CLXW                                                   LIFT1880
 1030 CONTINUE                                                          LIFT1890
      I = 20                                                            LIFT1900
      IF(J.EQ.1) WRITE(6,1) I, QL(1), Q(27), AICLT, Q(61), CLAT,        LIFT1910
     1 Q(28), AICLW, Q(62), CLAW                                        LIFT1920
C                                                                       LIFT1930
C***************** LINEAR BODY-TAIL INT. LIFT *** ALL MACH. NUMBERS ****LIFT1940
C                                                                       LIFT1950
      CALL LIFT2(BTANST,TRTP1,RCT,DMT,ART,BT,BAPT,BART,CLAT,AICLT,RL4,  LIFT1960
     1 CKTB,CKBT,RM)                                                    LIFT1970
C                                                                       LIFT1980
C***************** TOTAL LINEAR LIFT DUE TO THE TAIL --- ALL MACH NUMBERLIFT1990
C                                                                       LIFT2000
      CLATBA(JJ)=CLAT*CKTB                                              LIFT2010
      CLATCO(JJ)=CLAT*CKBT                                              LIFT2020
      CLXT=CLAT*PI*D1*D1/4.                                             LIFT2030
      CLXT=CLXT/SREF                                                    LIFT2040
      CLATAR(JJ)=CLXT                                                   LIFT2050
      CLATB = CLAT*(CKBT+CKTB)                                          LIFT2060
      CLATWV=0.                                                         LIFT2070
      CLAWB = 0.                                                        LIFT2080
      CKWB = 0.                                                         LIFT2090
      CKBW = 0.                                                         LIFT2100
      IF(NW.EQ.0) GO TO 1040                                            LIFT2110
C                                                                       LIFT2120
C***************** LINEAR BODY-WING INT. LIFT *** ALL MACH. NUMBERS ****LIFT2130
C                                                                       LIFT2140
      CALL LIFT2(BTANSW,TRWP1,RCW,DMW,ARW,BW,BAPW,BARW,CLAW,AICLW,RL5,  LIFT2150
     1 CKWB,CKBW,RM)                                                    LIFT2160
C                                                                       LIFT2170
C***************** TOTAL LINEAR LIFT DUE TO THE WING --- ALL MACH NUMBERLIFT2180
C                                                                       LIFT2190
      CLAWBA(JJ)=CLAW*CKWB                                              LIFT2200
      CLABCO(JJ)=CLAW*CKBW                                              LIFT2210
      CLAWB = CLAW*(CKWB+CKBW)                                          LIFT2220
      CLWBAR(JJ)=CLAWB                                                  LIFT2230
C                                                                       LIFT2240
C***************** LINEAR WING-TAIL INT. LIFT *** ALL MACH. NUMBERS ****LIFT2250
C                                                                       LIFT2260
      IV = 2                                                            LIFT2270
      LINEAR = 1                                                        LIFT2280
      DW1 = 0.                                                          LIFT2290
      CALL LIFT3(TRT, BT, DMT, XD1T, GAMMAT, DW1, LINEAR, IV, RITWV,AHL,LIFT2300
     1 RM)                                                              LIFT2310
      FMDMW2 = F-DMW/2.                                                 LIFT2320
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      IF(FMDMW2.EQ.C.) FMDMW2 = .002                                    LIFT2330
      CLATWV =(CLAW*CLAT*CKWB*RITWV*BT     /(4.*PI*ART*FMDMW2     )     LIFT2340
     1 ) * SREF / SET                                                   LIFT2350
      CLAWVA(JJ)=CLATWV                                                 LIFT2360
 1040 CONTINUE                                                          LIFT2370
      I = 21                                                            LIFT2380
      IF(J.EQ.1)WRITE(6,1) I, Q1(1), Q2(57), CKTB, Q2(58), CKBT, Q2(59),LIFT2390
     1 CLATB, Q2(60), CKWB, Q2(61), CKBW, Q2(62), CLAWB                 LIFT2400
C                                                                       LIFT2410
C****************** LINEAR LIFT DUE TO INTAKES *** ALL MACH. NUMBERS ****LIFT2420
C***************ALREADY AVAILABLE FROM INLET S/R ***********************LIFT2430
      XCPI = C.0                                                        LIFT2440
      CLAI=0.C                                                          LIFT2450
      IF ( KSTEP  .LE.  1  )  GO TO 1188                                LIFT2460
      IF  ( KIND  .LT.  30  )  GO TO 1188                               LIFT2470
      AMUNCH = RM                                                       LIFT2480
      NRM=1                                                             LIFT2490
      CALL INLIFX(NRM,CLAI,CDBON)                                       LIFT2500
 1188 CONTINUE                                                          LIFT2510
      CNAFL1=C.0                                                        LIFT2520
      CNAFL2=0.0                                                        LIFT2530
      CNAAB1=0.0                                                        LIFT2540
      CNAAB2=0.0                                                        LIFT2550
 1046 CNAB=(CNANAC + CNAFL1 + CNAAB1 + CNAFL2 + CNAAB2 + CNABTL)*DPR    LIFT2560
      CNABPD=CNAB/DPR                                                   LIFT2570
      CNAPD(JJ)=CNABPD                                                  LIFT2580
      CNANOS(JJ)=CNANAC                                                 LIFT2590
      CNAF1(JJ)=CNAFL1                                                  LIFT2600
      CNAB1(JJ)=CNAAB1                                                  LIFT2610
      CNAF2(JJ)=CNAFL2                                                  LIFT2620
      CNAB2(JJ)=CNAAB2                                                  LIFT2630
      CNABT(JJ)=CNABTL                                                  LIFT2640
      IF(J .EQ. 1) WRITE(6,FLRBUG)                                      LIFT2650
C                                                                       LIFT2660
C                                                                       LIFT2670
C****************** TOTAL LINEAR LIFT *** ALL MACH. NUMBERS *************LIFT2680
C                                                                       LIFT2690
      COST = 1.                                                         LIFT2700
      IF (IART.EQ.3) COST = .750                                        LIFT2710
      COSW = 1.                                                         LIFT2720
      IF (IARW.EQ.3) COSW = .750                                        LIFT2730
      CLAAWV=CLATWV                                                     LIFT2740
C                                                                       LIFT2750
C     DUMMY                                                             LIFT2760
      KFIXK = 1                                                         LIFT2770
      IF( (NW.EQ.0) .AND. (KFIXK.GT.0) ) CLAAWV=0.0                     LIFT2780
C                                                                       LIFT2790
C                                                                       LIFT2800
      CNA = (CNANAC+CNABTL+CLAI+(CLATB+CLAAWV)*COST+CLAWB*COSW)*DPR     LIFT2810
      CNA=CNA + (CNAFL1 + CNAAB1 + CNAAB2 + CNAFL2)*DPR                 LIFT2820
      CLATOT(JJ)=CNA/DPR                                                LIFT2830
      CNAT = (CLATB+CLATWV)*COST                                        LIFT2840
      CLTWAR(JJ)=CNAT                                                   LIFT2850
C                                                                       LIFT2860
C****************** CONTROL LIFT *** ALL MACH. NUMBERS ******************LIFT2870
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C                                                                       LIFT2880
      SKWB = 0.                                                         LIFT2890
      SKBW = 0.                                                         LIFT2900
      SKTB = 0.                                                         LIFT2910
      SKBT = 0.                                                         LIFT2920
      CNDT = 0.0                                                        LIFT2930
      CNDW = 0.0                                                        LIFT2940
      IF(ICNTRL.EQ.1) GO TO 1050                                        LIFT2950
      CALL LIFTS(BW,IABW,CKWB,CKBW,CLAW,CNDW,SKWB,SKBW)                 LIFT2960
      I = 22                                                            LIFT2970
      IF(J.EQ.1)WRITE(6,1) I, Q1(1), Q2(63), CLATWV, Q2(64), CNA,       LIFT2980
     1 Q2(65), SKWB, Q2(66), SKBW, Q2(72), CNDW                         LIFT2990
      GO TO 1060                                                        LIFT3000
 1050 CALL LIFTS(BT,IABT,CKTB,CKBT,CLAT,CNDT,SKTB,SKBT)                 LIFT3010
      I = 22                                                            LIFT3020
      IF(J.EQ.1)WRITE(6,1) I, Q1(1), Q2(63), CLATWV, Q2(64), CNA,       LIFT3030
     1 Q2(55), SKTB, Q2(56), SKBT, Q2(71), CNDT                         LIFT3040
 1060 CONTINUE                                                          LIFT3050
C                                                                       LIFT3060
C***************** PITCHING MOMENTS AND CENTERS OF PRESSURE ************LIFT3070
C                                                                       LIFT3080
C*********************NOSE AND CYLINDER *** M LE 1.0********************* LIFT3090
C                                                                       LIFT3100
      IF (ITRIP.GT.0) GO TO 1100                                        LIFT3110
      CPRAT = 1.                                                        LIFT3120
      ALOD = FR                                                         LIFT3130
      IF(ITN.GT.4) ALOD = FR1                                           LIFT3140
      IF(ALOD.GT.5.) ALOD = 5.                                          LIFT3150
      IF(ALOD.LT.1.) ALOD = 1.                                          LIFT3160
      AFAFN = FAFN                                                      LIFT3170
      IF(ITN.GT.4) AFAFN = FAFN1                                        LIFT3180
      IF(ITN.EQ.2) AFAFN = FAFN1                                        LIFT3190
      IF(ITN.NE.3.OR.ITN.NE.5) GO TO 1070                               LIFT3200
      CPRC1 = POLY(AFAFN,.978,.090,-.009,.0003)                         LIFT3210
      CPRC5 = POLY(AFAFN,.906,.427,-.045,.0013)                         LIFT3220
      CPRAT = CPRC1+(CPRC5-CPRC1)/4.*(ALOD -1.)                         LIFT3230
      GO TO 1080                                                        LIFT3240
 1070 CPR01 = POLY(AFAFN,.955,.295,-.021,.00001)                        LIFT3250
      CPR05 = POLY(AFAFN,.938,.498,-.009,-.002)                         LIFT3260
      CPRAT = CPR01+(CPR05-CPR01)/4.*(ALOD -1.)                         LIFT3270
      IF(RM.EQ.1.) CPRAT = CPRAT * 1.2                                  LIFT3280
 1080 CONTINUE                                                          LIFT3290
      IF(ITN .GT. 4) GO TO 1090                                         LIFT3300
      VSBL=VOLN/(RL1*SREF)                                              LIFT3310
      XD1B = RL1*(1.-VSBL)/D1*CPRAT                                     LIFT3320
      GO TO 1110                                                        LIFT3330
 1090 CONTINUE                                                          LIFT3340
      VSBL=VOLN/(RL1*SREF)                                              LIFT3350
      XD1B = RL1*(1.-VSBL)/D1*CPRAT                                     LIFT3360
      IF ( J  .EQ. 1  )  WRITE(6,BUG)                                   LIFT3370
      GO TO 1110                                                        LIFT3380
 1100 CONTINUE                                                          LIFT3390
C                                                                       LIFT3400
C*******************NOSE AND CYLINDER *** M.GE. 1.2 *********************LIFT3410
C                                                                       LIFT3420
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      CALL BDYLPM (RM)                                                  LIFT3430
 1110 CONTINUE                                                          LIFT3440
      XD1BTL = 0.                                                       LIFT3450
      IF(IBTL.EQ.0) GO TO 1130                                          LIFT3460
      IF(ITRIP.LE.0) GO TO 1120                                         LIFT3470
C                                                                       LIFT3480
C*******************M .GE. 1.2 ****** BODY *** BOAT-TAIL ***************LIFT3490
C                                                                       LIFT3500
      XD1BTL=0.62*RLD+RL2/D1                                            LIFT3510
      GO TO 1130                                                        LIFT3520
 1120 CONTINUE                                                          LIFT3530
C                                                                       LIFT3540
C******************** M .LE. 0.9 AND MACH 1. ****** BODY **BOAT-TAIL *****LIFT3550
C                                                                       LIFT3560
      XD1BTL = RLD*(D1+2.*D)/(3.*(D1+D))+RL2/D1                         LIFT3570
      IF ( J  .EQ. 1  )  WRITE(6,BUG)                                   LIFT3580
 1130 CONTINUE                                                          LIFT3590
C                                                                       LIFT3600
C******************** SURFACES *** TAIL AND BODY/TAIL INT. *** ALL MACH NULIFT3610
C                                                                       LIFT3620
      IF(NAERO(8).EQ.2) GO TO 1135                                      LIFT3630
 1135 CONTINUE                                                          LIFT3640
      CALL PMOMNT(DMT,BDCT,TRT,RCT,RL4,BTANST,BAPT,BAPPT,XD1T,XD1BT,    LIFT3650
     1ATNS2T,RM)                                                        LIFT3660
      XD1W = 0.                                                         LIFT3670
      XD1BW = 0.                                                        LIFT3680
      IF(NW.NE.1) GO TO 1140                                            LIFT3690
      IF(NAERO(9).EQ.2) GO TO 1140                                      LIFT3700
C                                                                       LIFT3710
C******************** SURFACES *** WING AND BODY/WING INT. *** ALL MACH NULIFT3720
C                                                                       LIFT3730
      CALL PMOMNT(DMW,BDCW,TRW,RCW,RL5,BTANSW,BAPW,BAPPW,XD1W,XD1BW,    LIFT3740
     1ATNS2W,RM)                                                        LIFT3750
 1140 CONTINUE                                                          LIFT3760
C                                                                       LIFT3770
C***************** C.P. OF INLET, ALREADY AVAILABLE FROM INLET S/R********LIFT3780
      XCP=0.0                                                           LIFT3790
      XCP=XCPI                                                          LIFT3800
      IF ( KSTEP  .EQ.  1  )  XCP = XCGD1                               LIFT3810
C                                                                       LIFT3820
C***************** TOTAL CENTER OF PRESSURE *** ALL MACH. NUMBERS ******LIFT3830
C                                                                       LIFT3840
 1141 CONTINUE                                                          LIFT3850
      XD1 = (CNANAC*XD1B+CNABTL*XD1BTL+CLAW*CKWB*XD1W*COSW+CLAW*CKBW*   LIFT3860
     1XD1BW*COSW+CLAT*CKTB*XD1T*COST+CLAT*CKBT*XD1BT*COST+CLAAWV*XD1T*  LIFT3870
     2 COST             +CLAI*XCP)/CNA*DPR                             LIFT3880
      IF ( NW  .NE.  1  )  GO TO 2754                                   LIFT3890
      RLX=RL5 + D1                                                      LIFT3900
      CALL PMOMNT(DMW,BDCW,TRW,RCW,RLX,BTANSW,BAPW,BAPPW,XDXW,          LIFT3910
     1XDXBW,ATNS2W,RM)                                                  LIFT3920
      XD11= (CNANAC*XD1B+CNABTL*XD1BTL+CLAW*CKWB*XDXW*COSW+CLAW*CKBW*   LIFT3930
     1XDXBW*COSW+CLAT*CKTB*XD1T*COST+CLAT*CKBT*XD1BT*COST+CLAAWV*XD1T*  LIFT3940
     2 COST             +CLAI*XCP)/CNA*DPR                             LIFT3950
 2754 IF ( NW  .NE.  1  )  XD11 = XD1                                   LIFT3960
      I = 24                                                            LIFT3970
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      IF(J.EQ.1) WRITE(6,1) I, Q1(1), Q2(73), XD1B, Q2(74), XD1BTL,     LIFT3980
     1 Q2(75), XD1T, Q2(70), XD1,   Q2(77), XD1W, Q2(78), XD1BW         LIFT3990
C                                                                       LIFT4000
C****TOTAL PITCHING MOMENT AND DAMPING COEFFICIENT - ALL MACH NOS.****  LIFT4010
C                                                                       LIFT4020
      CMAB =(CNANAC*(XCGD1-XD1B)+CNABTL*(XCGD1-XD1BTL))*DPR             LIFT4030
      CMAN = CLAI*(XCGD1-XCP) *DPR                                      LIFT4040
      CMAT = ((CLAAWV+CLAT*CKTB)*COST*(XCGD1-XD1T)+CLAT*COST*CKBT*      LIFT4050
     1(XCGD1-XD1BT))*DPR                                                LIFT4060
      CMAW = 0.                                                         LIFT4070
      CNAW = 0.                                                         LIFT4080
      CMDDOT = 0.                                                       LIFT4090
      CMADOT = 0.                                                       LIFT4100
      CLPW = 0.                                                         LIFT4110
      CMC = 0.0                                                         LIFT4120
 1150 IF (NW.EQ.0) GO TO 1160                                           LIFT4130
      CMAW = (CLAW*COSW*CKWB*(XCGD1-XD1W)+CLAW*COSW*CKBW*(XCGD1-XD1BW)) LIFT4140
     1*DPR                                                              LIFT4150
      CNAW = (CLAW*COSW*CKWB+CLAW*COSW*CKBW)*DPR                        LIFT4160
      XQTMT = (RL4+(5.*RCT-3.*TCT)/8.)/D1                               LIFT4170
      XQTMW = (RL5+(5.*RCW-3.*TCW)/8.)/D1                               LIFT4180
      CMADOT = 2.*CLAAWV*COST*(XCGD1-XQTMT)*(XQTMW-XQTMT)*DPR           LIFT4190
      ARMYW = DMW/2.+BW*(RCW+2.*TCW)/(6.*(RCW+TCW))                     LIFT4200
C                                                                       LIFT4210
C*** NEILSON ROLL DAMPING FACTORS ***************************************LIFT4220
C                                                                       LIFT4230
      PKRW = .59                                                        LIFT4240
      IF (RNW.EQ.2) PKRW = 1.0                                          LIFT4250
      IF (RNW.EQ.3) PKRW= 1.41                                          LIFT4260
      IF (RNW.EQ.4) PKRW = 1.65                                         LIFT4270
      CLPW = PKRW*ARMYW*(1.+BW/(2.*DMW))*CLAW*DPR/D1                    LIFT4280
 1160 CMA = CMAB+CMAT+CMAW+CMAN                                         LIFT4290
      ARMYT = DMT/2.+BT*(RCT+2.*TCT)/(6.*(RCT+TCT))                     LIFT4300
      PKRT = .59                                                        LIFT4310
      IF (RNT.EQ.2) PKRT = 1.0                                          LIFT4320
      IF (RNT.EQ.3) PKRT= 1.41                                          LIFT4330
      IF (RNT.EQ.4) PKRT = 1.65                                         LIFT4340
      CLPT = PKRT*ARMYT*(1.+BT/(2.*DMT))*(CLAT+CLAAWV)*DPR/D1           LIFT4350
      CLP = -1.*(CLPW+CLPT)                                             LIFT4360
      SPANP = BWB/BTH                                                   LIFT4370
      IF(SPANP.GT.1.5) GO TO 1170                                       LIFT4380
      CMQ = -2.*(CNANAC*(XCGD1-XD1B)**2+CNABTL*(XCGD1-XD1BTL)**2+(CLAAWVLIFT4390
     1+CLAT*CKTB)*COST*(XCGD1-XD1T)**2+CLAT*COST*CKBT*(XCGD1-XD1BT)**2+ LIFT4400
     2 CLAW*COSW*CKWB*(XCGD1-XD1W)**2+CLAW*COSW*CKBW*(XCGD1-XD1BW)**2   LIFT4410
     3                          +CLAI*(XCGD1-XCP)**2)*DPR               LIFT4420
      GO TO 1180                                                        LIFT4430
 1170 CMQ = -2.*(CNANAC*(XCGD1-XD1B)**2+CNABTL*(XCGD1-XD1BTL)**2+       LIFT4440
     1(CLAT*CKTB)*COST*(XCGD1-XD1T)**2+CLAT*COST*CKBT*(XCGD1-XD1BT)**2+ LIFT4450
     2 CLAW*COSW*CKWB*(XCGD1-XD1W)**2+CLAW*COSW*CKBW*(XCGD1-XD1BW)**2   LIFT4460
     3                          +CLAI*(XCGD1-XCP)**2)*DPR               LIFT4470
 1180 CONTINUE                                                          LIFT4480
      IF (ICNTRL.EQ.2) GO TO 1190                                       LIFT4490
      COSE = 1.                                                         LIFT4500
       PK=1.                                                            LIFT4510
      IF (IART.EQ.3) COSE = .866                                        LIFT4520
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      IF(IART.EQ.2.OR.IART.EQ.5) PK = 9.0                                LIFT4530
      IF (IART.EQ.3) PK=0.866                                            LIFT4540
      IF (IART.EQ.4) PK = 1.414                                          LIFT4550
      PKK = 1.                                                           LIFT4560
      IF (IART.EQ.3) PKK=.866                                            LIFT4570
      IF (IART.EQ.4) PKK=.707                                            LIFT4580
      CHAT = (CLAT*CKTB+CLAAWV)*PKK*(RHLT-D1*XD1T)/RCT*SREF/SET*DPR      LIFT4590
      CHDT = (CLAT*SKTB+CLAAWV)*(RHLT-D1*XD1T)/RCT*SREF/SET*DPR          LIFT4600
      CMDT =PK*((       CLAT*SKTB)*(XCGD1-XD1T)+CLAT*SKBT*(XCGD1-      LIFT4610
     1     XD1BT))*DPR                                                   LIFT4620
      DELALP=-CMA/CMDT                                                   LIFT4630
      CPDEG=(57.296*CNDT-CNA*CMDT/CMA)*DYNP*SREF/WMISS/57.296/144.       LIFT4640
      CLATRM=CNA + 57.296*CNDT*DELALP                                    LIFT4650
      ALPTRM=(WMISS/(DYNP*SREF*CLATRM))*57.296*144.                      LIFT4660
      DELTRM=ALPTRM*DELALP                                               LIFT4670
      PKRTD = .36+.007*RM+.06*(1.-TRT**2.5)                              LIFT4680
      CLRD = (DPR*CLAT*SKTB*(DMT+BT*PKRTD)*RNT)/(4.*D1)                  LIFT4690
C                                                                        LIFT4700
C**********COMPONENTS OF DAMPING TERMS*********************************** LIFT4710
C                                                                        LIFT4720
      TERMA=(-2.*CNANAC*(XCGD1-XD1B)**2)*57.3                            LIFT4730
      TERMB=(-2.*CNABTL*(XCGD1-XD1BTL)**2)*57.3                          LIFT4740
      TERMC=(-2.*CLAT*CKTB*COST*(XCGD1-XD1T)**2)*57.3                    LIFT4750
      TERMD=(-2.*(CLAAWV + CLAT*CKTB)*COST*(XCGD1-XD1T)**2)*57.3         LIFT4760
      TERME=(-2.*CLAT*COST*CKBT*(XCGD1-XD1BT)**2)*57.3                   LIFT4770
      TERMF=(-2.*CLAW*COSW*CKWB*(XCGD1-XD1W)**2)*57.3                    LIFT4780
      TERMG=(-2.*CLAW*COSW*CKBW*(XCGD1-XD1BW)**2)*57.3                   LIFT4790
      TERMH=(-2.*CLAI*(XCGD1-XCP)**2)*57.3                               LIFT4800
C                                                                        LIFT4810
C**************SYMMETRICAL CONFIGURATIONS ONLY*******                   LIFT4820
C*********CNR=CMQ MINUS WING CONTRIBUTION************                   LIFT4830
      CNR= TERMA + TERMB + TERMC + TERME + TERMH                         LIFT4840
C                                                                        LIFT4850
C***************CNBETA=CMA MINUS WING CONTRIBUTION******                LIFT4860
      TERMI=(CLAT*CKTB*COST*(XCGD1-XD1T) + CLAT*COST*CKBT*(XCGD1-XD1BT))LIFT4870
     1*DPR                                                               LIFT4880
      CNBETA=CMAB + CMAN + TERMI                                         LIFT4890
C**********CYBETA=CNA MINUS WING CONTRIBUTION*****                      LIFT4900
      CYBETA=(CNANAC + CNABTL + CLAI + (CLATB*COST))*DPR                 LIFT4910
      I = 96                                                             LIFT4920
      IF ( J .NE. 1 ) GO TO 1191                                         LIFT4930
      IF (J.EQ.1) WRITE(6,127) I,CMAB,CMAT,CMAW,CMA,CMQ,CMDT,            LIFT4940
     1 CLRD,PKRTD,CMO                                                    LIFT4950
      WRITE(6,ROLL)                                                      LIFT4960
      WRITE(6,SLOM)                                                      LIFT4970
      GO TO 1191                                                         LIFT4980
 1150 CONTINUE                                                           LIFT4990
      COSE = 1.                                                          LIFT5000
      IF (IARW.EQ.3) COSE = .866                                         LIFT5010
      IF (IARW.EQ.2) PK=1.0                                              LIFT5020
      IF (IARW.EQ.3) PK=0.866                                            LIFT5030
      IF (IARW.EQ.4) PK=1.414                                            LIFT5040
      PKK = 1.                                                           LIFT5050
      IF (IARW.EQ.3) PKK=.866                                            LIFT5060
      IF (IARW.EQ.4) PKK=.707                                            LIFT5070
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      CMAW = CLAW*PKK*CKWB*(RHLW-D1*XD1W)/RCW*SREF/SEW*DPR                    LIFT5080
      CMDW = CLAW*SKWB*(RHLW-D1*XD1W)/RCW*SREF/SEW*DPR                       LIFT5090
      CLDTWV = CLATWV*SKWB/CKWB*57.296                                       LIFT5100
      CMDW = PK*(CLAW*(SKWB*(XCGD1-XD1W)+SKBW*(XCGD1-XD1BW))+CLDTWV*         LIFT5110
     1(XCGD1-XD1T))*DPR                                                      LIFT5120
      DELALP=-CMA/CMDW                                                       LIFT5130
      CPDEC=(57.296*CNDW-CNA*CMDW/CMA)*DYNP*SREF/WMISS/57.296/144.           LIFT5140
      CLATRM=CNA + 57.296*CNDW*DELALP                                        LIFT5150
      ALPTRM=(WMISS/(DYNP*SREF*CLATRM))*57.296*144.                          LIFT5160
      DELTRM=ALPTRM*DELALP                                                   LIFT5170
      CMDDOT = PK*CLATWV*SKWB/CKWB*DPR*57.296                                LIFT5180
      PKRWD = .36+.007*PM+.06*(1.-TRW**2.5)                                  LIFT5190
      PKRTD = .36+.007*PM+.06*(1.-TRT**2.5)                                  LIFT5200
      CLRD = DPR*(CLAW*SKWB*(DMW+BW*PKRWD)*RNW+CLDTWV*(DMT+BT*PKRTD)*        LIFT5210
     1RNT)/(4.*D1)                                                           LIFT5220
      I = 98                                                                 LIFT5230
      IF (J.EQ.1) WRITE (6,127) I,CMAB,CMAT,CMAW,CMA,CMQ,CMDW,               LIFT5240
     1 CLRD,PKRTD,CMQ                                                        LIFT5250
C                                                                            LIFT5260
 1191 CONTINUE                                                               LIFT5270
      ALDMAX=0.5*SQRT(CNA/CDCON)                                             LIFT5280
      CLOPT=SQRT(CNA*CDOON)                                                  LIFT5290
      D3=D3SV                                                                LIFT5300
      RETURN                                                                 LIFT5310
      END                                                                    LIFT5320


      SUBROUTINE LIFT1(ARI,SEI,TRI,ATNS2I,BARI,AICLI,THKPI,XINI,SLEIR,       LIF10010
     1   BTSLE,CNR,DELN,CLAI,PM)                                             LIF10020
      COMMON/DRG/                                                            LIF10030
     1   D1       ,THETAC   ,FINE     ,RS       ,R1       ,RL1      ,       LIF10040
     2   XCYL     ,XTHEBT   ,XBT      ,RL3      ,ITN      ,AMACW    ,       LIF10050
     3   AMACT    ,THKRT    ,THKRW    ,RL1A     ,IBTL     ,ATCT     ,       LIF10060
     4   ATCW     ,DML      ,ITSECT   ,IWSECT   ,RXINT    ,RXINW    ,       LIF10070
     5   BTANST   ,BTANSW   ,RCW      ,FLTSEW   ,XLENW    ,FLTSET   ,       LIF10080
     6   XLENT    ,QRATIO   ,DN       ,DE       ,D3       ,RCT      ,       LIF10090
     7   NW       ,TCW      ,TCT      ,BT       ,BW       ,ART      ,       LIF10100
     8   APW      ,TRT      ,TRW      ,SREF     ,DB                         LIF10110
       COMMON/XXX/ AIC60(301),AIC61(301),CNR66(90),CNR67(42),                LIF10120
     1XSP46(26),ANL47(28),ANL48(30),ANL49(30),SKK17(85),XAC78(219),          LIF10130
     2XAC79(219),XACC18(85),XAC271(50),XAC28(177),XAC291(6)                  LIF10140
      COMMON/AA/CP37AL(45),CP314A(45),CP27AL(45),CP214A(45),XCPBEN(36),       LIF10150
     4XCPBPP(36),XCP74(133),XCP64(45),XCP65(45),XCP75(133),CNA21(90),        LIF10160
     5CNA22(78),CNA23(105),CNA24(77),VOLRA(78),EKERB(34)                     LIF10170
     A,CNA72(152),CNA73(152)                                                 LIF10180
      COMMON/LFT/                                                            LIF10190
     1   ATNS2T   ,ATNS2W   ,SEW      ,SET      ,DMW      ,DMT      ,       LIF10200
     2   RL4      ,RL5      ,ALPHAR   ,RITWV    ,IART     ,ICNTRL   ,       LIF10210
     3   D2       ,RL2                                                      LIF10220
      COMMON/AERO/                                                           LIF10230
     1   ATNS4T   ,ATNS4W   ,BTANA    ,BART     ,BARW     ,BAPT     ,       LIF10240
     2   BAPW     ,BAPPT    ,BAPPW    ,BETA     ,BFN      ,CFT      ,       LIF10250
     3   CFW      ,CDB      ,CFB      ,CNANAC   ,CLABT    ,CLAT     ,       LIF10260
     4   CLAW     ,CLTV     ,CKWB     ,CKBW     ,CKBT     ,CKTB     ,       LIF10270
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     5    CLATWV    ,D        ,DD       ,DD2      ,DPR      ,DHL      ,    LIF10280
     6    FAFN      ,F        ,FL       ,FR       ,PI       ,RLD      ,    LIF10290
     7    RLDR      ,RRTANA   ,SLETR    ,SLEWR    ,STSREF   ,SWSREF   ,    LIF10300
     8    SKRT      ,SKTR     ,SKRW     ,SKWR     ,TRTP1    ,TRWP1    ,    LIF10310
     9    CFI       ,TANST    ,TANSW    ,TANS4T   ,TANS4W   ,TANS2T   ,    LIF10320
     A    TANS2W    ,XD1R     ,XD1RT    ,XD1T     ,XD1W     ,XNLCMR   ,    LIF10330
     B    XNLCBR    ,ACT      ,ACW      ,XNLCLR   ,BODYL    ,TAILL          LIF10340
      DIMENSION X(3), NINV(3)                                                LIF10350
      DIMENSION TABLE(14)                                                    LIF10360
      REAL KM, KAR                                                           LIF10370
      DATA TABLE/0., 1.57, 1., 1.57, 2., 1.57, 3., 1.246, 4., 1.040,         LIF10380
     1           5.,  .90, 6.,  .80/                                         LIF10390
      DPR = 57.2958                                                          LIF10400
      J=1                                                                    LIF10410
      CON1 = ARI*SFI/(DPR*SREF)                                              LIF10420
      CNR = 1.0                                                              LIF10430
      IF (RM.EQ.1.) GO TO 120                                                LIF10440
      X(1) = TPI                                                             LIF10450
      X(2) = ATNS2I                                                          LIF10460
      X(3) = BARI                                                            LIF10470
      NVAR = 3                                                               LIF10480
      NINV(1) = 4                                                            LIF10490
      NINV(2) = 7                                                            LIF10500
      NINV(3) = 10                                                           LIF10510
      IF (RM.LT.1.) GO TO 100                                                LIF10520
      IF(BARI.GT.7.) X(3)=7.                                                 LIF10530
       CALL  FASTF(NVAR,NINV,AIC61(1),X,AICLI)                               LIF10540
      GO TO 105                                                              LIF10550
  100 CONTINUE                                                               LIF10560
      IF (BARI  .LE.7.) GO TO 101                                            LIF10570
      X(3) = 7.0                                                             LIF10580
  101 CALL  FASTF(NVAR,NINV,AIC60(1),X,AICLI)                                LIF10590
  105 CONTINUE                                                               LIF10600
      IF (BARI  .LE.7.) GO TO 130                                            LIF10610
      IF (BARI  .GT.10.) GO TO 110                                           LIF10620
      AICLI = AICLI+(.38-AICLI)/3.*(BARI  -7.)                               LIF10630
      GO TO 130                                                              LIF10640
  110 AICLI = .38-.029*(BARI  -10.)                                          LIF10650
      GO TO 130                                                              LIF10660
  120 CALL LINE(7,ATNS2I,TABLE(1),AICLI)                                     LIF10670
  130 CLAI = AICLI*CON1                                                      LIF10680
      DDEL = ATAN(THKRI/(XINI+XINI))                                         LIF10690
      IF(ITSECT.NE.2.OR.BART.NE.BARI) GO TO 131                              LIF10700
      THICK = THKRT * RCT                                                    LIF10710
      RADI = THICK/4.+((RCT/2.)**2)/THICK                                    LIF10720
      RADIP = SQRT(RADI**2-(.25*RCT)**2)                                     LIF10730
      TPRIME = THICK/2.-RADI+RADIP                                           LIF10740
      DDEL = ATAN(TPRIME/(.25*RCT))                                          LIF10750
  131 CONTINUE                                                               LIF10760
      IF(IWSECT.NE.2.OR.BARW.NE.BARI) GO TO 132                              LIF10770
      IF ( NW .EQ. 0 ) GO TO 132                                             LIF10780
      THICK = THKRW * RCW                                                    LIF10790
      RADI = THICK/4.+((RCW/2.)**2)/THICK                                    LIF10800
      RADIP = SQRT(RADI**2-(.25*RCW)**2)                                     LIF10810
      TPRIME = THICK/2.-RADI+RADIP                                           LIF10820
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      DDEL = ATAN(TPRIME/(.25+RCW))                                    LIF10830
  132 CONTINUE                                                         LIF10840
      DELN = DPR*DDEL/COS(SLEIR)                                       LIF10850
      IF (RM.LE.1.) GO TO 160                                          LIF10860
      IF(RM.LT.1.0) GO TO 160                                          LIF10870
      IF (ARI.LT.1.0.AND.RM.GE.1.0) GO TO 155                          LIF10880
      IF(RM.EQ.1.0) GO TO 160                                          LIF10890
      BTVAL = BTSLE                                                    LIF10900
      IF(BTSLE.GT.1.0) GO TO 140                                       LIF10910
       CALL PLINF(6,7,CNR66(1),DELN,BTVAL,CNR)                         LIF10920
      GO TO 150                                                        LIF10930
  140 BTVAL = 1.0/BTSLE                                                LIF10940
       CALL PLINF(6,3,CNR67(1),DELN,BTVAL,CNR)                         LIF10950
  150 IF (CNR.GT.1.0) CNR=1.0                                          LIF10960
      CLAI = CLAI*CNR                                                  LIF10970
      GO TO 160                                                        LIF10980
  155 CONTINUE                                                         LIF10990
      IF(RM.GE.1.0.AND.RM.LE.1.65) KM = .35+1.*(RM-1.)                 LIF11000
      IF(RM.GT.1.65.AND.RM.LE.2.1) KM = 1.0                            LIF11010
      IF(RM.GT.2.1.AND.RM.LE.3.65) KM = 1.-.515*(RM-2.1)               LIF11020
      IF(RM.GT.3.65.AND.RM.LE.5.0) KM = .2-.148*(RM-3.65)              LIF11030
      IF(RM.GT.5.)  KM = 0.                                            LIF11040
      KAR = -.2468+.2463/ARI                                           LIF11050
      CLAI = CLAI*(1.0+KM*KAR)                                         LIF11060
  160 CONTINUE                                                         LIF11070
      RETURN                                                           LIF11080
      END                                                              LIF11090


      SUBROUTINE MAINS                                                 MANS0010
C   NUK,CM-CGSM  R.K.MCDONOUGH  FIV/EBCD   10/18/73                    MANS0020
C     SUBROUTINE MAINS PERFORMS THESE FUNCTIONS AT THE START OF EACH   MANS0030
C     PHASE--                                                          MANS0040
C         (1) PUTS INPUT PHASE DATA INTO WORKING LOCATIONS             MANS0050
C         (2) PERFORMS INITIALIZATION OF CERTAIN VARIABLES             MANS0060
C         (3) CONTROLS ITERATION TO FIND CRUISE RANGE WHICH EXHAUSTS   MANS0070
C             FUEL AT THE END OF THE TRAJECTORY                        MANS0080
C         (4) PUTS TABULAR DATA INTO TABLE LOOK-UP  ARRAYS             MANS0090
C         (5) CONSTRUCTS CLIMB SCHEDULE FOR CLIMB PHASES IF MHGEN=1    MANS0100
C         (6) CALLS RUNGE K TO INTIATE INTEGRATION OF EACH PHASE       MANS0110
C     MAINS   RETURNS CONTROL TO STDATA AT THE END OF THE LAST PHASE   MANS0120
C     INPUT GENERAL DATA      STDATA    MAINS     DERI/                MANS0130
      COMMON /FAILUR/ KFAIL                                            MANS0140
      COMMON/NEWVPM/ VPM102(102)                                       MANS0150
      EQUIVALENCE( VPM102(1), DALPIN )                                 MANS0160
      COMMON /ROUNDP/ PRNG(20), RUF23(23)                              MANS0170
      COMMON/CIBLK/CI(1000)/BCDBLK/LINE1(20), LINE2(20)                MANS0180
C     INPUT GENERAL DATA NAMES                                         MANS0190
      EQUIVALENCE                                                      MANS0200
     1    (VELI,    CI(  1)), (XMACHI,  CI(  2)), (GAMMAI,  CI(  3)),  MANS0210
     2    (ALTI,    CI(  4)), (TIMEI,   CI(  5)), (RANGEI,  CI(  6)),  MANS0220
     3    (MOPT,    CI(  7)), (WTI,     CI(  8)), (MXSTEP,  CI(  9)),  MANS0230
     4    (DSTART,  CI( 10)), (DMIN,    CI( 11)), (EREF,    CI( 12)),  MANS0240
     5    (ERRFAC,  CI( 13)), (DELMAX,  CI( 14)), (DALPH,   CI( 15)),  MANS0250
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     *                                                  (DALPH,    DFCO(1)),   MANS0260
     6    (DALT,     CI( 16)), (DMACH,    CI( 17)), (DCFN,     CI( 18)),   MANS0270
     7    (DVCL,     CI( 19)), (DHCL,     CI( 20)), (NTRYS,    CI( 21)),   MANS0280
     8    (JPRINT,   CI( 22)), (SAVE,     CI( 23)), (IPRNT2,   CI( 24)),   MANS0290
     9    (GSTD,     CI( 25)), (RE,       CI( 26)), (NLPHAZ,   CI( 27)),   MANS0300
     *    (NCPHAZ,   CI( 28)), (NDPHAZ,   CI( 29)), (WDROP,    CI( 30)),   MANS0310
     1    (FSTART,   CI( 31)), (AEXITI,   CI( 32)), (TVACI,    CI( 33)),   MANS0320
     2    (XISPI,    CI( 34)), (WPROPB,   CI( 35)), (WPROPS,   CI( 36)),   MANS0330
     3    (AEXITS, CI( 37)),   (IPROP1, CI( 38)),   (RTOL,    CI( 39)),   MANS0340
     4    (TVACMX, CI( 40)),   (TVACMN, CI( 41)),   (NSETS,   CI( 42)),   MANS0350
     5    (SREF,    CI( 43)),  (XTHRTL, CI( 61)),   (YISP,    CI( 81)),   MANS0360
     *   (LINOUT,    CI( 45))                                              MANS0370
      EQUIVALENCE                                                          MANS0380
     1    (SMACH1, CI(101)),   (CLALF1, CI(121)),                          MANS0390
     *    (SMACH1, SMACH),                                                 MANS0400
     2    (SMACH2, CI(141)),   (CLALF2, CI(161)),                          MANS0410
     3    (SMACH3, CI(181)),   (CLALF3, CI(201)),                          MANS0420
     4    (SMACH4, CI(221)),   (CLALF4, CI(241)),                          MANS0430
     5    (SMACH5, CI(261)),   (CLALF5, CI(281)),                          MANS0440
     6    (DMACH1, CI(302)),   (CDO1,   CI(321)),                          MANS0450
     7    (DMACH2, CI(422)),   (CDO2,   CI(441)),                          MANS0460
     8    (DMACH3, CI(542)),   (CDO3,   CI(561)),                          MANS0470
     9    (DMACH4, CI(662)),   (CDO4,   CI(681)),                          MANS0480
     *    (DMACH5, CI(782)),   (CDO5,   CI(801))                           MANS0490
C     INPUT PHASE DATA          STDATA     MAINS      DERIV                 MANS0500
      COMMON/PIBLK/PI(70)/IPBLK/IP(10)/PSBLK/PS(70,20)/IPSBLK/IPS(10,20)MANS0510
C                                                                          MANS0520
C     INPUT PHASE DATA NAMES                                               MANS0530
      EQUIVALENCE                                                          MANS0540
     1    (XMACHF,   PI(  1)), (ALTF,     PI(  2)), (GAMMAF,   PI(  3)),   MANS0550
     2    (TPHASE,   PI(  4)), (TTOTAL,   PI(  5)), (FVALUE,   PI(  6)),   MANS0560
     3    (SLOPE,    PI(  7)), (ALPMAX,   PI(  8)), (ANZMAX,   PI(  9)),   MANS0570
     4    (DPRINT,   PI( 10)), (CANT,     PI( 11)), (GTOPT,    PI( 12)),   MANS0580
     5    (GKV,      PI( 13)), (GKG,      PI( 14)), (GKVCRU,   PI( 15)),   MANS0590
     6    (XPITCH,   PI( 21)), (YPITCH,   PI( 41)),                        MANS0600
     7    (ITERM,    IP(  1)), (NAERO,    IP(  2)), (IPTYPE,   IP(  3)),   MANS0610
     8    (MODES,    IP(  4)), (MHGEN,    IP(  5)), (ICONT,    IP(  6))    MANS0620
C     WORKING COMMON            STDATA,    MAINS,     DERIV, OUTPUT         MANS0630
      COMMON/CBLK/C(400)/OUTBLK/PAGEB(12,50)                               MANS0640
      EQUIVALENCE                                                          MANS0650
     1    (RC,       C(  1)),  (Q,        C(  2)),  (QS,       C(  3)),    MANS0660
     2    (GRAV,     C(  4)),  (GRAVT,    C(  5)),  (GRAVN,    C(  6)),    MANS0670
     3    (TWOG,     C(  7)),  (THR,      C(  8)),  (THRQ,     C(  9)),    MANS0680
     4    (SSV,      C( 10)),  (RHO,      C( 11)),  (PRESS,    C( 12)),    MANS0690
     5    (VISC,     C( 13)),  (TEMP,     C( 14)),  (ALPHA,    C( 15)),    MANS0700
     6    (XMACH,    C( 16)),  (CDO,      C( 17)),  (CLAQS,    C( 18)),    MANS0710
     7    (CLALF,    C( 19)),  (CF,       C( 20)),  (WF,       C( 21)),    MANS0720
     8    (SFC,      C( 22)),  (TT4,      C( 23)),  (ANZ,      C( 24)),    MANS0730
     9    (ANX,      C( 25)),  (NITER,    C( 26)),  (NBOOST,   C( 27)),    MANS0740
     *    (NSPHAZ,   C( 28)),  (IPRINT,   C( 29)),  (RSAVE,    C( 30)),    MANS0750
     1    (ETA,      C( 31)),  (TSAVE,    C( 32)),  (XTOL,     C( 33)),    MANS0760
     2    (NERR,     C( 34)),  (ERLIMT,   C( 35)),  (NEQ,      C( 36)),    MANS0770
     3    (IDONE,    C( 37)),  (NDONE,    C( 38)),  (ERLOG,    C( 39)),    MANS0780
     4    (NBAD,     C( 40)),  (JSTEP,    C( 41)),  (TTOL,     C( 42)),    MANS0790
     5    (TMAX,     C( 43)),  (DELT,     C( 44)),  (KSUB,     C( 45)),    MANS0800
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     7                          (KKK,     C( 56)),  (INDEX,   C( 57))     MANS0810
      EQUIVALENCE                                                         MANS0820
     1    (TOUT,    C( 58)),  (IOUT,    C( 59)),  (NPHAZ,   C( 60)),    MANS0830
     2    (SINGAM,  C( 73)),  (COSGAM,  C( 74)),  (DALP,    C( 75)),    MANS0840
     3    (VMASS,   C( 76)),  (GDOTRQ,  C( 77)),  (DEGRAD,  C( 78)),    MANS0850
     4    (TVAC,    C( 79)),  (AEXIT,   C( 80)),  (XISP,    C( 81)),    MANS0860
     5    (ACCN,    C( 82)),  (ACCT,    C( 83)),  (XNCW,    C( 84)),    MANS0870
     6    (WPR ,    C( 85)),  (WEMPTY,  C( 86)),  (NPAGE,   C( 87)),    MANS0880
     7    (NOUT,    C( 88)),  (NLINES,  C( 89)),  (NCON,    C( 90)),    MANS0890
     8    (NMAP,    C( 91)),  (RNGI,    C( 92)),  (NTRY,    C( 93)),    MANS0900
     9    (ALTMAX,  C( 94)),  (GAMOLD,  C( 95)),  (HOLD,    C( 96)),    MANS0910
     *                        (ISV(1),  C(101)),  (STLU(1), C(141))     MANS0920
C     INTEGRATION VARIABLES    STDATA    MAINS     DERIV, OUTPUT         MANS0930
      REAL*8 XPRIM1                                                       MANS0940
      REAL*8 XSV(10)                                                      MANS0950
      COMMON/RKBLK/X(10),XDOT(10),XPRIM1(10)                              MANS0960
      EQUIVALENCE                                                         MANS0970
     1    (TIME,    X(  1)),  (GAMMA,   X(  2)),  (V,       X(  3)),    MANS0980
     2    (ALT,     X(  4)),  (R,       X(  5)),  (W,       X(  6)),    MANS0990
     3    (VI,      X(  7)),                                            MANS1000
     4                        (GDOT,    XDOT(2)), (VDOT,    XDOT(3)),   MANS1010
     5    (HDOT,    XDOT(4)), (RDOT,    XDOT(5)), (WDOT,    XDOT(6)),   MANS1020
     6    (VIDOT,   XDOT(7))                                            MANS1030
C     ATMOSPHERE SUBROUTINE COMMUNICATION          DERIV,STDATA,MAINS   MANS1040
      COMMON/AIRBLK/ALTA,      TEMPA,    RHOA,     PRESSA,   SSVA,       MANS1050
     1    VISCA                                                          MANS1060
C                                                                         MANS1070
      COMMON/TRAJX/CEP,CEROP,XMACHP, ALPHAP, IMODES, IND, DUM2(4)         MANS1080
      DIMENSION                                                           MANS1090
     1    YISP(20),            XTHRTL(20),                               MANS1100
     8                         XPITCH(20),          YPITCH(20),          MANS1110
     9    DECO(4),             STLU(20,6),          ISV(12)              MANS1120
      DIMENSION    HCLS(21), HDOTA(3), VCLA(3),  SMACH(20,10)            MANS1130
C                                                                         MANS1140
C                                                                         MANS1150
C                                                                         MANS1160
 9876 CONTINUE                                                            MANS1170
C                                                                         MANS1180
C**** CONTROL IS RETURNED TO THIS POINT AT THE END OF EACH PHASE********MANS1190
C     COMPUTE SPECIFIC RANGE AT THE END OF THE CRUISE PHASE  (FT/LB)      MANS1200
      IF(  NPHAZ .EQ. NCPHAZ )  DRDW= V*COSGAM     /ABS(WDOT+1.E-10)      MANS1210
     1                                             /6076.115              MANS1220
C                                                                         MANS1230
      PRNG(NPHAZ) = R                                                     MANS1240
C     TEST FOR COMPLETION OF LAST PHASE OF TRAJECTORY                     MANS1250
      IF( NPHAZ .LT. NLPHAZ )  GO TO 200                                  MANS1260
C     PRINT TABLE B  OUTPUT AT THE END OF THE TRAJECTORY.                 MANS1270
      NOUT=0                                                              MANS1280
      CALL OUTPUT                                                         MANS1290
      NLINES=0                                                            MANS1300
C     IF ITERATION TO SATISFY FUEL EXHAUSTION IS NOT UNDER WAY, RETURN    MANS1310
C     CONTROL TO STDATA                                                   MANS1320
      IF ( NITER  .EQ.  0  )  KFAIL=50                                    MANS1330
      IF ( NITER  .EQ.  0  )  RETURN                                      MANS1340
C     TEST FOR ITERATION CONVERGENCE.                                     MANS1350
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      DRNG= ( W-WEMPTY )*DRDW                                          MANS1360
      IF(  ABS( DRNG) .LE. RTOL)  GO TO 110                            MANS1370
      IF(  NTRY .LT. NTRYS )  GO TO 120                                MANS1380
      IFAIL=1                                                          MANS1390
  110 NITER=0                                                          MANS1400
      IPRINT=1                                                         MANS1410
  120 CONTINUE                                                         MANS1420
      DO 130  I=1,7                                                    MANS1430
  130 XPRIM1(I)=XSV(I)                                                 MANS1440
      NPHAZ=NCPHAZ                                                     MANS1450
      RNGI=RNGI+DRNG                                                   MANS1460
      IF( RNGI .GT. 0. ) GO TO 136                                     MANS1470
      NX=NX+1                                                          MANS1480
      IF( NX .LT. 2 )  GO TO 136                                       MANS1490
      IF ( LINOUT .NE. 0 ) WRITE ( 6,135)                              MANS1500
  135 FORMAT(// ' ERROR DETECTED IN VEHPER MAINS SUBROUTINE.  VARIABLE MANS1510
     *LENGTH CRUISE LEG WAS NEGATIVE ON SUCCESSIVE ITERATIONS'/        MANS1520
     *  ' FAULURE WAS PROBABLY DUE TO INSUFFICIENT FUEL'  )            MANS1530
      CALL ERROUT                                                      MANS1540
      IF ( KFAIL  .GT.  0  )  RETURN                                   MANS1550
  136 CONTINUE                                                         MANS1560
      WPR=W-WEMPTY                                                     MANS1570
      IF ( LINOUT .NE. 0 ) WRITE (6,140) DRNG,DRDW,WPR,RNGI            MANS1580
  140 FORMAT(//'  D RANGE=',F10.2,', DRDW=', F10.5,  ', W-WEMPTY=',F9.2,MANS1590
     1          ', RNGI=', F10.2, 'NMI' // )                           MANS1600
      GO TO 210                                                        MANS1610
C                                                                      MANS1620
C                                                                      MANS1630
C                                                                      MANS1640
C                                                                      MANS1650
      ENTRY MAINS1                                                     MANS1660
C     MAINS1 IS ENTRY POINT FOR CALLS FROM STDATA  AT THE START OF TRAJ.MANS1670
      NX=0                                                             MANS1680
  200 NPHAZ=NPHAZ+1                                                    MANS1690
C                                                                      MANS1700
C     PUT XPRIM1 ARRAY INTO X ARRAY IN CASE THIS IS THE FIRST PHASE    MANS1710
  210 CONTINUE                                                         MANS1720
      DO 215 I=1,10                                                    MANS1730
  215 X(I)=XPRIM1(I)                                                   MANS1740
C                                                                      MANS1750
C     PUT PHASE DATA  INTO  WORKING  LOCATIONS                         MANS1760
      DO 220 I=1,7C                                                    MANS1770
  220 PI(I)= PS(I,NPHAZ)                                               MANS1780
      DALPH=DALPIN                                                     MANS1790
      ALPTES=ABS(ALPMAX) /DEGRAD                                       MANS1800
      IF(DALPH.GT.ALPTES) DALPH=ALPTES                                 MANS1810
      DO 230 I=1,10                                                    MANS1820
  230 IP(I)=IPS(I,NPHAZ)                                               MANS1830
C                                                                      MANS1840
C     INITIALIZE PATH ANGLE TO ZERO VALUE FOR CRUISE PHASE  (ICONT=13) MANS1850
C     ALSO INSURE THAT SUSTAINER MODE IS ZERO (THROTTLEABLE) FOR       MANS1860
C     CRUISE AND  TRANSITION PHASES.                                   MANS1870
      IF( ICONT  -    13 )  233, 231, 232                              MANS1880
  231 XPRIM1(2)=0.DO                                                   MANS1890
  232 MODES=0                                                          MANS1900
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  233 CONTINUE                                                          MANS1910
C                                                                       MANS1920
C     DO  ONCE-PER-PHASE INITIALIZATION OF CONSTANTS                    MANS1930
      TSAVE=TIME                                                        MANS1940
      RSAVE=R/6076.115                                                  MANS1950
      NDONE=1                                                           MANS1960
      INDEX=0                                                           MANS1970
      TOUT=0.                                                           MANS1980
      IF( ALPMAX .EQ. 0.)   ALPMAX=10.                                  MANS1990
      ALPMAX=ALPMAX/DEGRAD                                              MANS2000
      IF(ANZMAX .EQ. 0.)   ANZMAX=3.                                    MANS2010
C     INITIALIZE TABLE LOOK-UP INDICES                                  MANS2020
      DO 250 I=1,12                                                     MANS2030
  250 ISV(I)=1                                                          MANS2040
      DUM=DSIN(DUMDUM)                                                  MANS2050
      ETA=CANT/DEGRAD                                                   MANS2060
C     SAVE TRAJ. STATE AT START OF FIRST ITERATIVE SEGMENT              MANS2070
      IF(  NPHAZ .NE. NOPHAZ .OR.  NTRY .NE. 0)   GO TO 270             MANS2080
      DO 260 I=1,7                                                      MANS2090
  260 XSV(I)=XPRIM1(I)                                                  MANS2100
  270 CONTINUE                                                          MANS2110
      IF( TPHASE .EQ. 0 )  TPHASE=1.E4                                  MANS2120
      IF( TTOTAL .EQ. 0 )  TTOTAL=1.E4                                  MANS2130
      TMAX= AMIN1( TPHASE+TIME, TTOTAL)                                 MANS2140
      TTOL=  AMAX1( TMAX*1.E-6, 0.001)                                  MANS2150
      THR=0.                                                            MANS2160
      ALPHA=0.                                                          MANS2170
      TVAC=0.                                                           MANS2180
      XISP=0.                                                           MANS2190
      SEC=0.                                                            MANS2200
      WF=0.                                                             MANS2210
      TT4=0.                                                            MANS2220
      IMODES=MODES                                                      MANS2230
      GAMOLD=0.                                                         MANS2240
      ACCN=0.                                                           MANS2250
      HOLD=0.                                                           MANS2260
      THRQ=0.                                                           MANS2270
C                                                                       MANS2280
C     CHECK FOR LEGAL VALUE OF NAERO                                    MANS2290
      IF( NAERO .GT. 0  .AND. NAERO .LE. 5)  GO TO 290                  MANS2300
      IF ( LINOUT .NE. 0 ) WRITE (6,280) NAERO, NPHAZ                   MANS2310
  280 FORMAT( //'  NAERO=',I2, ' IN PHASE',I3 )                        MANS2320
 9000 CALL ERROUT                                                       MANS2330
      IF ( KFAIL  .GT.  0  )   RETURN                                   MANS2340
C                                                                       MANS2350
  290 CONTINUE                                                          MANS2360
C     DROP WEIGHT IF REQUESTED                                          MANS2370
      IF(  NPHAZ .NE. NDPHAZ ) GO  TO 300                               MANS2380
      W=W-WDROP                                                         MANS2390
      XPRIM1(6)=0.D0                                                    MANS2400
      XPRIM1(6)=W                                                       MANS2410
  300 CONTINUE                                                          MANS2420
C                                                                       MANS2430
C     COMPUTE INITIAL INTEGRATION STEP SIZE AND FIRST PRINT-OUT TIME    MANS2440
      DELT= AMIN1( TMAX-TIME, DSTART)                                   MANS2450
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      IF(  DPRINT .EQ.  0.)   GO TO 310                                  MANS2460
      TOUT= DPRINT*( AINT( TIME/DPRINT) +1. )                            MANS2470
      IF(ABS(TOUT-TIME)-TTOL .LE.0.) TOUT= DPRINT +TIME                  MANS2480
      DELT= AMIN1( DELT, TOUT-TIME )                                     MANS2490
      IF(DELT.LT.0.0)CALL ERROUT                                         MANS2500
      IF(DELT.LT.0.0)RETURN                                              MANS2510
  310 CONTINUE                                                           MANS2520
C                                                                        MANS2530
C     SET ROCKET ENGINE PARAMETERS                                       MANS2540
      IF(IPTYPE-3)  317, 316, 318                                        MANS2550
  316 AEXIT= AEXITS                                                      MANS2560
      IF( TVACMX-TVACMN .NE. 0. ) GO TO 319                              MANS2570
      IF ( LINOUT .NE. 0 ) WRITE (6,3160)                                MANS2580
 3160 FORMAT(// ' ILLEGAL INPUT.  TVACMX-TVACMN=0  IN ROCKET SUSTAINER  MANS2590
     *PHASE' )                                                           MANS2600
      CALL ERROUT                                                        MANS2610
      IF ( KFAIL  .GT.  0  )   RETURN                                    MANS2620
  317 IF(IPTYPE .EQ. 0)  GO TO 318                                       MANS2630
      AEXIT=AEXITI                                                       MANS2640
      TVAC=TVACI                                                         MANS2650
      XISP=XISPI                                                         MANS2660
      IF( XISP .NE. 0. ) GO TO 319                                       MANS2670
      IF ( LINOUT .NE. 0 ) WRITE (6,3170)                                MANS2680
 3170 FORMAT(// ' ROCKET ENGINE SPECIFIC IMPULSE IS ZERO  IN BOOST PHASEMANS2690
     * ')                                                                MANS2700
      CALL ERROUT                                                        MANS2710
      IF ( KFAIL  .GT.  0  )   RETURN                                    MANS2720
  318 AEXIT=0.                                                           MANS2730
  319 CONTINUE                                                           MANS2740
C                                                                        MANS2750
C     START BOOSTER SEGMENT IF REQUESTED                                 MANS2760
      IF(  NPHAZ .NE. NBOOST)  GO TO  320                                MANS2770
      WEMPTY=W-WPROPB                                                    MANS2780
      WFULL=W                                                            MANS2790
  320 CONTINUE                                                           MANS2800
C                                                                        MANS2810
C     START SUSTAINER SEGMENT IF REQUESTED                               MANS2820
      IF( NPHAZ .NE. NSPHAZ )  GO TO 325                                 MANS2830
      WEMPTY= W-WPROPS                                                   MANS2840
      WFULL=W                                                            MANS2850
  325 CONTINUE                                                           MANS2860
C                                                                        MANS2870
C     START ITERATIVE SEGMENT IF REQUIRED                                MANS2880
      IF(NPHAZ .NE. NCPHAZ) GO TO 360                                    MANS2890
      IF(NITER .EQ. 0) GO TO 340                                         MANS2900
      IF( IPRNT2)   330,330,340                                          MANS2910
  330 CONTINUE                                                           MANS2920
      IF(NTRY .GT. 0) GO TO 332                                          MANS2930
      NOUT=0                                                             MANS2940
      CALL OUTPUT                                                        MANS2950
  332 IPRINT=0                                                           MANS2960
      GO TO 350                                                          MANS2970
  340 CONTINUE                                                           MANS2980
      IPRINT=1                                                           MANS2990
  350 CONTINUE                                                           MANS3000
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      ITERM=4                                                          MANS3010
      FVALUE=RNGI                                                      MANS3020
      NTRY=NTRY+1                                                      MANS3030
  360 CONTINUE                                                         MANS3040
C                                                                      MANS3050
C     CHECK FOR LEGAL VALUES OF ICONT                                  MANS3060
      IF(  ICONT .GT. 0  .AND. ICONT .LT. 15 )   GO TO 380             MANS3070
      IF ( LINOUT .NE. 0 ) WRITE (6,370) ICONT, NPHAZ                  MANS3080
  370 FORMAT( //    '  ILLEGITIMATE VALUE OF OF ICONT.  ICONT=', I3,   MANS3090
     1              ' IN PHASE', I3 )                                  MANS3100
      GO TO 9000                                                       MANS3110
  380 CONTINUE                                                         MANS3120
      IF( NPHAZ .NE. NOPHAZ ) GO TO 382                                MANS3130
      IF( ICONT .EQ. 13 ) GO TO 382                                    MANS3140
      IF ( LINOUT .NE. 0 ) WRITE (6,381)                               MANS3150
  381 FORMAT(//  '  ERROR AT START OF VARIABLE LENGTH CRUISE PHASE.     MANS3160
     * ICONT IS NOT EQUAL TO 13.' )                                    MANS3170
      CALL ERROUT                                                      MANS3180
      IF ( KFAIL  .GT.  0  )   RETURN                                  MANS3190
  382 CONTINUE                                                         MANS3200
C                                                                      MANS3210
C     CHECK FOR LEGAL VALUE OF ITERM                                   MANS3220
      IF (  ITERM .GE. 0 .AND. ITERM  .LT. 10 )   GO TO 400            MANS3230
      IF ( LINOUT .NE. 0 ) WRITE (6,390) ITERM,NPHAZ                   MANS3240
  390 FORMAT( //   'ILLEGTIMATE VALUE OF ITERM.  ITERM=',  I3,         MANS3250
     1              ' IN PHASE', I3 )                                  MANS3260
      GO TO 9000                                                       MANS3270
  400 CONTINUE                                                         MANS3280
C                                                                      MANS3290
C     PUT TABULAR DATA INTO TABLE LOOK-UP ARRAYS.  CONVERT  ANGLES TO  MANS3300
C     RADIANS                                                          MANS3310
      DO 410 J=1,6                                                     MANS3320
      DO 410 I=1,20                                                    MANS3330
  410 STLU(I,J)=0.                                                     MANS3340
      DO 420  I=1,20                                                   MANS3350
      STLU(I,4)=YPITCH(I)                                              MANS3360
      IF( ICONT .LE. 8) STLU(I,4)=YPITCH(I)/DEGRAD                     MANS3370
  420 CONTINUE                                                         MANS3380
      NAER2=2*NAERO-1                                                  MANS3390
      DO 430 I=1,20                                                    MANS3400
      STLU(I,1)=SMACH(I, NAER2)                                        MANS3410
      STLU(I,2) = SMACH(I, NAER2+1) * DEGRAD                           MANS3420
      STLU(I,3)=XPITCH(I)                                              MANS3430
      STLU(I,5)=XTHRTL(I)                                              MANS3440
      STLU(I,6)=YISP(I)                                                MANS3450
  430 CONTINUE                                                         MANS3460
C                                                                      MANS3470
C     INSURE THAT EXIT AREA IS ZERO DURING COAST PHASE                 MANS3480
      IF( IPTYPE .EQ. 0)  AEXIT=0.                                     MANS3490
C                                                                      MANS3500
C                                                                      MANS3510
C     COMMAND ENGINE TO OPERATE AT MAXIMUM THRUST DURING BOOST PHASES  MANS3520
      IF( IPTYPE .LT. 3  )  MODES=1                                    MANS3530
C                                                                      MANS3540
C     CHECK FOR LEGAL VALUES OF PROPULSION SYSTEM TYPE                 MANS3550
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      IF( IPTYPE  .GE. 0 .AND.  IPTYPE  .LE. 5 ) GO TO 440                MANS3560
      IF ( LINOUT .NE. 0 ) WRITE (6,435) IPTYPE,NPHAZ                     MANS3570
  435 FORMAT( //    ' ILLEGITIMATE VALUE OF IPTYPE.  IPTYPE=', I3,        MANS3580
     I              ' IN PHASE',I3 )                                      MANS3590
      GO TO 9000                                                          MANS3600
  440 CONTINUE                                                            MANS3610
C                                                                         MANS3620
C                                                                         MANS3630
C                                                                         MANS3640
C                                                                         MANS3650
      IF( MHGEN .EQ.0 ) GO TO  800                                        MANS3660
C     GENERATE CLIMB SCHEDULE FOR MAX RATE OF CLIMB(R/C).  SEARCH FOR     MANS3670
C     MAX  R/C  AT EACH ALTITUDE  TERMINATES WHEN 3 POINTS ON CURVE       MANS3680
C     HAVE BEEN FOUND  AND  POINT 2 R/C  IS GREATER THAN R/C AT POINTS    MANS3690
C     1 OR 3.                                                             MANS3700
      VMASS=W/GSTD                                                        MANS3710
      IMODES=1                                                            MANS3720
      IPSV=IPROP1                                                         MANS3730
      IPROP1=1                                                            MANS3740
      DHCL = ABS( ALTF - ALT )  /  10.                                    MANS3750
      HCLS(1)=DHCL* AINT(ALT/DHCL)                                        MANS3760
      ALPC=0.01                                                           MANS3770
      NALTS=( ALTF-HCLS(1))/ DHCL +2.1                                    MANS3780
      IF(  NALTS .GT. 2  .AND.  NALTS .LE. 20 )  GO TO 460                MANS3790
      IF ( LINOUT .NE. 0 ) WRITE (6,450) NALTS                            MANS3800
  450 FORMAT( //    ' ERROR IN CLIMB SCHEDULE GENERATION.  NUMBER OF ALTMANS3810
     1ITUDES DEFINED=',I3)                                                MANS3920
      GO TO 9000                                                          MANS3830
C                                                                         MANS3840
C                                                                         MANS3850
C**** START ALTITUDE DO LOOP*******                                       MANS3860
  460 CONTINUE                                                            MANS3870
      IF ( LINOUT  .NE.  0  )  CALL PAGE                                  MANS3880
      DO 700  I=1,NALTS                                                   MANS3890
      RC= HCLS(I)+RE                                                      MANS3900
      ALTA=HCLS(I)                                                        MANS3910
      CALL AIR                                                            MANS3920
      IF ( KFAIL  .GT.  0  )   RETURN                                     MANS3930
      TEMP =TEMPA                                                         MANS3940
      PRESS=PRESSA                                                        MANS3950
      VMAX=XMACHF*SSVA                                                    MANS3960
      DVCL=ABS(DVCL)                                                      MANS3970
      IF( I .GT. 1) GO TO 462                                             MANS3980
      VMIN= AMAX1( 0.5*VMAX, V )                                          MANS3990
      VCL=AINT(VMIN/DVCL)*DVCL +DVCL                                      MANS4000
      VCLS=V                                                              MANS4010
      ALTA=ALT                                                            MANS4020
      CALL AIR                                                            MANS4030
      IF(KFAIL.GT.0) RETURN                                               MANS4040
      GO TO 680                                                           MANS4050
  462 CONTINUE                                                            MANS4060
C                                                                         MANS4070
C     START CLIMB SPEED SEARCH                                            MANS4080
      VCLZ=AINT(VCL/DVCL) * DVCL  +  DVCL                                 MANS4090
      IF ( VCLZ .LT. VMAX ) VCL = VCLZ                                    MANS4100
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      DO 600  J=1,20                                                    MANS4110
      XMACH=VCL/SSVA                                                    MANS4120
      CLALPH=SLINE(XMACH,1,2)                                           MANS4130
      CDO=DSLINE(XMACH,ALTA,NAERO)                                      MANS4140
      QS=0.5*RHOA*VCL*VCL*SREF+1.E-10                                   MANS4150
      CDOQS=CDO*QS                                                      MANS4160
      CLAQS=CLALPH*QS                                                   MANS4170
      DALPC=1.                                                          MANS4180
C                                                                       MANS4190
C     AT THE GIVEN MACH NO. AND ALTITUDE, FIND THE CLIMB ANGLE AND      MANS4200
C     ANGLE OF ATTACK                                                   MANS4210
      DO  500  K=1,20                                                   MANS4220
      NALP=K                                                            MANS4230
      IF( DALPC .LT. 0.002) GO TO 465                                   MANS4240
      ALPHA =ALPC                                                       MANS4250
      CALL TPROP1                                                       MANS4260
      IF ( KFAIL  .GT.  0  )   RETURN                                   MANS4270
  465 CONTINUE                                                          MANS4280
      THR=THR                                                           MANS4290
      DRAG= CDOQS+ CLAQS*ALPC*ALPC                                      MANS4300
      SINGAM=(  THR *COS(ALPC)- DRAG)/W                                 MANS4310
      COSGAM= SQRT(  ABS(1.-SINGAM*SINGAM)  )                           MANS4320
      ALPC1=   VMASS*( GSTD -VCL*VCL/RC          )*COSGAM /             MANS4330
     1          ( THR + CLAQS )                                        MANS4340
      DALPC= ABS(ALPC-ALPC1)                                            MANS4350
      IF(  DALPC      -0.0001 )      530,530,470                        MANS4360
  470 ALPC=ALPC1                                                        MANS4370
  500 CONTINUE                                                          MANS4380
C     END OF DO LOOP FOR ALPHA SOLUTION                                 MANS4390
C                                                                       MANS4400
C                                                                       MANS4410
C     NORMAL EXIT FROM ALPHA DO LOOP SIGNIFIES ERROR                    MANS4420
      IF ( LINOUT .NE. 0 ) WRITE (6,520)                                MANS4430
  520 FORMAT(//  '  FAILURE IN MAINS CLIMB SCHEDULE GENERATION.  ANGLE OMANS4440
     1F ATTACK SEARCH DID NOT CONVERGE' // )                            MANS4450
      NAMELIST/NALPC/ NALP, DALPC, ALPC, ALPC1, ALPHAP, XMACHP,         MANS4460
     1  PRESSP, TEMPP, RHOA, QS, RC, ALTA, SSVA, VCL, CEP              MANS4470
      IF ( LINOUT .GT. 1 ) WRITE(6,NALPC)                               MANS4480
      GO TO 9000                                                        MANS4490
C                                                                       MANS4500
C                                                                       MANS4510
  530 CONTINUE                                                          MANS4520
C     ANGLE OF ATTACK CONVERGED. CONTINUE SEARCH LOGIC FOR  MAX R/C     MANS4530
C     SPEED                                                             MANS4540
      HDOT=VCL*SINGAM                                                   MANS4550
      IF((LINOUT.GT.0).OR.(LINOUT.LT.-1) )                              MANS4560
     *WRITE(6,580) ALTA, VCL,  HDOT, ALPC, THR, DRAG, SINGAM            MANS4570
  580 FORMAT(/'      ALTA=' ,F7.0,                                      MANS4580
     2           '  VCL =' ,F7.2,                                      MANS4590
     3           '  HDOT=' ,F7.2,                                      MANS4600
     4           '  ALPC=' ,F7.5,                                      MANS4610
     5           '  THR=',F7.1,                                        MANS4620
     6           '  DRAG=' ,F7.1,                                      MANS4630
     7           '  SINGAM=',F7.5/)                                    MANS4640
      IF( J-2 )  540,541,545                                            MANS4650
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C                                                                       MANS4660
C     SAVE FIRST POINT ON  R/C VS VCL CURVE.                            MANS4670
  540 CONTINUE                                                          MANS4680
      HDOTA(1)=HDOT                                                     MANS4690
      VCLA(1)=VCL                                                       MANS4700
      GO TO 572                                                         MANS4710
C                                                                       MANS4720
C     SECOND POINT ON  R/C VS VCL CURVE                                 MANS4730
  541 CONTINUE                                                          MANS4740
      IF( HDOT- HDOTA(1) )   543,542,542                                MANS4750
C                                                                       MANS4760
C     R/C INCREASED.  SAVE SECOND POINT                                 MANS4770
  542 HDOTA(2)=HDOT                                                     MANS4780
      VCLA(2)=VCL                                                       MANS4790
      GO TO 570                                                         MANS4800
C                                                                       MANS4810
C     R/C DECREASED AFTER FIRST STEP.  REVERSE SEARCH DIRECTION.        MANS4820
  543 CONTINUE                                                          MANS4830
      HDOTA(2)=HDOTA(1)                                                 MANS4840
      VCLA(2) =VCLA(1)                                                  MANS4850
      HDOTA(1)=HDOT                                                     MANS4860
      VCLA(1) =VCL                                                      MANS4870
      DVCL=-DVCL                                                        MANS4880
      VCL=VCLA(2)                                                       MANS4890
      GO TO 570                                                         MANS4900
C                                                                       MANS4910
C     THIRD AND SUBSEQUENT POINTS ON R/C VS VCL CURVE                   MANS4920
  545 HDOTA(3)=HDOT                                                     MANS4930
      VCLA(3) =VCL                                                      MANS4940
C                                                                       MANS4950
C     IF R/C DECREASED,  MAX R/C HAS BEEN BRACKETED                     MANS4960
      IF( HDOTA(3) - HDOTA(2)  )      650,650,550                       MANS4970
  550 CONTINUE                                                          MANS4980
      HDOTA(1)=HDOTA(2)                                                 MANS4990
      HDOTA(2)=HDOTA(3)                                                 MANS5000
      VCLA(1) =VCLA(2)                                                  MANS5010
      VCLA(2) =VCLA(3)                                                  MANS5020
  570 CONTINUE                                                          MANS5030
      IF (  (VCL.LT.VMAX) .AND. (VCL.GT.VMIN)  )  GO TO 572             MANS5040
      VCLS=VCL                                                          MANS5050
      GO TO 680                                                         MANS5060
  572 CONTINUE                                                          MANS5070
      VCL=VCL+DVCL                                                      MANS5080
      VCL=AMIN1(VCL, VMAX)                                              MANS5090
      VCL=AMAX1(VCL, VMIN)                                              MANS5100
C                                                                       MANS5110
C                                                                       MANS5120
  600 CONTINUE                                                          MANS5130
C     END OF DO LOOP FOR CLIMB SPEED SEARCH                             MANS5140
C                                                                       MANS5150
C                                                                       MANS5160
C     NORMAL EXIT SIGNIFIES FAILURE                                     MANS5170
      IF ( LINOUT .NE. 0 ) WRITE (6,640)  ALTA                          MANS5180
  640 FORMAT( // '  FAILURE IN MAINS CLIMB SCHEDULE GENERATION.  CLIMB SMANS5190
     1PEED SEARCH FAILED AT ALTITUDE=', F10.0, ' FT.'  / '  CLIMB PHASE MANS5200
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     2 WILL PROCEED IF AT LEAST TWO POINTS ON CLIMB SCHEDULE HAVE BEEN   MANS5210
     3 GENERATED')                                                       MANS5220
      GO TO 665                                                          MANS5230
C                                                                        MANS5240
  650 CONTINUE                                                           MANS5250
C     PERFORM SECOND ORDER CURVE FIT THROUGH LAST THREE POINTS ON R/C    MANS5260
C     VS SPEED CURVE                                                     MANS5270
      A1= VCLA(2)*VCLA(3)**2 -VCLA(2)**2*VCLA(3)                         MANS5280
      A2= VCLA(3)*VCLA(1)**2 -VCLA(3)**2*VCLA(1)                         MANS5290
      A3= VCLA(1)*VCLA(2)**2 -VCLA(1)**2*VCLA(2)                         MANS5300
      A=  HDOTA(1)*A1 + HDOTA(2)*A2  + HDOTA(3)*A3                       MANS5310
      D=  A1+A2+A3+1.E-20                                                MANS5320
      B=  HDOTA(2)*VCLA(3)**2  - VCLA(2)**2 *HDOTA(3)                    MANS5330
     1   +HDOTA(3)*VCLA(1)**2  - VCLA(3)**2 *HDOTA(1)                    MANS5340
     1   +HDOTA(1)*VCLA(2)**2  - VCLA(1)**2 *HDOTA(2)                    MANS5350
      C1= VCLA(2)*HDOTA(3) - HDOTA(2)*VCLA(3)                            MANS5360
     1   +VCLA(3)*HDOTA(1) - HDOTA(3)*VCLA(1)                            MANS5370
     1   +VCLA(1)*HDOTA(2) - HDOTA(1)*VCLA(2)                            MANS5380
C     SAVE MAX R/C AND ASSOCIATED CLIMB SPEED                            MANS5390
      VCLS   =-B/(2.*C1)                                                 MANS5400
      HDOTS =( A+ B*VCLS +C1*VCLS*VCLS )/D                               MANS5410
      IF((LINOUT.GT.0).OR.(LINCUT.LT.-1) )                               MANS5420
     *WRITE(6,660)  HDOTS, VCLS, A, B, C1, D                             MANS5430
  660 FORMAT(   '  MAX R/C=', F10.2,' FT/SEC,    V=', F10.2,'FT/SEC  A=', MANS5440
     1F15.3,   ' B=',F15.3,' C=',F15.3,' D=',F15.3  )                    MANS5450
C                                                                        MANS5460
C     IF R/C IS NEGATIVE,  COMPUTE A MAXIMUM           ALTITUDE WHICH    MANS5470
C     WILL CONSTRAIN SUBSEQUENT PHASES                                   MANS5480
      IF( HDOTS .GT. 0 )  GO TO 680                                      MANS5490
      ALTMAX=HCLS(I-1)                                                   MANS5500
  665 CONTINUE                                                           MANS5510
      IF( I-1 .GE. 2 )  GO TO 800                                        MANS5520
      IF ( LINOUT .NE. 0 ) WRITE ( 6,670 )                               MANS5530
  670 FORMAT( //    '  FAILURE IN MAINS CLIMB SCHEDULE GENERATION.',     MANS5540
     1      '  POSITIVE RATE OF CLIMB FOUND FOR ONLY ONE POINT' )        MANS5550
      GO TO 9000                                                         MANS5560
C                                                                        MANS5570
C     SAVE CLIMB MACH NO. AND ALTITUDE IN STLU ARRAY                     MANS5580
  680 CONTINUE                                                           MANS5590
      STLU(I,4)=VCLS/SSVA                                                MANS5600
      STLU(I,3)=ALTA                                                     MANS5610
      HCLS(I+1)=HCLS(I)+DHCL                                             MANS5620
C     MAKE LAST POINT THE CRUISE ALTITUDE+1000 FT.                       MANS5630
      IF( I .EQ. NALTS-1       )  HCLS(NALTS)=ALTF+1000.                 MANS5640
  700 CONTINUE                                                           MANS5650
      IF ( LINOUT  .NE.  0  )  CALL PAGE                                 MANS5660
      IPROP1=IPSV                                                        MANS5670
C*****END OF DO LOOP FOR ALTITUDE SURVEY*********                       MANS5680
C                                                                        MANS5690
C                                                                        MANS5700
C                                                                        MANS5710
  800 CONTINUE                                                           MANS5720
C                                                                        MANS5730
C    CONSTRAIN INPUT ALTF TO VALUE OF ALTMAX.   NOTE THAT ALTMAX IS      MANS5740
C     INITIALIZED TO 1.E8 IN STDATA.                                     MANS5750
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      ALTF=AMIN1(ALTF,ALTMAX)                                          MANS5760
C                                                                      MANS5770
C                                                                      MANS5780
C     START INTEGRATION OF PHASE                                       MANS5790
      CALL RUNGEK ( KWISH )                                            MANS5800
      IF ( KWISH  .EQ.  4321  )  GO TO 9876                            MANS5810
      RETURN                                                           MANS5820
      END                                                              MANS5830



      SUBROUTINE OUTPUT                                                OUTP0010
C     PCM=NUK.CGSM  RKM/HUE   7/11/73   FIV-EBCD                       OUTP0020
C     SUBROUTINE OUTPUT PRINTS TABULAR TIME HISTORY OF TRAJECTORY      OUTP0030
C     VARIABLES.                                                       OUTP0040
C         NOUT=      COUNTER FOR TOTAL NUMBER OF OUTPUT POINTS PER TRAJ. OUTP0050
C                    NOUT=0 AT START AND AT COMPLETION OF TRAJ.        OUTP0060
C         NLINES=    COUNTER FOR NUMBER OF OUTPUT LINES PER PAGE.      OUTP0070
C                    NLINES=0 AT START OF TRAJ                         OUTP0080
C         NPAGE=     PAGE NUMBER                                       OUTP0090
C         IPRINT=    FLAG TO SUPPRESS PRINTING. IPRINT=0 SUPRESSES OUTPUTOUTP0100
C                                                                      OUTP0110
      COMMON /QACCST/ QMAXQ, VMAXQ, DUMQA(8)                           OUTP0120
      COMMON/CIBLK/CI(1000)/CBLK/C(400)                                OUTP0130
     1      /OUTBLK/PAGEB(14,50)/BCDBLK/LINE1(20),LINE2(20)           OUTP0140
      EQUIVALENCE   (GSTD,    CI( 25))                                 OUTP0150
C     WORKING COMMON           STDATA,   MAINS,    DERIV, OUTPUT       OUTP0160
      EQUIVALENCE                                                      OUTP0170
     1    (RC,       C(  1)),  (Q,       C(  2)),  (QS,      C(  3)), OUTP0180
     2    (GRAV,     C(  4)),  (GRAVT,   C(  5)),  (GRAVN,   C(  6)), OUTP0190
     3    (TWOG,     C(  7)),  (THR,     C(  8)),  (THRQ,    C(  9)), OUTP0200
     4    (SSV,      C( 10)),  (RHO,     C( 11)),  (PRESS,   C( 12)), OUTP0210
     5    (VISC,     C( 13)),  (TEMP,    C( 14)),  (ALPHA,   C( 15)), OUTP0220
     6    (XMACH,    C( 16)),  (CDO,     C( 17)),  (CLAQS,   C( 18)), OUTP0230
     7    (CLALF,    C( 19)),  (CF,      C( 20)),  (WF,      C( 21)), OUTP0240
     8    (SEC,      C( 22)),  (TT4,     C( 23)),  (ANZ,     C( 24)), OUTP0250
     9    (ANX,      C( 25)),  (NITER,   C( 26)),  (NBOOST,  C( 27)), OUTP0260
     *    (NSPHAZ,   C( 28)),  (IPRINT,  C( 29)),  (RSAVE,   C( 30)), OUTP0270
     1    (ETA,      C( 31)),  (TSAVE,   C( 32)),  (XTOL,    C( 33)), OUTP0280
     2    (NERR,     C( 34)),  (ERLIMT,  C( 35)),  (NEQ,     C( 36)), OUTP0290
     3    (IDONE,    C( 37)),  (NDONE,   C( 38)),  (ERLOG,   C( 39)), OUTP0300
     4    (NBAD,     C( 40)),  (JSTEP,   C( 41)),  (TTOL,    C( 42)), OUTP0310
     5    (TMAX,     C( 43)),  (DELT,    C( 44)),  (KSUB,    C( 45)), OUTP0320
     7                         (KKK,     C( 56)),  (INDEX,   C( 57))  OUTP0330
      EQUIVALENCE                                                      OUTP0340
     1    (TOUT,     C( 58)),  (IOUT,    C( 59)),  (NPHAZ,   C( 60)), OUTP0350
     2    (SINGAM,   C( 73)),  (COSGAM,  C( 74)),  (DALP,    C( 75)), OUTP0360
     3    (VMASS,    C( 76)),  (GDOTRQ,  C( 77)),  (DEGRAD,  C( 78)), OUTP0370
     4    (TVAC,     C( 79)),  (AEXIT,   C( 80)),  (XISP,    C( 81)), OUTP0380
     5    (ACCN,     C( 82)),  (ACCT,    C( 83)),  (XNOW,    C( 84)), OUTP0390
     6    (WPR ,     C( 85)),  (WEMPTY,  C( 86)),  (NPAGE,   C( 87)), OUTP0400
     7    (NOUT,     C( 88)),  (NLINES,  C( 89)),  (NCON,    C( 90)), OUTP0410
     8    (NMAP,     C( 91)),  (RNGI,    C( 92)),  (NTRY,    C( 93)), OUTP0420
     9    (ALTMAX,   C( 94))                                          OUTP0430
C      INTEGRATION VARIALBLES  STDATA    MAINS     DERIV, OUTPUT      OUTP0440
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      REAL*8 XPRIM1                                                          OUTP0450
      COMMON/RKBLK/X(10),XDOT(10),XPRIM1(10)                                 OUTP0460
      EQUIVALENCE                                                            OUTP0470
     1    (TIME,     X(  1)),  (GAMMA,    X(  2)),  (V,        X(  3)),    OUTP0480
     2    (ALT,      X(  4)),  (R,        X(  5)),  (W,        X(  6)),    OUTP0490
     3    (VI,       X(  7)),                                               OUTP0500
     4                         (GDOT,     XDOT(2)), (VDOT,     XDOT(3)),   OUTP0510
     5    (HDOT,     XDOT(4)), (RDOT,     XDOT(5)), (WDOT,     XDOT(6)),   OUTP0520
     6    (VIDOT,    XDOT(7))                                               OUTP0530
      EQUIVALENCE    ( CI(45), LINOUT )                                     OUTP0540
C                                                                            OUTP0550
      DIMENSION      PAGEA(14),IPAGEB(50)                                   OUTP0560
      IF ( Q .GT. QMAXQ ) QMAXQ = Q                                          OUTP0570
      IF ( V .GT. VMAXQ ) VMAXQ = V                                          OUTP0580
      IF ( LINOUT .EQ. 0  ) GO TO 9000                                       OUTP0590
      IF( IPRINT .EQ. 0 )  GO TO 9000                                        OUTP0600
      IF( NOUT .GT. 0 )   GO TO 40                                           OUTP0610
      IF( NLINES .EQ. 0 ) GO TO 15                                           OUTP0620
      IF( NLINES .EQ.50)  GO TO 9000                                         OUTP0630
      GO TO 75                                                               OUTP0640
C                                                                            OUTP0650
C                                                                            OUTP0660
   15 CONTINUE                                                               OUTP0670
C     WRITE TABLE A HEADING                                                  OUTP0680
      CALL PAGE                                                              OUTP0690
   20 FORMAT( 1H1, 1X, 20A4,27HLTV AEROSPACE CORP./CONCEPT, I3/              OUTP0700
     1             2X, 20A4,26HVEHPER                PAGE   , I3,1HA )      OUTP0710
      WRITE(6,30)                                                            OUTP0720
   30 FORMAT( /4X,  'TIME',  3X, 'GAMMA', 3X,' SPEED', 1X, 'ALTITUDE',       OUTP0730
     1          3X,  'RANGE', 2X, 'WEIGHT', 3X, 'THRUST', 6X,'NX',          OUTP0740
     2          6X, 'NZ', 2X, 'ALPHA', 3X, 'THETA', 5X, 'LIFT',             OUTP0750
     3          5X, 'DRAG', 2X, 'MACH', 1X, 'STEPS', 1X, 'STEPS',           OUTP0760
     4          1X, 'NERR'/                                                 OUTP0770
     *          4X,  ' SEC',  3X, '  DEG', 3X,'FT/SEC', 1X, '      FT',    OUTP0780
     1          3X,  ' N MI', 2X, '   LBM', 3X, '   LBF', 6X,' G',        OUTP0790
     2          6X, ' G', 2X, '  DEG', 3X, '  DEG', 5X, ' LBF',            OUTP0800
     3          5X, ' LBF', 2X, '    ', 1X, ' GOOD', 1X, '  BAD'  )        OUTP0810
      IF( NOUT .NE. 0)   GO TO 9000                                          OUTP0820
   40 CONTINUE                                                               OUTP0830
      NOUT=NOUT+1                                                            OUTP0840
      NLINES=MOD(NOUT,50)                                                    OUTP0850
      IF( NLINES .EQ. 0 ) NLINES=50                                          OUTP0860
C                                                                            OUTP0870
C     COMPUTE AND PRINT A LINE OF PAGE A DATA                                OUTP0880
      DO 50  I=1,6                                                           OUTP0890
   50 PAGEA(I)  = X(I)                                                       OUTP0900
      PAGEA(2)=PAGEA(2)*DEGRAD                                               OUTP0910
      PAGEA(5)=PAGEA(5)/6076.115                                             OUTP0920
      PAGEA(7)=THR                                                           OUTP0930
      PAGEA(8)=(VDOT-GRAVT)/GSTD                                             OUTP0940
      PAGEA(9)=ANZ                                                           OUTP0950
      PAGEA(10)=ALPHA*DEGRAD                                                 OUTP0960
      PAGEA(11)= (ALPHA+GAMMA)*DEGRAD                                        OUTP0970
      PAGEA(12)=  CLAQS*ALPHA                                                OUTP0980
      PAGEA(13)=  PAGEA(12)*ALPHA + CDO*QS                                   OUTP0990
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      PAGEA(14)= XMACH                                                  OUTP1000
      WRITE(6,60)  PAGEA, JSTEP, NBAD, NERR                             OUTP1010
   60 FORMAT( 1X, F7.2,  F8.2, F8.1, F9.1, F8.2, F8.1, F9.1, 2F8.3,     OUTP1020
     1            F7.2,  F8.2, 2F9.1, F6.2, 216,  I5 )                 OUTP1030
C                                                                       OUTP1040
C     SAVE A LINE OF TABLE B DATA                                       OUTP1050
      N=NLINES                                                          OUTP1060
      PAGEB(1,N)=X(1)                                                   OUTP1070
      PAGEB(2,N)=XDOT(2)*DEGRAD                                         OUTP1080
      DO 70 I=1,4                                                       OUTP1090
      I2=I+2                                                            OUTP1100
   70 PAGEB( I2,N)=XDOT(I2)                                             OUTP1110
      PAGEB(7,N)= THRQ/(QS+1.E-10)                                      OUTP1120
      PAGEB(8,N)= THR/ (QS+1.E-10)                                      OUTP1130
      PAGEB(9,N)= WF/(THR+1.E-10)*3600.                                 OUTP1140
      PAGEB(10,N)=TT4                                                   OUTP1150
      PAGEB(11,N)= THR/(WF+1.E-10)                                      OUTP1160
      PAGEB(12,N)= X(7)                                                 OUTP1170
      IPAGEB(N)=NMAP                                                    OUTP1180
      PAGEB(13,N)=Q                                                     OUTP1190
C                                                                       OUTP1200
      IF( NLINES .LT. 50 )   GO TO 9000                                 OUTP1210
C                                                                       OUTP1220
C     WRITE TABLEB HEADING AND CONTENTS OF PAGEB ARRAY                  OUTP1230
   75 CONTINUE                                                          OUTP1240
      CALL PAGE                                                         OUTP1250
   80 FORMAT(1H1, 1X, 20A4,27HLTV AEROSPACE CORP./CONCEPT, I3/          OUTP1260
     1            2X, 2CA4,26HVEHPER                PAGE  , I3,1HB )  OUTP1270
C                                                                       OUTP1280
      WRITE(6,90)                                                       OUTP1290
   90 FORMAT(/4X,   'TIME', 3X, 'G-DOT', 4X, 'V-DOT', 4X, 'H-DOT',      OUTP1300
     2         3X,   'R-DOT', 3X, 'W-DOT', 3X, 'CFNREQ', 6X, 'CFN',    OUTP1310
     3         8X,   'SEC',4X, 'TT4', 5X, 'ISP', 1X, 'V-IDEAL', ' NMAP',OUTP1320
     *         1X,   'DYN PRESS'/                                       OUTP1330
     1         5X,     'SEC',1X,'DEG/SEC', 3X,'FT/SEC', 3X, 'FT/SEC',  OUTP1340
     2         2X,  'FT/SEC', 1X, 'LBM/SEC', 18X,                       OUTP1350
     3         1X, 'LBM/HR/LBF', 2X, 'DEG R', 5X, 'SEC', 2X, 'FT/SEC' , OUTP1360
     *         8X,   'LBS/FT2'  )                                       OUTP1370
C                                                                       OUTP1380
      WRITE(6,100) ((PAGEB(I,J), I=1,12), IPAGEB(J), PAGEB(13,J),       OUTP1390
     *  J=1,NLINES)                                                     OUTP1400
  100 FORMAT( 1X, F7.2, F8.3, 2F9.1, F8.1, F8.1, 2F9.5, F11.4,          OUTP1410
     1       F7.1, F8.1, F8.1, I5, F10.2)                               OUTP1420
C                                                                       OUTP1430
      NPAGE=NPAGE+1                                                     OUTP1440
      IF( NLINES .EQ.50 )  GO TO 15                                     OUTP1450
 9000 RETURN                                                            OUTP1460
      END                                                               OUTP1470



      SUBROUTINE PROP11                                                 PRP10010
C     MODES    -1 MIN THRUST                                            PRP10020
C     MODES     0 CFN REQUIRED                                          PRP10030
C     MODES    +1 MAX THRUST                                            PRP10040
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      COMMON /EPPRT/ BOMB(4),MUM,IARI(2)                                PRP10050
      COMMON /EXCLUD/ PT2, TT2, PTO, CDA, ADAC, PT2PO                   PRP10060
      COMMON /PRINTR/ I2(2),IVP,I4(4)                                   PRP10070
      COMMON /FAILUR/ KFAIL                                             PRP10080
      COMMON /RJBLOK/ RJ(50)                                            PRP10090
      EQUIVALENCE                                                       PRP10100
     1(RJ( 1),CNM   ),(RJ( 2),ANC   ),(RJ( 3),ANN   ),(RJ( 4),AL    ),  PRP10110
     2  (RJ(6), CDB ), ( RJ(7), C1 ),                                  PRP10120
     3(RJ( 9),PT4Y  ),(RJ(10),GAM   ),(RJ(11),A6MAX ),(RJ(12),ACMAX ),  PRP10130
     4  ( RJ(13), A6MIN ), ( RJ(14), XMOMR),                           PRP10140
     5(RJ(17),CDC   ),(RJ(18),PCMGN ),                (RJ(20),ALFOLD),  PRP10150
     6(RJ(21),A243  ),(RJ(22),FARLB ),(RJ(23),IID   ),(RJ(24),BPAR  ),  PRP10160
     7                (RJ(26),TT4   ),(RJ(27),FAR   ),(RJ(28),PM    ),  PRP10170
     8  (RJ(29), WF ), ( RJ(30), ANC4 ), ( RJ(31), PT2PCC ),           PRP10180
     9(RJ(33),TO    ),(RJ(34),PO    ),(RJ(35),KDIA  ),(RJ(36),PT4I  ),  PRP10190
     X (RJ(37),PT41  ),(RJ(38),PT42  ),(RJ(39),PT43  ),                PRP10200
     1(RJ(40),AM6   ),(RJ(41),AM4   ),(RJ(42),AM2   ),(RJ(43),GAM2  ),  PRP10210
     2  ( RJ(44), GAM4 ), ( RJ(45), P6 ), ( RJ(47), AR2 ),             PRP10220
     3(RJ(48),AR4   ),(RJ(49),PT4   ),(RJ(50),WAA3  )                  PRP10230
C  COMMON BLOCK FOR ALTITUDE,TITLE,ID AND FUEL DECKS                   PRP10240
      COMMON /ALTDD/                                                    PRP10250
     1K1,ALT(24),SDTEMP(24),PRESS(24),ID(8)                             PRP10260
      COMMON /FUELXX/                                                   PRP10270
     2K2,KK(15),TT2TAB(15 ),TFAR1(15,15),TTRS1(15,15),TTRS2(15,15),     PRP10280
     X TTRS3(15,15),                                                    PRP10290
     3K3,KL(15),JGAMM,TT4TA(15),TFAR2(15,15),TGAM(15,15),FG(15,15),     PRP10300
     XFG(15,15),                                                        PRP10310
     4K4,KN(15),JR,   TT4TB(15),TFAR3(15,15),RTAB(15,15),ER(15,15),     PRP10320
     XFR(15,15),                                                        PRP10330
     5NP1,AAM(24),ANC1(24),FARL(24)                                     PRP10340
C  COMMON BLOCK FOR INLET PERFORMANCE MAP                               PRP10350
      COMMON/INLETX/                                                    PRP10360
     6K8,KPTC(15),ALPHV(15),AAMACH(15,15),ADACC(15,15),PT3PTO(15,15),   PRP10370
     1ADDD(15,15)                                                       PRP10380
      COMMON/RJDAT/CFN1,CFN2,A5A3,A6A3,ACA3,SFC,B11,B12,B13             PRP10390
      COMMON/TRAJX/ CFNET,CFNRQ,AMACH,ALF1,MODES,IND,FARMAX,TT4MAX,FSLBOPRP10400
     1,ICODE                                                            PRP10410
      COMMON/EXTERN/ AR(20)                                             PRP10420
      EQUIVALENCE (AR(3),D3),(AR(12),A3)                                PRP10430
C     OPT 1     PC MARGIN    MODE = 1                                   PRP10440
C     OPT 2     TT4 MAX      KODE2 = 1                                  PRP10450
C     OPT 3     FAR MAX      MODE = 2                                   PRP10460
C     OPT 4     CFN                                                     PRP10470
C     TABLE 2     TEMP RISE                                             PRP10480
C     TABLE 3     GAMMA                                                 PRP10490
C     TABLE 4     R                                                     PRP10500
C     TABLE 5     BURNER SEVENTY TABLE ( TEMP RISE EFF, LEAN BLOW OUT ) PRP10510
C     TABLE 6     INLET MAP ( PT2PTO,ADAC,CDA)                          PRP10520
      COMMON /CODEXX/II(16)                                             PRP10530
      EQUIVALENCE (II(1),KIND)                                          PRP10540
      COMMON /CBLK/ CLATR(400)                                          PRP10550
      EQUIVALENCE ( CLATR(60), NPHAZ )                                  PRP10560
       LOGICAL OPT(3)                                                   PRP10570
      LOGICAL L1,L2,L3,L4                                               PRP10580
      DIMENSION NUMBER( 6), JVER(7)                                     PRP10590
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```
      DATA NUMBER/'1','2','3OR4','3OR4','5','6'/                        PRP10600
      DATA JVER/'DTRQ','PT4','AM2','AM2*','AOAC','PMAR','CFRQ'/         PRP10610
      NAMELIST /STOP/   ALF1,AMACH,BPAR,PO,      FAR,TT2,      TT4,     PRP10620
     1WAA3,TTO,PTO,AOAC,PT2PO,DTRISE,ANC,MODES,              DTREQ,PT4N,PPRP10630
     2T4!,PT2MAR,PT2POC,AM2,AM2NEW,CFNET,CFNRQ,WF,WA,J1,J2,J3,J4,J5,J6,  PRP10640
     3 FARLB,PT2POA                                                     PRP10650
     4  ,AM4,AM6,GAM2,GAM4,CDA,AR2,AR4,ACA3,A5A3,P6PT6,GAM              PRP10660
     5   ,CFHI,CFLO,WFHI,WFLO,L1,L2,L3,L4                               PRP10670
      GAMF(Q,R)=(1.+(Q-1.)/2.*R*R)                                      PRP10680
      WFHI = 0.0                                                        PRP10690
      WFLO = 0.0                                                        PRP10700
      NOUT=IVP                                                          PRP10710
      IND = 0                                                           PRP10720
      CALL ISEN (TO,PO,AMACH,TT2,PTO)                                   PRP10730
      IF( KFAIL .GT. 0 ) RETURN                                         PRP10740
   75 TTO=TT2                                                           PRP10750
C  OBTAIN  PRESS RECOVERY,AOAC AND ADDITIVE DRAG                        PRP10760
      CALL TLU2(ALF1,ALPHV,K8,AMACH,AAMACH,KPTC,AOACC,AOAC,IND)         PRP10770
      IF(IND.NE.0) GO TO 415                                            PRP10780
      CALL TLU22(PT3PTO,PT2POA)                                         PRP10790
      CALL TLU22(ADDD,CDA)                                              PRP10800
      PT2MAR =(1.-PCMGN/100.)*PT2POA                                    PRP10810
      PT2 = PTO*PT2MAR                                                  PRP10820
      L4=.FALSE.                                                        PRP10830
      IF(ICODE.NE.0) GO TO 10                                           PRP10840
      A3=.7854*D3**2/144.                                               PRP10850
      A2A3 = 1.                                                         PRP10860
      L2=.FALSE.                                                        PRP10870
      L3=.FALSE.                                                        PRP10880
      OPT(2)=.FALSE.                                                    PRP10890
      OPT(3)=.FALSE.                                                    PRP10900
      IF(TT4MAX.GT.0.) OPT(2) = .TRUE.                                  PRP10910
      IF(FARMAX.GT.0.) OPT(3)=.TRUE.                                    PRP10920
      A5A6=A5A3/A6A3                                                    PRP10930
      A6A5=1./A5A6                                                      PRP10940
      ICODE =1                                                          PRP10950
   10 L2= OPT(2)                                                        PRP10960
      L3=OPT(3)                                                         PRP10970
      L1=.TRUE.                                                         PRP10980
      IXX = 0                                                           PRP10990
      PART=GAM/2.*PO*AMACH**2*A3                                        PRP11000
      AOA3=AOAC*ACA3                                                    PRP11010
      WAA3=SQRT(GAM)*.7765056*PO*AMACH/SQRT(TO)*AOAC*ACA3               PRP11020
      WA=WAA3*A3                                                        PRP11030
      CA=CDA*PART*ACA3                                                  PRP11040
      RDR=XMOMR*WA*AL/32.174*AMACH*49.04*SQRT(TO)                       PRP11050
      DR=2.*AOA3*PART-RDR                                               PRP11060
C                                                                       PRP11070
      AOA2=(AOAC*ACA3)/A2A3                                             PRP11080
      BPAR=WAA3*(1.-AL)/A5A3*(TTO/1000.)**2                             PRP11090
      CALL TLU1(BPAR,AAM,NB1,ANC1,ANC, IND)                             PRP11100
      IF(IND.NE.0) GO TO 410                                            PRP11110
      CALL TLU11(FARL,FARLB)                                            PRP11120
      IF(FARLB.LE.0.) FARLB = 0.005                                     PRP11130
       WF = .025*3600.*A3*WAA3*(1.-AL)                                  PRP11140
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```
      IF(MODES) 15,17,16                                                    PRP11150
   15 FAR= FARLB*FSLBO                                                      PRP11160
      WF = FAR*WA*3600.0*(1.-AL)                                            PRP11170
      L2 = .FALSE.                                                          PRP11180
      GO TO 225                                                             PRP11190
   17 L4 =.TRUE.                                                            PRP11200
      IF( CFNRQ .LE. 0. ) GO TO 456                                         PRP11210
   16 IF (OPT(3))                                                           PRP11220
     1WF    =FARMAX*3600.*A3*(1-AL)*WAA3                                   PRP11230
      IF(OPT(2))                                                            PRP11240
     1DTREQ=(TT4MAX-TT2)/ANC                                                PRP11250
  225 PT2PO = PT2MAR                                                        PRP11260
  230 PT2POC=PT2POA                                                         PRP11270
C                                                                           PRP11280
C                                                                           PRP11290
      J5=0                                                                  PRP11300
      J6=0                                                                  PRP11310
  235 PT4I=.91*PT2PO*PO*(TTO/TO)**(GAM/(GAM-1.))                            PRP11320
      FAR=WF/(WA*3600.*(1.-AL))                                             PRP11330
  240 J1=0                                                                  PRP11340
      J2=0                                                                  PRP11350
  245 CALL DTRGET (FAR,TT2,DTRISE,IND)                                      PRP11360
      IF (IND.NE.0) GO TO 395                                               PRP11370
      TT4=TT2+ANC*DTRISE                                                    PRP11380
      IF(.NOT.L3 .AND. L2) GO TO 250                                        PRP11390
      GO TO 260                                                             PRP11400
  250 IF (ABS(DTRISE-DTREQ).LT..5) GO TO 259                                PRP11410
      IF (J1.GT.50) GO TO 345                                               PRP11420
      J1=J1+1                                                               PRP11430
      FAR=FAR*DTREQ/DTRISE                                                  PRP11440
      IF (OPT(3).AND.FAR.GT.FARMAX) FAR=FARMAX                              PRP11450
      GO TO 245                                                             PRP11460
  259 WF = FAR * 3600. * A3 * (1.-AL) * WAA3                                PRP11470
  260 CALL RGAMER (IID,0.0, TT2,GAM2,IND,AR2)                               PRP11480
      IF (IND.NE.0) GO TO 400                                               PRP11490
      CALL RGAMER (IID,FAR, TT4,GAM4,IND,AR4)                               PRP11500
      IF (IND.NE.0) GO TO 400                                               PRP11510
C                                                                           PRP11520
      PT4N=((1.-AL)*(1.+FAR)*WAA3*SQRT(TT4))/(A5A3*CNM*SQRT((32.2*GAM4/APRP11530
     1R4)*((2./(GAM4+1.))**((GAM4+1.)/(GAM4-1.)))))                         PRP11540
      IF (ABS(PT4I-PT4N).LT.2.) GO TO 265                                   PRP11550
      PT4I=PT4N                                                             PRP11560
      IF (J2.EQ.50) GO TO 350                                               PRP11570
      J2=J2+1                                                               PRP11580
      GO TO 245                                                             PRP11590
C                                                                           PRP11600
  265 CAR=CNM*A5A3                                                          PRP11610
      BR=1./CAR                                                             PRP11620
      K=-1                                                                  PRP11630
      CALL MACHNO (BR,GAM4,AM4,K,IND)                                       PRP11640
      IF (IND.NE.0) GO TO 385                                               PRP11650
      AM2=0.1                                                               PRP11660
      STO1=0.                                                               PRP11670
      STO2=0.                                                               PRP11680
      PR1=AM4*SQRT(GAMF(GAM4,AM4))                                          PRP11690
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      BP2=1.-CDB/2.                                                          PRP11700
      BB3=1.+GAM4*AM4*AM4                                                    PRP11710
      BB4=(GAM2-1.)/2.                                                       PRP11720
      BB5=(1.+FAR)*(1.-AL)*SQRT((GAM2*AR4**TT4)/(GAM4*AR2*TT2))              PRP11730
      J3=0                                                                   PRP11740
  270 CONTINUE                                                               PRP11750
      G22=AM2*AM2                                                            PRP11760
      AM2NEW=BB1*(1.+GAM2*G22*BB2)/(BB3*SQRT(1.+BB4*G22))/BB5                PRP11770
      IF (ABS(AM2NEW-AM2)-.0001) 280,280,275                                 PRP11780
  275 IF (J3.GT.50) GO TO 355                                                PRP11790
      J3=J3+1                                                                PRP11800
      AA=(AM2NEW-STO1)/(AM2-STO2)                                            PRP11810
      IF (AA.EQ.1.) GO TO 360                                                PRP11820
      Q=AA/(AA-1.)                                                           PRP11830
      IF (Q.GE.1.) Q=.99                                                     PRP11840
      IF (Q.LE.-1.) Q=-.99                                                   PRP11850
      STO1=AM2NEW                                                            PRP11860
      STO2=AM2                                                               PRP11870
      AM2=Q*STO2+(1.-Q)*STO1                                                 PRP11880
      GO TO 270                                                              PRP11890
C                                                                            PRP11900
C                                                                            PRP11910
  280 PT2POC=PO/PTO*AMACH/AM2*SQRT(GAM*TT2/GAM2/TO)*(1.+(GAM2-1.)/2.*AM2PRP11920
     1**2)**((GAM2+1.)/2./(GAM2-1.))*AOA2                                    PRP11930
      K=1                                                                    PRP11940
      CALL MACHNO (A6A5,GAM4,AM6,K,IND)                                      PRP11950
      IF (IND.NE.0) GO TO 385                                                PRP11960
      IF (MODES .LT. 0) GO TO 325                                            PRP11970
      IF(L3) GO TO 285                                                       PRP11980
      IF(L2) GO TO 290                                                       PRP11990
      IF(L1) GO TO 300                                                       PRP12000
  325 PT2PO = PT2POC                                                         PRP12010
      P6PT6=GAMF(GAM4,AM6)**(-GAM4/(GAM4-1.))                                PRP12020
      CFINT=(A6A3/(.7*AMACH**2))*(PT4N/PO*ANN*P6PT6*(1.+GAM4*AM6**2)-1.)PRP12030
     1-2.*AOAC*ACA3                                                          PRP12040
      FG=(CFINT+2.*AOA3)*PART                                                PRP12050
      FN=FG-DR-DA                                                            PRP12060
      CFNET=FN/PART                                                          PRP12070
      IF(MODES.NE. 0) GO TO 326                                              PRP12080
  315 IF (ABS(CFNET-CFNRQ) .LT..001) GO TO 326                               PRP12090
      IF(IXX.EQ. 0) GO TO 327                                                PRP12100
  316 IF( CFNET .LE. 0.005 ) GO TO 312                                       PRP12110
      IF(CFNET .LT. CFNRQ) GO TO 317                                         PRP12120
      WFHI = WF                                                              PRP12130
      CFHI = CFNET                                                           PRP12140
      IF (WFLO .GT. 0.0) GO TO 318                                           PRP12150
  319 WF = WF*(CFNRQ/CFNET)**.84                                             PRP12160
  320 IF(J6 .GT. 50) GO TO 375                                               PRP12170
      IF( J6 .GT. 40 )  WRITE(6,STOP)                                        PRP12180
      J6=J6+1                                                                PRP12190
      GO TO 417                                                              PRP12200
  317 CFLO = CFNET                                                           PRP12210
      WFLO = WF                                                              PRP12220
      IF(WFHI .LE. 0.0) GO TO 319                                            PRP12230
  318 WF = WFLO +              (CFNRQ-CFLO)/(CFHI-CFLO)*(WFHI -WFLO)         PRP12240
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```
      GO TO 320                                                          PRP12250
326 SFC=WF/FN                                                            PRP12260
    G22=GAMF(GAM4,AM4)                                                   PRP12270
    T4=TT4/G22                                                           PRP12280
    PS2=(GAMF(GAM2,AM2))**(GAM2/(1.-GAM2))*PTO*PT2POC                    PRP12290
    IF(MODES .EQ. -2) MODES = 0                                          PRP12300
    RETURN                                                               PRP12310
327 IF(CFNET.LT.CFNRQ) GO TO 326                                         PRP12320
    L1 = .FALSE.                                                         PRP12330
    L2 = .FALSE.                                                         PRP12340
    L3 = .FALSE.                                                         PRP12350
    IXX = 1                                                              PRP12360
    GO TO 316                                                            PRP12370
285 IF(L2) GO TO 301                                                     PRP12380
299 IF(.NOT.L1) GO TO 325                                                PRP12390
    IF(PT2POC .LT. PT2MAR) GO TO 305                                     PRP12400
    L3 = .FALSE.                                                         PRP12410
    GO TO 300                                                            PRP12420
301 IF(TT4 .GT.TT4MAX) GO TO 302                                         PRP12430
    L2 = .FALSE.                                                         PRP12440
    GO TO 299                                                            PRP12450
302 L3 = .FALSE.                                                         PRP12460
    GO TO 250                                                            PRP12470
305 L1 = .FALSE.                                                         PRP12480
    GO TO 325                                                            PRP12490
250 IF(.NOT.L1) GO TO 325                                                PRP12500
    IF(PT2POC .LT. PT2MAR) GO TO 305                                     PRP12510
    L2 = .FALSE.                                                         PRP12520
    GO TO 300                                                            PRP12530
300 IF (ABS(1.-PT2POC/PT2MAR).LE..001) GO TO 325                         PRP12540
    IF(J5.GT.50) GO TO 370                                               PRP12550
    J5=J5+1                                                              PRP12560
    IF(L4) GO TO 310                                                     PRP12570
311 WF=WF*((PT2MAR/PT2POC)**2*TT4-TT2)/(TT4-TT2)                         PRP12580
417 IF(WF.LE.0.) GO TO 312                                               PRP12590
    FAR=WF/(WAA3*A3*3600.*(1.-AL))                                       PRP12600
    IF(OPT(3) .AND. FAR .GT. FARMAX) FAR = FARMAX                        PRP12610
313 WF = FAR*3600.*A3*(1.-AL)*WAA3                                       PRP12620
    GO TO 240                                                            PRP12630
312  IF(FAR .LE. FARLB)  GO TO 451                                       PRP12640
    FAR= FARLB                                                           PRP12650
    GO TO 313                                                            PRP12660
310 P6PT6=GAMF(GAM4,AM6)**(-GAM4/(GAM4-1.))                              PRP12670
    CFINT=(A6A3/(.7*AMACH**2))*(PT4N/PO*ANN*P6PT6*(1.+GAM4*AM6**2)-1.)PRP12680
   1-2.*AOAC*ACA3                                                        PRP12690
    HG=(CFINT+2.*AOA3)*PART                                              PRP12700
    FN=HG-DR-DA                                                          PRP12710
    CFNET=FN/PART                                                        PRP12720
    CFN=CFNET                                                            PRP12730
    IF(CFN.LT. CFNRQ  .OR.PT2POA.GT. PT2POC) GO TO 311                   PRP12740
    L1 = .FALSE.                                                         PRP12750
    GO TO 315                                                            PRP12760
345 IND=1                                                                PRP12770
    GO TO 380                                                            PRP12780
350 IND=2                                                                PRP12790
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      GO TO 380                                                          PRP12800
  355 IND=3                                                              PRP12810
      GO TO 380                                                          PRP12820
  360 IND=4                                                              PRP12830
      IF ( IVP .NE. 0 ) WRITE (6,520)                                    PRP12840
      GO TO 505                                                          PRP12850
  370 IND=6                                                              PRP12860
      GO TO 380                                                          PRP12870
  375 IND=7                                                              PRP12880
  380 IF ( IVP .NE. 0 ) WRITE (6,525) JVER(IND)                          PRP12890
      GO TO 505                                                          PRP12900
  385 IND=8                                                              PRP12910
      IF ( IVP .NE. 0 ) WRITE (6,530)                                    PRP12920
      GO TO 505                                                          PRP12930
  395 IDEN=NUMBER(2)                                                     PRP12940
      GO TO 435                                                          PRP12950
  400 IDEN=NUMBER(3)                                                     PRP12960
      GO TO 435                                                          PRP12970
  410 IDEN=NUMBER(5)                                                     PRP12980
      GO TO 435                                                          PRP12990
  415 IDEN=NUMBER(6)                                                     PRP13000
  435 IF ( IVP .NE. 0 ) WRITE (6,540) IDEN                               PRP13010
      IF ( IVP .NE. 0 ) WRITE (6,545) BOMB, IARI(MUM)                    PRP13020
      IF (IND.EQ.10) GO TO 440                                           PRP13030
      IF ( IVP .EQ. 0 ) RETURN                                           PRP13040
      WRITE (6,550)                                                      PRP13050
  505 IF( NOUT.LE. 1 ) RETURN                                            PRP13060
      WRITE ( 6, STOP )                                                  PRP13070
      RETURN                                                             PRP13080
  440 IF ( IVP .NE. 0 ) WRITE (6,555)                                    PRP13090
      GO TO 505                                                          PRP13100
  451 IF(MODES .EQ. 0) GO TO 456                                         PRP13110
      IND = 1                                                            PRP13120
      IF ( IVP .NE. 0 ) WRITE (6,452)                                    PRP13130
  452 FORMAT(49H LEAN BLOW OUT PRESSURE RECOVERY EXCEEDS CRITICAL)       PRP13140
      GO TO 505                                                          PRP13150
  456 MODES = -2                                                         PRP13160
      GO TO 15                                                           PRP13170
  520 FORMAT (' IMPROPER SLOPE IN ITERATION TO FIND AM2 ')               PRP13180
  525 FORMAT (' FAILURE TO CONVERGE IN  PROP1 IN THE LOOP FOR ',A4/)     PRP13190
  530 FORMAT ('0FAILURE IN MACHNO WHEN CALLED BY PROP1 ')                PRP13200
  540 FORMAT ('0AN OUT OF TABLE CONDITION EXISTS IN TABLE ',A4,' IN PROPPRP13210
     11 '/)                                                              PRP13220
  545 FORMAT (' 1ST IND VARIABLE=',E12.5,' 2ND IND VARIABLE= ',E12.5,' SPRP13230
     1UBTABLE =',F10.3,' SUBTABLE SIZE =',F10.3/' THE VARIABLE OUT OF RAPRP13240
     2NGE IS THE ',A4,' INDEPENDENT VARIABLE'/)                          PRP13250
  550 FORMAT (' THE INDEPENDENT VARIABLE IS LARGER THAN THE LARGEST TABLPRP13260
     1E VALUE'/)                                                         PRP13270
  555 FORMAT (' THE INDEPENDENT VARIABLE IS SMALLER THAN THE SMALLEST TAPRP13280
     1BLE VALUE'/)                                                       PRP13290
      END                                                                PRP13300


      SUBROUTINE RUNGEK ( KWISH )                                        RUNK0010
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C      SUBROUTINE RUNGE K  PERFORMS THE FOLLOWING FUNCTIONS--                RUNK0020
C          (1)NUMERICALLY INTEGRATES ALL THE VARIABLES OF INTEGRATION        RUNK0030
C             SIMULTANEOUSLY  USING FOURTH ORDER RUNGE-KUTTA FORMULAE        RUNK0040
C          (2)SIZES THE INTEGRATION TIME STEP  TO BOUND  THE INTEGRATION     RUNK0050
C             TRUNCATION ERROR   OR TO  STOP  THE INTEGRATION AT  PRINT      RUNK0060
C             TIMES AND PHASE TERMINATION TIME.                              RUNK0070
C          (3)CONTROLS NEWTON-RAPHSON ITERATION  TO  STOP  THE PHASE ON      RUNK0080
C             USER-SUPPLIED VALUE OF A TERMINATION PARAMETER, E.G.,          RUNK0090
C             ALTITUDE, MACH, PROPELLANT WEIGHT, ETC.                        RUNK0100
C          (4)CALLS OUTPUT SUBROUTINE AT PRINT TIMES  AND PHASE-END TIMES    RUNK0110
C          (5)STOPS THE INTEGRATION IF ALTITUDE GOES NEGATIVE  OR IF         RUNK0120
C             TOO MUCH OF THE VEHICLE MASS IS CONSUMED AS PROPELLANT         RUNK0130
      REAL*8  XPRIM1, XPRIM                                                  RUNK0140
      COMMON /FAILUR/ KFAIL                                                  RUNK0150
      COMMON/CBLK/C(400) /CIBLK/CI(1000)/PIBLK/PI(70)/IPBLK/IP(10)           RUNK0160
     1       /RKBLK/X(10),XDOT(10),XPRIM1(10)                                RUNK0170
      EQUIVALENCE    (T,        X(1))                                        RUNK0180
      EQUIVALENCE                                        (TSAVE,   C( 32)),  RUNK0190
     1    (XTOL,    C( 33)),  (NERR,    C( 34)),  (ERLIMT,  C( 35)),       RUNK0200
     2    (NEQ,     C( 36)),  (IDONE,   C( 37)),  (NDONE,   C( 38)),       RUNK0210
     3    (ERLOG,   C( 39)),  (NBAD,    C( 40)),  (JSTEP,   C( 41)),       RUNK0220
     4    (TTOL,    C( 42)),  (TMAX,    C( 43)),  (DELT,    C( 44)),       RUNK0230
     5    (KSUB,    C( 45)),  (RATIO,   C( 46)),  (AK(1),   C( 47)),       RUNK0240
     6    (AW(1),   C( 51)),                      (KKK,     C( 56)),       RUNK0250
     7    (INDEX,   C( 57)),  (TOUT,    C( 58)),  (IOUT,    C( 59)),       RUNK0260
     8    (WEMPTY,  C( 86)),  (NMAP,    C( 91))                            RUNK0270
      EQUIVALENCE                                                            RUNK0280
     1   (MXSTEP,   CI(  9)), (DSTART,  CI( 10)), (EREF,    CI( 12)),      RUNK0290
     2   (ERRFAC,   CI( 13)), (JPRINT,  CI( 22)), (DMIN,    CI( 11)),      RUNK0300
     3    (IPROP1,  CI(38))                                                 RUNK0310
      EQUIVALENCE                                                            RUNK0320
     1    (XSTAR,   PI(  6)), (SLOPE,   PI(  7)), (DPRINT,  PI( 10)),      RUNK0330
     2    (ALTF,    PI(  2))                                                RUNK0340
      EQUIVALENCE                (ITERM,   IP(  1)), (IPTYPE,  IP(  3))     RUNK0350
      DIMENSION  AK(4), AW(4), XPRIM(10,2), XINC(10), XDOTPM(10,2),          RUNK0360
     1           OLDINC(10),  XK(10)                                         RUNK0370
C                                                                            RUNK0380
      DIMENSION XNORM(7)                                                     RUNK0390
      DATA XNORM/1000., 1.0, 5000., 1.E5, 1.E6, 1000., 1000./                RUNK0400
      KWISH = 0                                                              RUNK0410
      KKK=0                                                                  RUNK0420
      RATIO = 0.D0                                                           RUNK0430
      NIX = -1                                                               RUNK0440
      N1 = 1                                                                 RUNK0450
      N2 = 2                                                                 RUNK0460
C                                                                            RUNK0470
C     GET EXACT RAMJET       PERFORMANCE AT PHASE START.   CALL TO         RUNK0480
C     DERIV INITIALIZES ANGLE OF ATTACK (ALPHA) AND THRUST(THR).             RUNK0490
      NAMELIST/NRK/IPTYPE, IPROP1, C                                         RUNK0500
      IF( IPTYPE .NE. 4  .OR. IPROP1 .GT. 0 )  GO TO 99                      RUNK0510
      DO 10 I=1,10                                                           RUNK0520
   10 X(I)=XPRIM1(I)                                                         RUNK0530
      IPROP1=1                                                               RUNK0540
      CALL DERIV                                                             RUNK0550
      IF(KFAIL.GT.0) RETURN                                                  RUNK0560
```

```
      IPROP1=C                                                          RUNK0570
C                                                                       RUNK0580
C     INITIALIZE LINEARIZED RAMJET              AT PHASE START          RUNK0590
      CALL TPROP                                                        RUNK0600
      IF(KFAIL.GT.0) RETURN                                             RUNK0610
   99 CONTINUE                                                          RUNK0620
      DO 98 J=1,NEQ                                                     RUNK0630
   98 XPRIM(J,N1) = XPRIM1(J)                                           RUNK0640
  101 DO 110 J = 1,NEQ                                                  RUNK0650
  110 X(J) = XPRIM(J,N1)                                                RUNK0660
      H2   = DELT                                                       RUNK0670
      M1 = 1                                                            RUNK0680
      M2 = 2                                                            RUNK0690
      DELT = DELT/2.00                                                  RUNK0700
      KSUB = 1                                                          RUNK0710
      CALL DERIV                                                        RUNK0720
      IF(KFAIL.GT.0) RETURN                                             RUNK0730
C                                                                       RUNK0740
  112 IF (NDONE)                12C,120,114                           RUNK0750
  114 CALL OUTPUT                                                       RUNK0760
      NDONE = 0                                                         RUNK0770
      IF(IDONE.LE.0) GO TO 120                                          RUNK0780
      OLDX = C(IDONE)                                                   RUNK0790
      XMIS   = XSTAR - OLDX                                             RUNK0800
  120 ASSIGN 300 TO NSTART                                              RUNK0810
  201 DO 202 J = 1,NEQ                                                  RUNK0820
      XDOTPM(J,M1) = XDOT(J)                                            RUNK0830
  202 XINC (J) = C.CO                                                   RUNK0840
C                                                                       RUNK0850
  206 KSUB = 2                                                          RUNK0860
      ASSIGN 212 TO N                                                   RUNK0870
  207 DO 208 J = 1,NEQ                                                  RUNK0880
      XK(J)   = XDOT(J) * DELT                                          RUNK0890
      XINC(J) = XINC(J) + AW(KSUB-1) * XK(J)                            RUNK0900
  208 X(J) = XPRIM(J,N1) + AK(KSUB) * XK(J)                             RUNK0910
  210 CALL DERIV                                                        RUNK0920
      IF(KFAIL.GT.0) RETURN                                             RUNK0930
  211 GO TO N, (212,213,214,225)                                        RUNK0940
  212 KSUB = 3                                                          RUNK0950
      ASSIGN 213 TO N                                                   RUNK0960
      GO TO 207                                                         RUNK0970
  213 KSUB = 4                                                          RUNK0980
      ASSIGN 214 TO N                                                   RUNK0990
      GO TO 207                                                         RUNK1000
  214 DO 220 J = 1,NEQ                                                  RUNK1010
      XINC(J)   = XINC(J) + AW(4) * XDOT(J) * DELT                      RUNK1020
      XPRIM(J,N2) = XPRIM(J,N1) + XINC(J)                               RUNK1030
  220 X(J) = XPRIM(J,N2)                                                RUNK1040
C                                                                       RUNK1050
      ASSIGN 225 TO N                                                   RUNK1060
      KSUB = 1                                                          RUNK1070
      GO TO 210                                                         RUNK1080
C                                                                       RUNK1090
  225 GO TO NSTART, (320,310,300)                                       RUNK1100
C                                                                       RUNK1110
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  300 ASSIGN 310 TO NSTART                                                    RUNK1120
      NO = N1                                                                 RUNK1130
      N1 = N2                                                                 RUNK1140
      DO 303 J = 1,NEQ                                                        RUNK1150
      OLDINC(J)  = XINC(J)                                                    RUNK1160
      XINC (J) = 0.00                                                         RUNK1170
  303 XDOTPM(J,M2) = XDOT(J)                                                  RUNK1180
      GO TO 206                                                               RUNK1190
C                                                                             RUNK1200
  310 DO 314 J = 1,NEQ                                                        RUNK1210
  314 XINC (J) = (XINC (J) + OLDINC (J))*3.00 - (XDOTPM (J,M1) + XDOTPM       RUNK1220
     1(J,M2)*4.00 + XDOT (J))*DELT                                            RUNK1230
      ASSIGN 315 TO KERR                                                      RUNK1240
      N1 = NO                                                                 RUNK1250
      GO TO 340                                                               RUNK1260
  315 IF( E2 .GT. ERLIMT .AND. INDEX .EQ. 0 )  GO TO 500                      RUNK1270
  316 ASSIGN 320 TO NSTART                                                    RUNK1280
      ASSIGN 206 TO IBEGIN                                                    RUNK1290
      A1 = A2                                                                 RUNK1300
      GO TO 404                                                               RUNK1310
C                                                                             RUNK1320
  320 RATIO  = DELT / OLDDEL                                                  RUNK1330
      HFACT = DELT/(1.00 + RATIO)                                             RUNK1340
      ACOEF1 = -RATIO * RATIO * HFACT                                         RUNK1350
      ACOEF2 = RATIO*(DELT + 3.00*OLDDEL)                                     RUNK1360
      ACOEF3 = DELT + DELT + HFACT                                            RUNK1370
      DO 330 J = 1,NEQ                                                        RUNK1380
  330 XINC (J) = ACOEF1*XDOTPM (J,M1) + ACOEF2*XDOTPM (J,M2) - 6.00*XINCRUNK1390
     1(J) + ACOEF3*XDOT (J)                                                   RUNK1400
C                                                                             RUNK1410
      ASSIGN 400 TO KERR                                                      RUNK1420
C                                                                             RUNK1430
C     PROCESS ERRORS IN THE INCREMENTS AND SELECT THE MAXIMUM ONE (E2).       RUNK1440
  340 E2 = 0.00                                                               RUNK1450
C                                                                             RUNK1460
C     SELECT THE MAXIMUM ERROR.                                               RUNK1470
      DO 360 J = 1,NEQ                                                        RUNK1480
      XINN =  ABS(XINC(J))/XNORM(J)                                           RUNK1490
      IF(XINN -  E2) 360,360,358                                              RUNK1500
  358 NERR = J                                                                RUNK1510
      E2 = XINN                                                               RUNK1520
  360 CONTINUE                                                                RUNK1530
      IF(E2.LT.1.E-10) E2 = 1.E-10                                            RUNK1540
      A1   = A2                                                               RUNK1550
      IF(DELT.LT.0.0) CALL ERROUT                                             RUNK1560
      IF(DELT.LT.0.0) RETURN                                                  RUNK1570
      A2 = ALOG (E2) - 5.00*ALOG (DELT)                                       RUNK1580
      GO TO KERR, (400, 315)                                                  RUNK1590
C                                                                             RUNK1600
  400 IF (E2 - ERLIMT)        402,402,510                                     RUNK1610
  402 H2     = DELT                                                           RUNK1620
  404 OLDDEL = DELT                                                           RUNK1630
C                                                                             RUNK1640
C     CONTROL COMES HERE WHEN A SUCCESSFUL RUNGE KUTTA INTERVAL IS COMPLRUNK1650
      IF (ITERM)                410,420,410                                 RUNK1660
```

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C                                                                       RUNK1670
C     WHEN INDEX EXCEEDS ZERO AN ITERATION FOR DEPENDENT VARIABLE STOP IRUNK1680
  410 CONTINUE                                                          RUNK1690
      IF (INDEX)                413,411,413                           RUNK1700
  411 OLDMIS = XMIS                                                     RUNK1710
      H2SAVE = H2                                                       RUNK1720
      XMIS   = XSTAR - C(IDONE)                                         RUNK1730
      IF (OLDMIS * XMIS)        412,413 ,418                          RUNK1740
  412 IF (SLOPE * XMIS)         413,413,418                           RUNK1750
C                                                                       RUNK1760
  413 INDEX  = INDEX + 1                                                RUNK1770
      XNOW = C(IDONE)                                                   RUNK1780
      IF(ITERM-2) 4131,4130,4131                                        RUNK1790
 4130 H2SAVE= ABS(H2SAVE/2.00)  * SIGN(1.00, OLDMIS*(XSTAR-XNOW)   )    RUNK1800
      GO TO 4132                                                        RUNK1810
 4131 H2SAVE=(XSTAR-XNOW)/ (XNOW-OLDX) *H2SAVE                          RUNK1820
 4132 DELT = H2SAVE + H2                                                RUNK1830
      IF(DELT)  4133,4133,4135                                          RUNK1840
 4133 WRITE (6,4134)                                                    RUNK1850
 4134 FORMAT(30HONEGATIVE INTEGRATION INTERVAL)                         RUNK1860
      GO TO 430                                                         RUNK1870
 4135 IF( ABS(H2SAVE) - XTOL) 700,415,415                               RUNK1880
  700 TMAX = T                                                          RUNK1890
      GO TO 420                                                         RUNK1900
  415 IF (INDEX - 20)           418,416,416                           RUNK1910
  416 WRITE (6,417)                                                     RUNK1920
  417 FORMAT(54HOITERATION TO STOP ON A DEPENDENT VARIABLE UNCONVERGED) RUNK1930
      GO TO 430                                                         RUNK1940
  418 OLDX = C(IDONE)                                                   RUNK1950
      IF (INDEX)                420,420,101                           RUNK1960
C                                                                       RUNK1970
  420 JSTEP = JSTEP + 1                                                 RUNK1980
  423 IF ( ABS (TMAX - T) - TTOL) 424, 424, 427                         RUNK1990
  424 DO 425 J = 1,NEQ                                                  RUNK2000
  425 XPRIM1(J) = XPRIM(J,N2)                                           RUNK2010
  426 CALL OUTPUT                                                       RUNK2020
      KWISH = 4321                                                      RUNK2030
      RETURN                                                            RUNK2040
  427 IF (JSTEP+NBAD-MXSTEP)    431,428,428                           RUNK2050
  428 WRITE (6,429)                                                     RUNK2060
  429 FORMAT(17HOMXSTEP EXCEEDED.)                                      RUNK2070
  430 CALL ERROUT                                                       RUNK2080
      IF(KFAIL.GT.0) RETURN                                             RUNK2090
C                                                                       RUNK2100
  431 IF (H2 - DMIN)            4312,4318,4318                        RUNK2110
 4312 KKK = KKK + 1                                                     RUNK2120
      IF (KKK - 10)             4319,4314,4314                        RUNK2130
 4314 WRITE (6,4316) DMIN                                               RUNK2140
 4316 FORMAT(36HOTEN CONSECUTIVE INTERVALS LESS THANF6.4,6H SECS.)      RUNK2150
      GO TO 430                                                         RUNK2160
 4318 KKK = 0                                                           RUNK2170
C                                                                       RUNK2180
C                                                                       RUNK2190
 4319 CONTINUE                                                          RUNK2200
C     NEGATIVE ALTITUDE CHECK                                           RUNK2210
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      IF(  X(4)+100. .GT. C )  GO TO 4322                                  RUNK2220
      WRITE(6,4320)  X(4)                                                  RUNK2230
 4320 FORMAT( // 10H ALTITUDE= F8.2 )                                      RUNK2240
      GO TO 430                                                            RUNK2250
 4322 CONTINUE                                                             RUNK2260
C     WEIGHT CHECK                                                         RUNK2270
      IF( X(6)/WEMPTY  .GT. C.10)  GO TO 4324                              RUNK2280
      WRITE(6,4323)                                                        RUNK2290
 4323 FORMAT( // 86H TEST IN RUNGE K FOUND THAT VEHICLE WEIGHT IS LESS     RUNK2300
     1 THAN 10 PERCENT OF EMPTY WEIGHT  )                                  RUNK2310
      GO TO 430                                                            RUNK2320
 4324 CONTINUE                                                             RUNK2330
      A3= (A2-A1)*RATIO+A2                                                 RUNK2340
      DELT = AMIN1 ( EXP ((ERLCG - A3)/5.00), 4.00*H2)                     RUNK2350
      IF( XDOT(4) .LT. 0. )  DELT=AMIN1(  DELT, (X(4)+100.)/(-XDOT(4)*2.RUNK2360
     *  ))                                                                 RUNK2370
      IF(ITERM .EQ.7)  DELT=AMIN1(  ABS((ALTF-X(4))/XDOT(4))*0.7, DELT)  RUNK2380
C                                                                          RUNK2390
C                                                                          RUNK2400
  433 IF (DPRINT)              438,438,434                                 RUNK2410
  434 IF ( ABS (TOUT - T) - TTOL) 435, 435, 436                            RUNK2420
  435 CALL OUTPUT                                                          RUNK2430
      TOUT = TOUT + DPRINT                                                 RUNK2440
  436 IF (T + DELT - TOUT)     442,442,437                                 RUNK2450
  437 DELT = TOUT - T                                                      RUNK2460
      GO TO 442                                                            RUNK2470
  438 IF (MOD(JSTEP, JPRINT)) 442,440,442                                  RUNK2480
  440 CALL OUTPUT                                                          RUNK2490
  442 IF (T + DELT - TMAX)     450,444,444                                 RUNK2500
  444 DELT = TMAX - T                                                      RUNK2510
C                                                                          RUNK2520
  450 CONTINUE                                                             RUNK2530
C     TEST FLIGHT CONDITION  REGION AT THE END   OF EACH STEP              RUNK2540
      IF( IPTYPE .EQ. 4 .AND. IPROP1 .EQ. 0 )  CALL TPROPA                 RUNK2550
      IF(KFAIL.GT.0) RETURN                                                RUNK2560
      M0 = M1                                                              RUNK2570
      M1 = M2                                                              RUNK2580
      M2 = M0                                                              RUNK2590
      N0 = N1                                                              RUNK2600
      N1 = N2                                                              RUNK2610
      N2 = N0                                                              RUNK2620
      DO 460 J = 1,NEQ                                                     RUNK2630
      XDOTPM(J,M2) = XDOT(J)                                               RUNK2640
  460 XINC (J) = C.00                                                      RUNK2650
      GO TO 206                                                            RUNK2660
C                                                                          RUNK2670
  500 ASSIGN 101 TO IBEGIN                                                 RUNK2680
      GO TO 505                                                            RUNK2690
  510 DO 520 J = 1,NEQ                                                     RUNK2700
      XDOT(J)  = XDOTPM(J,M2)                                              RUNK2710
  520 XINC (J) = C.00                                                      RUNK2720
  505 CONTINUE                                                             RUNK2730
      NBAD = NBAD + 1                                                      RUNK2740
      H2   = DELT                                                          RUNK2750
      DELT = AMIN1 ( EXP ((ERLCG - A2)/5.00), DELT)                        RUNK2760
```

```
      A2   = A1                                                          RUNK2770
      IF (NIX - JSTEP)          540,550,540                             RUNK2780
  540 NIX = JSTEP                                                       RUNK2790
      GO TO IBEGIN, (206,101)                                           RUNK2800
  550 ASSIGN 101 TO IBEGIN                                              RUNK2810
      IF (NBAD+JSTEP-MXSTEP)    560,560,428                             RUNK2820
  560 GO TO IBEGIN, (206,101)                                           RUNK2830
      END                                                               RUNK2840


      SUBROUTINE STDATA ( IR, KR )                                      STDA0010
C     SUBROUTINE STDATA PERFORMS THE FOLLOWING FUNCTIONS--              STDA0020
C         (1) INITIALIZES COMMON BLOCKS ASSOCIATED WITH TRAJECTORY      STDA0030
C             COMPUTATION WITH ZEROS OR BUILT-IN NON-ZERO VALUES.       STDA0040
C         (2) READS INPUT GENERAL DATA INTO CI ARRAY  ONCE PER TRAJ.    STDA0050
C         (3) READS DATA FOR 20 PHASES INTO PI AND IP ARRAY,  CLEARING  STDA0060
C             CERTAIN DATA TO ZERO BETWEEN PHASES--ONCE PER TRAJ.       STDA0070
C         (4) RESETS CERTAIN COUNTERS, FLAGS, AND CONSTANTS AT THE      STDA0080
C             START OF EACH TRAJ.                                       STDA0090
C         (5) INITIALIZES VARIABLES OF INTEGRATION.                     STDA0100
C         (6) CALLS MAINS TO INITIATE COMPUTATION OF THE FIRST          STDA0110
C             TRAJECTORY PHASE                                          STDA0120
C     INPUT GENERAL DATA       STDATA    MAINS     DERI/                STDA0130
      COMMON /FAILUR/ KFAIL                                             STDA0140
      COMMON/NEWVPM/ VPM11(11), IVPM4(4), VPM7(7),                      STDA0150
     1     ZSLOPE(20), ZTPHAZ(20), ZTOTAL(20), PMORE(20)                STDA0160
      EQUIVALENCE ( PMORE(1), TPCMGN )                                  STDA0170
      COMMON /RJBLOK/ RJ(50)                                            STDA0180
      EQUIVALENCE ( RJ(18), PCMGN )                                     STDA0190
      COMMON /PRINTR/ IZQ2(2), LAZRUS, IZQ4(4)                          STDA0200
      COMMON /PREF / KBYPSM,KBYDRG,Z4(4),NZ3(4),XMACHE(20),ALTE(20),    STDA0210
     1     GAMMAE(20),EVALUE(20),XPITCH(10,20),YPITCH(10,20),ITERM(20), STDA0220
     2     NAERO(20),IPTYPE(20),MODES(20),MHGEN(20),ICONT(20),          STDA0230
     3     ALPMAX(20),ANZMAX(20),FUSY(20)                               STDA0240
      COMMON /TOVPER/ FUZ(10),KIZ,FUZE( 4)    ,                        STDA0250
     1     TVX,TVN,YISX(20),XTHR(20)     , EXTRA(15)                   STDA0260
      COMMON /BYAIR/ SRF,S1(20),S2(20),S3(20),S4(20),S5(20),            STDA0270
     1     CL1(20),CL2(20),CL3(20),CL4(20),CL5(20),                     STDA0280
     3     DM1(20),DM2(20),DM3(20),DM4(20),DM5(20),                     STDA0290
     4     CD1(20,5),CD2(20,5),CD3(20,5),CD4(20,5),CD5(20,5)            STDA0300
      COMMON/CIBLK/CI(1000)/BCDBLK/LINE1(20), LINE2(20)                 STDA0310
C     INPUT GENERAL DATA NAMES                                          STDA0320
      EQUIVALENCE                                                       STDA0330
     1    (VELI,    CI(  1)), (XMACHI,  CI(  2)), (GAMMAI,  CI(  3)),  STDA0340
     2    (ALTI,    CI(  4)), (TIMEI,   CI(  5)), (RANGEI,  CI(  6)),  STDA0350
     3    (MOPT,    CI(  7)), (WTI,     CI(  8)), (MXSTEP,  CI(  9)),  STDA0360
     4    (DSTART,  CI( 10)), (DMIN,    CI( 11)), (EREF,    CI( 12)),  STDA0370
     5    (ERRFAC,  CI( 13)), (DELMAX,  CI( 14)), (DALPH,   CI( 15)),  STDA0380
     *                                           (DALPH,   DECO(1)),   STDA0390
     6    (DALT,    CI( 16)), (DMACH,   CI( 17)), (DCEN,    CI( 18)),  STDA0400
     7    (DVCL,    CI( 19)), (DHCL,    CI( 20)), (NTRYS,   CI( 21)),  STDA0410
     8    (JPRINT,  CI( 22)), (SAVE,    CI( 23)), (IPRNT2,  CI( 24)),  STDA0420
     9    (GSTD,    CI( 25)), (RE,      CI( 26)), (NLPHAZ,  CI( 27)),  STDA0430
     *    (NCPHAZ,  CI( 28)), (NDPHAZ,  CI( 29)), (WDROP,   CI( 30)),  STDA0440
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     1    (ESTART,  CI( 31)), (AEXITI,  CI( 32)), (TVACI,   CI( 33)),   STDA0450
     2    (XISPI,   CI( 34)), (WPROPB,  CI( 35)), (WPROPS,  CI( 36)),   STDA0460
     3    (AEXITS,  CI( 37)), (IPROPI,  CI( 38)), (RTOL,    CI( 39)),   STDA0470
     4    (TVACMX,  CI( 40)), (TVACMN,  CI( 41)), (NSETS,   CI( 42)),   STDA0480
     5    (SREF,    CI( 43)), (RJFLAG,  CI( 44)), (LINOUT,  CI( 45))    STDA0490
      EQUIVALENCE                                                       STDA0500
     *    (XTERTL,  CI( 61)), (YISP,    CI( 81)),                      STDA0510
     1    (SMACH1, CI(101)), (CLALF1, CI(121)),                         STDA0520
     2    (SMACH2, CI(141)), (CLALF2, CI(161)),                         STDA0530
     3    (SMACH3, CI(181)), (CLALF3, CI(201)),                         STDA0540
     4    (SMACH4, CI(221)), (CLALF4, CI(241)),                         STDA0550
     5    (SMACH5, CI(261)), (CLALF5, CI(281)),                         STDA0560
     6    (DMACH1, CI(302)), (CD01,   CI(321)),                         STDA0570
     7    (DMACH2, CI(422)), (CD02,   CI(441)),                         STDA0580
     8    (DMACH3, CI(542)), (CD03,   CI(561)),                         STDA0590
     9    (DMACH4, CI(662)), (CD04,   CI(681)),                         STDA0600
     *    (DMACH5, CI(782)), (CD05,   CI(801))                          STDA0610
C      INPUT PHASE DATA          STDATA    MAINS     DERIV              STDA0620
      COMMON/PIBLK/PI(70)/IPBLK/IP(10)/PSBLK/PS(70,20)/IPSBLK/IPS(10,20)STDA0630
C                                                                       STDA0640
C      WORKING COMMON            STDATA,   MAINS,    DERIV, OUTPUT     STDA0650
      COMMON/CBLK/C(400)/OUTBLK/PAGEB(14,50)                            STDA0660
      EQUIVALENCE                                                       STDA0670
     1    (RC,      C(  1)), (Q,       C(  2)), (QS,      C(  3)),   STDA0680
     2    (GRAV,    C(  4)), (GRAVT,   C(  5)), (GRAVN,   C(  6)),   STDA0690
     3    (TWOG,    C(  7)), (THR,     C(  8)), (THRQ,    C(  9)),   STDA0700
     4    (SSV,     C( 10)), (RHO,     C( 11)), (PRESS,   C( 12)),   STDA0710
     5    (VISC,    C( 13)), (TEMP,    C( 14)), (ALPHA,   C( 15)),   STDA0720
     6    (XMACH,   C( 16)), (CDO,     C( 17)), (CLAQS,   C( 18)),   STDA0730
     7    (CLALF,   C( 19)), (CF,      C( 20)), (WF,      C( 21)),   STDA0740
     8    (SFC,     C( 22)), (TT4,     C( 23)), (ANZ,     C( 24)),   STDA0750
     9    (ANX,     C( 25)), (NITER,   C( 26)), (NBCCST,  C( 27)),   STDA0760
     *    (NSPHAZ,  C( 28)), (IPRINT,  C( 29)), (RSAVE,   C( 30)),   STDA0770
     1    (ETA,     C( 31)), (TSAVE,   C( 32)), (XTOL,    C( 33)),   STDA0780
     2    (NERR,    C( 34)), (ERLIMT,  C( 35)), (NEQ,     C( 36)),   STDA0790
     3    (IDONE,   C( 37)), (NDONE,   C( 38)), (ERLOG,   C( 39)),   STDA0800
     4    (NBAD,    C( 40)), (JSTEP,   C( 41)), (TTOL,    C( 42)),   STDA0810
     5    (TMAX,    C( 43)), (DELT,    C( 44)), (KSUB,    C( 45)),   STDA0820
     6    (RATIO,   C( 46)), (AK(1),   C( 47)), (AW(1),   C( 51)),   STDA0830
     7                       (KKK,     C( 56)), (INDEX,   C( 57))    STDA0840
      EQUIVALENCE                                                       STDA0850
     1    (TOUT,    C( 58)), (IOUT,    C( 59)), (NPHAZ,   C( 60)),   STDA0860
     2    (SINGAM,  C( 73)), (COSGAM,  C( 74)), (DALP,    C( 75)),   STDA0870
     3    (VMASS,   C( 76)), (GDOTRO,  C( 77)), (DEGRAD,  C( 78)),   STDA0880
     4    (TVAC,    C( 79)), (AEXIT,   C( 80)), (XISP,    C( 81)),   STDA0890
     5    (ACCN,    C( 82)), (ACCT,    C( 83)), (XNOW,    C( 84)),   STDA0900
     6    (WPR ,    C( 85)), (WEMPTY,  C( 86)), (NPAGE,   C( 87)),   STDA0910
     7    (NOUT,    C( 88)), (NLINES,  C( 89)), (NCON,    C( 90)),   STDA0920
     8    (NMAP,    C( 91)), (RNGI,    C( 92)), (NTRY,    C( 93)),   STDA0930
     9    (ALTMAX,  C( 94)),                                          STDA0940
     *                       (ISV(1),  C(101)), (STLU(1), C(141))    STDA0950
C      INTEGRATION VARIABLES     STDATA    MAINS     DERIV, OUTPUT     STDA0960
      DOUBLE PRECISION XPRIM1                                           STDA0970
      COMMON/RKBLK/X(10),XDOT(10),XPRIM1(10)                            STDA0980
      EQUIVALENCE                                                       STDA0990
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     1    (TIME,     X(  1)), (GAMMA,    X(  2)), (V,        X(  3)),    STDA1000
     2    (ALT,      X(  4)), (R,        X(  5)), (W,        X(  6)),    STDA1010
     3    (VI,       X(  7)),                                            STDA1020
     4                        (GDOT,     XDOT(2)), (VDOT,    XDOT(3)),   STDA1030
     5    (HDOT,     XDOT(4)), (RDOT,    XDOT(5)), (WDOT,    XDOT(6)),   STDA1040
     6    (VIDOT,    XDOT(7))                                            STDA1050
C      ATMOSPHERE SUBROUTINE COMMUNICATION          DERIV,STDATA,MAINS    STDA1060
      COMMON/AIRBLK/ALTA,     TEMPA,    RHOA,     PRESSA,   SSVA,         STDA1070
     1    VISCA                                                           STDA1080
C      DIMENSION STATEMENT FOR          MAINS, DERIV                     STDA1090
      DIMENSION                                                          STDA1100
     1    YISP(20),              XTHRTL(20),          SMACH1(20),        STDA1110
     2    SMACH2(20),            SMACH3(20),          SMACH4(20),        STDA1120
     3    SMACH5(20),            CLALF1(20),          CLALF2(20),        STDA1130
     4    CLALF3(20),            CLALF4(20),          CLALF5(20),        STDA1140
     5    DMACH1(20),            DMACH2(20),          DMACH3(20),        STDA1150
     6    DMACH4(20),            DMACH5(20),          CD01(20,5),        STDA1160
     7    CD02(20,5),            CD03(20,5),          CD04(20,5),        STDA1170
     8    CD05(20,5),                                                     STDA1180
     9    DECO(4),               STLU(20,6),          ISV(12),           STDA1190
     *    AK(4),     AW(4)                                               STDA1200
      COMMON/TRAJX/TRAJA(10)/RJDAT/RJDATA(9)/EXTERN/AR(20)/              STDA1210
     1       CODEXX/II(16)                                               STDA1220
      EQUIVALENCE            (FARMAX,TRAJA( 7)), (TT4MAX,TRAJA( 8)),    STDA1230
     1    (FSLBO, TRAJA( 9)), (ICODE, TRAJA(10)), (A5A3, RJDATA( 3)),    STDA1240
     2    (A6A3, RJDATA( 4)), (ACA3, RJDATA( 5)), (D3,   AR(3)),         STDA1250
     3    (KIND, II(1)),      (IND, TRAJA( 6))                           STDA1260
      DATA BLANK/4H    /                                                 STDA1270
C                                                                        STDA1280
      SAVE1=SAVE                                                         STDA1290
C     SET COMMON BLOCKS TO ZERO                                          STDA1300
      DO 10 I=1,1000                                                     STDA1310
   10 CI(I)=0.                                                           STDA1320
C                                                                        STDA1330
      DO 20 I=1,400                                                      STDA1340
   20 C(I)=0.                                                            STDA1350
C                                                                        STDA1360
      DO 30 I=1,70                                                       STDA1370
   30 PI(I)=0.                                                           STDA1380
C                                                                        STDA1390
      DO 40 I=1,10                                                       STDA1400
   40 IP(I)=0                                                            STDA1410
C                                                                        STDA1420
      DO 60  J=1,50                                                      STDA1430
      DO 60  I=1,14                                                      STDA1440
   60 PAGEB(I,J)=0.                                                      STDA1450
C                                                                        STDA1460
      DO 70 J=1,20                                                       STDA1470
      DO 70 I=1,70                                                       STDA1480
   70 PS(I,J)=0.                                                         STDA1490
C                                                                        STDA1500
      DO 80 J=1,20                                                       STDA1510
      DO 80 I=1,10                                                       STDA1520
   80 IPS(I,J)=0                                                         STDA1530
C                                                                        STDA1540
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C                                                                       STDA1550
C     SET BUILT-IN INPUT GENERAL DATA                                   STDA1560
      SAVE=1.                                                           STDA1570
      NSETS = 2                                                         STDA1580
      ESTART = 0.                                                       STDA1590
      IPRNT2 = 1                                                        STDA1600
      IF ( LAZRUS  .EQ.  0  )  IPRNT2 = 0                               STDA1610
      LINOUT = LAZRUS                                                   STDA1620
      DPRINT = 0.                                                       STDA1630
C     SEE FUSY                                                          STDA1640
      RJFLAG = 0.                                                       STDA1650
      GSTD=32.17405                                                     STDA1660
      RE=20.9E6                                                         STDA1670
C     RANGE TOLERANCE IN NMI                                            STDA1680
C     XTOL  IS THE TIME TOLERANCE FOR PHASE DEPENDENT VARIABLE STOPS    STDA1690
      XTOL=0.0005                                                       STDA1700
      DO 100 I=1,20                                                     STDA1710
      LINE1(I)=BLANK                                                    STDA1720
  100 LINE2(I)=BLANK                                                    STDA1730
C                                                                       STDA1740
C     BUILT-IN PHASE DATA CONSTANTS APPLY TO  FIRST AND ALL SUBSEQUENT  STDA1750
C     PHASES UNLESS ALTERED BY INPUT DATA                               STDA1760
      NCON=0                                                            STDA1770
       ICODE=0                                                          STDA1780
C     SET NAMELIST VALUES INTO ACTIVE CORE                              STDA1790
      PCMGN = TPCMGN                                                    STDA1800
      DALPH = VPM11( 1)                                                 STDA1810
      DALT  = VPM11( 2)                                                 STDA1820
      DCEN  = VPM11( 3)                                                 STDA1830
      DELMAX= VPM11( 4)                                                 STDA1840
      DHCL  = VPM11( 5)                                                 STDA1850
      DMACH = VPM11( 6)                                                 STDA1860
      DMIN  = VPM11( 7)                                                 STDA1870
      DSTART= VPM11( 8)                                                 STDA1880
      DVCL  = VPM11( 9)                                                 STDA1890
      EREF  = VPM11(10)                                                 STDA1900
      ERREAC= VPM11(11)                                                 STDA1910
      IPROP1=IVPM4(1)                                                   STDA1920
      JPRINT=IVPM4(2)                                                   STDA1930
      MXSTEP= IVPM4(3)                                                  STDA1940
      NTRYS=IVPM4(4)                                                    STDA1950
      RANGEI=VPM7(1)                                                    STDA1960
      RTOL=VPM7(2)                                                      STDA1970
      TIMEI=VPM7(3)                                                     STDA1980
      GKG=VPM7(4)                                                       STDA1990
      GKV=VPM7(5)                                                       STDA2000
      GKVCRU=VPM7(6)                                                    STDA2010
      CTOPT=VPM7(7)                                                     STDA2020
C     FROM PSM OR NAM77                                                 STDA2030
      VELI    = Z4(1)                                                   STDA2040
      XMACHI  = Z4(2)                                                   STDA2050
      GAMMAI  = Z4(3)                                                   STDA2060
      ALTI    = Z4(4)                                                   STDA2070
      MOPT    = NZ3(1)                                                  STDA2080
      NLPHAZ  = NZ3(2)                                                  STDA2090
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      NCPHAZ  = NZ3(3)                                                  STDA2100
      NDPHAZ  = NZ3(4)                                                  STDA2110
      KIND = KIZ                                                        STDA2120
      WPROPP = FUZ(1)                                                   STDA2130
      XISPI  = FUZ(2)                                                   STDA2140
      TVACI  = FUZ(3)                                                   STDA2150
      AEXITI = FUZ(4)                                                   STDA2160
      WPROPS = FUZ(5)                                                   STDA2170
      AEXITS = FUZ(6)                                                   STDA2180
      WTI    = FUZ(8)                                                   STDA2190
      WDROP  = FUZ(9)                                                   STDA2200
      IF ( KIND .EQ. 43 ) WDROP = FUZ(10)                               STDA2210
      NTEN = 10                                                         STDA2220
      NKIND = MOD ( KIND, NTEN  )                                       STDA2230
      IF ( NKIND  .EQ.  3  )  WDROP = FUZ(10)                           STDA2240
      A5A3  = FUZE( 1)                                                  STDA2250
      A6A3  = FUZE( 2)                                                  STDA2260
      ACA3  = FUZE( 3)                                                  STDA2270
      D3    = FUZE( 4)                                                  STDA2280
      TVACMX = TVX                                                      STDA2290
      TVACMN = TVN                                                      STDA2300
      DO 1215 I=1,20                                                    STDA2310
      YISP(I) = YISX(I)                                                 STDA2320
      XTHRTL(I) = XTHR(I)                                               STDA2330
 1215 CONTINUE                                                          STDA2340
C     LOAD PHASE DATA INTO ACTIVA ARRAYS                                STDA2350
      DO 130 J=1,NLPHAZ                                                 STDA2360
      IPS( 1 ,J) = ITERM  (J)                                           STDA2370
      IPS( 2 ,J) = NAERO  (J)                                           STDA2380
      IPS( 3 ,J) = IPTYPE (J)                                           STDA2390
      IPS( 4 ,J) = MODES  (J)                                           STDA2400
      IPS( 5 ,J) = MHGEN  (J)                                           STDA2410
      IPS( 6 ,J) = ICONT  (J)                                           STDA2420
      PS(  1 ,J) = XMACHF (J)                                           STDA2430
      PS(  2 ,J) = ALTF   (J)                                           STDA2440
      PS(  3 ,J) = GAMMAF (J)                                           STDA2450
      PS(  6 ,J) = FVALUE (J)                                           STDA2460
      PS(  8 ,J) = ALPMAX (J)                                           STDA2470
      PS(  9 ,J) = ANZMAX (J)                                           STDA2480
      PS(4,J) = ZTPHAZ(J)                                               STDA2490
      PS(5,J)=ZTOTAL(J)                                                 STDA2500
      PS(7,J)=ZSLOPE(J)                                                 STDA2510
      PS( 10, J ) = FUSY(J)                                             STDA2520
      FUZPOP = 0.0                                                      STDA2530
      IF ( IPTYPE(J)  .LE.  2  )  FUZPOP = FUZ(7)                       STDA2540
      PS ( 11, J ) =FUZPOP                                              STDA2550
      PS( 12 ,J) = GTOPT                                                STDA2560
      PS( 13 ,J) = GKV                                                  STDA2570
      PS( 14 ,J) = GKG                                                  STDA2580
      PS( 15 ,J) = GKVCRU                                               STDA2590
      DO 1212 I=1,10                                                    STDA2600
      NUX = 20 + I                                                      STDA2610
      NUXX= 40 + I                                                      STDA2620
      PS(NUX,J) = XPITCH (I,J)                                          STDA2630
      PS(NUXX,J) = YPITCH(I,J)                                          STDA2640
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 1212 CONTINUE                                                          STDA2650
      DO 1213 I = 1, 10                                                 STDA2660
      NUX = 30                                                          STDA2670
      NUXX = 50                                                         STDA2680
      PS( NUX+I, J )  =  XPITCH(NUX,J)                                  STDA2690
      PS( NUXX+I, J )  =  YPITCH(NUXX,J)                                STDA2700
 1213 CONTINUE                                                          STDA2710
  130 CONTINUE                                                          STDA2720
C     FROM AM OR NAM78                                                  STDA2730
      SREF = SRF                                                        STDA2740
      DO 1100 I=1,20                                                    STDA2750
      SMACH1 (I) =  S1 (I)                                              STDA2760
      SMACH2 (I) =  S2 (I)                                              STDA2770
      SMACH3 (I) =  S3 (I)                                              STDA2780
      SMACH4 (I) =  S4 (I)                                              STDA2790
      SMACH5 (I) =  S5 (I)                                              STDA2800
      CLALF1 (I) = CL1 (I)                                              STDA2810
      CLALF2 (I) = CL2 (I)                                              STDA2820
      CLALF3 (I) = CL3 (I)                                              STDA2830
      CLALF4 (I) = CL4 (I)                                              STDA2840
      CLALF5 (I) = CL5 (I)                                              STDA2850
      DMACH1 (I) = DM1 (I)                                              STDA2860
      DMACH2 (I) = DM2 (I)                                              STDA2870
      DMACH3 (I) = DM3 (I)                                              STDA2880
      DMACH4 (I) = DM4 (I)                                              STDA2890
      DMACH5 (I) = DM5 (I)                                              STDA2900
      DO 1101 J=1,5                                                     STDA2910
      CD01 (I,J) = CD1 (I,J)                                            STDA2920
      CD02 (I,J) = CD2 (I,J)                                            STDA2930
      CD03 (I,J) = CD3 (I,J)                                            STDA2940
      CD04 (I,J) = CD4 (I,J)                                            STDA2950
      CD05 (I,J) = CD5 (I,J)                                            STDA2960
 1101 CONTINUE                                                          STDA2970
 1100 CONTINUE                                                          STDA2980
C                                                                       STDA2990
C                                                                       STDA3000
C     RESET COUNTERS, FLAGS, AND CONSTANTS AT THE START OF EACH         STDA3010
C     TRAJECTORY                                                        STDA3020
      DEGRAD=57.29578                                                   STDA3030
      DALP=0.001                                                        STDA3040
C                                                                       STDA3050
C     RUNGE KUTTA CONSTANTS                                             STDA3060
      AK(2)=0.5                                                         STDA3070
      AK(3)=0.5                                                         STDA3080
      AK(4)=1.0                                                         STDA3090
      AW(1)=1./6.                                                       STDA3100
      AW(2)=AW(1)+AW(1)                                                 STDA3110
      AW(4)=AW(1)                                                       STDA3120
      AW(3)= 1.-( AW(1) + AW(2) + AW(4) )                               STDA3130
      NEQ  =7                                                           STDA3140
      ERLOG=ALOG(EREF)                                                  STDA3150
      ERLIMT=EREF*ERRFAC                                                STDA3160
C                                                                       STDA3170
      IDONE=84                                                          STDA3180
C     NPHAZ IS PHASE COUNTER                                            STDA3190
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```
      NPHAZ=0                                                          STDA3200
      NCON=NCON+1                                                      STDA3210
      NTRY=0                                                           STDA3220
      JSTEP=0                                                          STDA3230
      NBAD=0                                                           STDA3240
      NOUT=0                                                           STDA3250
      NLINES=0                                                         STDA3260
      IPRINT=1                                                         STDA3270
      TWOG=2.*GSTD                                                     STDA3280
      NMAP=0                                                           STDA3290
      ALTMAX=1.E8                                                      STDA3300
C                                                                      STDA3310
C     IDENTIFY FIRST BOOST PHASE                                       STDA3320
      DO 150 I=1,NLPHAZ                                                STDA3330
      IF(IPS(3,I).GT. 2 )  GO TO 150                                   STDA3340
      IF(IPS(3,I).EQ.0)  GO TO 150                                     STDA3350
      NBOOST=I                                                         STDA3360
      GO TO 160                                                        STDA3370
  150 CONTINUE                                                         STDA3380
C                                                                      STDA3390
C     IDENTIFY FIRST SUSTAINER PHASE                                   STDA3400
  160 CONTINUE                                                         STDA3410
      DO 180  I=1,NLPHAZ                                               STDA3420
      IF( IPS(3,I) .LT. 3 )  GO TO 180                                 STDA3430
      NSPHAZ=I                                                         STDA3440
      GO TO 190                                                        STDA3450
  180 CONTINUE                                                         STDA3460
C                                                                      STDA3470
C                                                                      STDA3480
C     DETERMINE IF ITERATION FOR FUEL EXHASTION CRUISE RANGE IS TO BE DOSTDA3490
  190 CONTINUE                                                         STDA3500
      IF(  NCPHAZ  .EQ. 0   .OR. NCPHAZ .GT. NLPHAZ )  GO TO 195       STDA3510
      NITER=1                                                          STDA3520
      RNGI=  PS(6,NCPHAZ)                                              STDA3530
      IF( RNGI .LT. 0.1  )  RNGI=1.                                    STDA3540
C     INITIALIZE VARIABLES OF INTEGRATION                              STDA3550
  195 CONTINUE                                                         STDA3560
      DO 196 I=1,40                                                    STDA3570
  196 X(I)=0.                                                          STDA3580
      XPRIM1(1)=TIMEI                                                  STDA3590
      XPRIM1(2)=GAMMAI/DEGRAD                                          STDA3600
      XPRIM1(4)=ALTI                                                   STDA3610
      XPRIM1(5)=RANGEI*6076.115                                        STDA3620
      XPRIM1(6)=WTI                                                    STDA3630
      XDOT(1)=1.00                                                     STDA3640
      IF ( MOPT .GT. 0 )  GO TO 200                                    STDA3650
      V =VELI                                                          STDA3660
      GO TO 210                                                        STDA3670
  200 CONTINUE                                                         STDA3680
      ALTA=ALTI                                                        STDA3690
      CALL AIR                                                         STDA3700
      IF(KFAIL.GT.0) RETURN                                            STDA3710
      V =XMACHI*SSVA                                                   STDA3720
  210 XPRIM1(3)= AMAX1(V, 0.100)                                       STDA3730
      CALL MAINS1                                                      STDA3740
```

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      RETURN                                                            STDA3750
      END                                                               STDA3760


      SUBROUTINE TURBO(KFAIL)                                           TURB0010
      REAL KSTR,LBARE                                                   TURB0020
      REAL*4 INP20                                                      TURB0030
      COMMON /COMVLS/ COM(51)                                           TURB0040
      EQUIVALENCE (COM(23),FNETX),                                      TURB0050
     1  (COM(24),WTX),                                                 TURB0060
     2  (COM(25),WFX),                                                 TURB0070
     3  (COM(26),FMAX),                                                TURB0080
     4 (COM(28),T4X),                                                  TURB0090
     5 (COM(29),METTJX)                                                TURB0100
      COMMON/ALTDD/                                                     TURB0110
     1K1,ALT(24),SDTEMP(24), PRESS(24),ID(8)                            TURB0120
      COMMON /BACK/ BAC72(72)                                           TURB0130
      EQUIVALENCE ( BAC72(67), WDOTF )                                  TURB0140
      EQUIVALENCE ( BAC72(71), FN )                                     TURB0150
      COMMON /DESIGN/ DEN69(69),A999,DEN10(10)                          TURB0160
      COMMON/DESOPT/ KENG,KTANK,KINLT,METAL,ISTR, DES20(20)             TURB0170
      EQUIVALENCE ( ZCG, DES20(2)   )                                   TURB0180
      EQUIVALENCE (IDIFF, DES20(1))                                     TURB0190
      COMMON/EXTERN/ ARR(20)                                            TURB0200
      EQUIVALENCE (ARR(1),PLLT),(ARR(3),D3),              (ARR(14),TANLT)TURB0210
     1,(ARR(15),AR),(ARR(16),XMZERO),(ARR(17),XMRJTO),(ARR(18),HEIGHT), TURB0220
     1(ARR(19),BOSTLT)                                                  TURB0230
      COMMON /GENFAL/ KFGEN                                             TURB0240
      COMMON /INCOMM/XLDUMP,XFERNG,XINLET,XTIPCL,STERM,TNOZL            TURB0250
      COMMON /INDATA/ CDINL, CLALF,WEIGHT                               TURB0260
      EQUIVALENCE (WEIGHT,WINL)                                         TURB0270
      COMMON/INDES/ XINDD(16)                                           TURB0280
      COMMON/INLETX/K8,KPTC(15),ALPHV(15),AAMACH(15,15),ACACC(15,15),   TURB0290
     1 PT3PTO(15,15), ADDD(15,15)                                       TURB0300
      COMMON/INPTTJ/ END,ALPDES,AMDES,T4DES,      INP20(20)             TURB0310
      COMMON/IPROP/ INDL, IN3(3)                                        TURB0320
      EQUIVALENCE ( TV(19)  , ETAR )                                    TURB0330
      EQUIVALENCE (KSTR,INP20(1)) ,  (DCASE, INP20(2)),(WTTJ, INP20(3)),TURB0340
     1 (XLPAY,INP20(4)), (RHOF, INP20(5)), (REH, INP20(6)),             TURB0350
     2 (WPL, INP20(8)), (XLMISC,INP20(9)), (WSTRI,INP20(10)),           TURB0360
     3  (WDVAST,INP20(11))                                             TURB0370
      EQUIVALENCE ( WMISTJ, INP20(13) )                                 TURB0380
      EQUIVALENCE (WASURF, INP20(14)),  (WBOOST, INP20(15))             TURB0390
      COMMON /PRINTR/ IPSM, IPLK6(6)                                    TURB0400
      COMMON /TJINLP/ XENG, RENGD, XMISSL                               TURB0410
      COMMON/TURBI/ TV(30)                                              TURB0420
      EQUIVALENCE ( TV(2), ALFTJ )                                      TURB0430
      EQUIVALENCE (AC,TV(8)), (TJALT,TV(3)),(DFTIP,TV(9))               TURB0440
     6, (A9,TV(10)), (T4TJ, TV(6)), (TJMACH, TV(4)), (TJTHR, TV(5))     TURB0450
      EQUIVALENCE(WAFCDS,TV(1))                                         TURB0460
      EQUIVALENCE (WFUEL, TV(11)),(XTOTAL, TV(12)),                     TURB0470
     1 (XLPS, TV(13)), (XLNOZ,  TV(14))                                 TURB0480
      COMMON/WATES/ WT,LBARE,DTT,DRF,DFF,DFTXP,DMAX,WAT20(20)           TURB0490
      COMMON/WATIN/ WAT7(7), OPR,RFAN,TIT,WAT3(3)                       TURB0500
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      EQUIVALENCE (OPR,PRC),(TIT,T4)                                    TURB0510
      DIMENSION G(15,15)                                                TURB0520
      NAMELIST/TANK/ XLTW,WSH,WFS,AWT,WWT,VOLWT,ASKINP,WSTRPS,WSUM,XCYL,TURB0530
     1 VOLTNK,WFUEL,XLPS,XTOTAL                                         TURB0540
      NAMELIST/WAK/ TO,T2,P2,WC,P3,T3,P4,T55,XE,P55,P8,T8,VE,VO,GA,WAK2 TURB0550
      NAMELIST/CKK/ WAFCDS,WAF,XLNOZ,DNOZ,SEXIT,SNOZ,ALNCZ,WNOZ,        TURB0560
     1 XBARNZ,RENGO,XENG,XLENG,INP20                                    TURB0570
      NAMELIST/CHECK/ TV,ARR                                            TURB0580
C     COMPUTE CORRELATED AIRFLOW FOR INPUT THRUST, M, T4                TURB0590
      DWT = .01 * TJTHR                                                 TURB0600
      DCASE = D3                                                        TURB0610
      DTANK = DCASE                                                     TURB0620
      XMISSL = 4. * PLLT                                                TURB0630
      ILOO = 1                                                          TURB0640
      ILOOM = 3                                                         TURB0650
      KFAIL = 0                                                         TURB0660
      RHZF = RHOF                                                       TURB0670
      PI=3.14159                                                        TURB0680
      AMACH=TJMACH                                                      TURB0690
      AM=TJMACH                                                         TURB0700
      XMZERO = TJMACH                                                   TURB0710
      T4=T4TJ                                                           TURB0720
      ETARIN = 0.9                                                      TURB0730
      HP=TJALT                                                          TURB0740
      CALL TLU1(HP,ALT,K1,PRESS,PO,IND)                                 TURB0750
      CALL TLU11(SDTEMP,TO)                                             TURB0760
      T2 = TO * (1.+0.2*AM*AM)                                          TURB0770
      P2 = PO * ETARIN * (T2/TO)**3.5                                   TURB0780
      WC = 0.3 * T2 * (PRC**0.286 - 1.)                                 TURB0790
      P3 = P2 * PRC                                                     TURB0800
      T3 = T2 * (1. + WC/(0.24*T2))                                     TURB0810
      P4 = 0.95 * P3                                                    TURB0820
      T55 = T4 - WC / 0.276                                             TURB0830
      XE = WC / (0.248*T4-WC)                                           TURB0840
      P55 = P4 * (XE + 1.)**(-3.5)                                      TURB0850
      P8 = 0.506 * P55                                                  TURB0860
      T8 = T55 / 1.165                                                  TURB0870
      VE = 47.8 * SQRT(T8)                                              TURB0880
      VO = 49. * AM * SQRT(TO)                                          TURB0890
      FND=TJTHR                                                         TURB0900
      GA =FND/((VE/32.174)+(P8-PO)*53.3*T8/(P8*VE)-VO/32.174)           TURB0910
      WAK2 = GA * SQRT(T2/519.) / (P2/2116.25)                          TURB0920
        IF(IPSM.GT.0) WRITE(6,CHECK)                                    TURB0930
      IF ( IPSM  .GT.  0  )  WRITE(6,WAK)                               TURB0940
   10 IDES = 0                                                          TURB0950
      WAFCDS = WAK2                                                     TURB0960
      XMCR = 1.0                                                        TURB0970
      CALL INLET(WAK2,TJMACH, XMCR, ALFTJ, ETARIN,ETAROT,ACAP,IDES,CD)  TURB0980
      IF ( KFGEN .GT. 0 ) GO TO 995                                     TURB0990
      ETAR = ETARIN                                                     TURB1000
C     COMPUTE ADDITIVE DRAG + BLEED DRAG                                TURB1010
      CALL GENENG                                                       TURB1020
      IF ( KFGEN  .GT.  0  )  GO TO 995                                 TURB1030
      ILOO = ILOO + 1                                                   TURB1040
      IF ( ILOO  .GT. ILOOM ) GO TO 995                                 TURB1050
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      DW = ABS ( FND - FN )                                              TURB1060
      IF ( DW  .LE.  DWT ) GO TO 20                                      TURB1070
      WAK2 = WAK2 * FND / FN                                             TURB1080
      GO TO 10                                                           TURB1090
   20 AM=TJMACH                                                          TURB1100
      AS = A999                                                          TURB1110
      DYNP=0.7*PO*AM*AM                                                  TURB1120
      DAPBL = CD * DYNP * ACAP / 144.                                    TURB1130
      FNET = FN - DAPBL                                                  TURB1140
      SFC = WDOTF / FNET                                                 TURB1150
      WAF=WAFCDS*(P2/2116.25)/ SQRT(T2/518.6)                            TURB1160
      CALL WATE(WAF)                                                     TURB1170
C     WATE OUTPUTS ENGINE LENGTH, DIAMETER, WEIGHT                       TURB1180
C     NOZZLE WEIGHT                                                      TURB1190
      XLNOZ=1.6*DFTIP                                                    TURB1200
      DNOZ=SQRT(4.*A9/PI*144.)                                           TURB1210
      SEXIT=A9                                                           TURB1220
      SNOZ=SQRT(XLNOZ**2 + 0.25*(DFTIP**2-DNOZ**2))                      TURB1230
      ALNOZ=PI*SNOZ*(0.5*DFTIP + 0.5*DNOZ)                               TURB1240
      WNOZ=3.35*ALNOZ/144.                                               TURB1250
      WENG = WT + WNOZ                                                   TURB1260
      XBARNZ=XLNOZ*(0.5*DFTIP + DNOZ)/3./(0.5*DFTIP + 0.5*DNOZ)          TURB1270
      RENGO = 0.5 * DFTIP                                                TURB1280
      XENG=LBARE + XLNOZ                                                 TURB1290
      XLENG = XENG + 2.0 * RENGO                                         TURB1300
      IF ( IPSM  .GT.  0  )  WRITE(6,CKK)                                TURB1310
      IF (DMAX .GT. DCASE) GO TO 995                                     TURB1320
      CALL INLEXP                                                        TURB1330
      IF ( INDL  .GT.  0  )  GO TO 995                                   TURB1340
C     INLETP COMPUTED INLET & DUCT LENGTH, WEIGHT, LOCATION . . .        TURB1350
C     METAL = 1, ALUMINUM                                                TURB1360
C           = 2, TITANIUM                                                TURB1370
C           = 3, STEEL                                                   TURB1380
      GO TO (40, 50, 60), METAL                                          TURB1390
   40 RHOMTL = 0.1                                                       TURB1400
      E = 10.47E6                                                        TURB1410
      GO TO 70                                                           TURB1420
   50 RHOMTL = 0.167                                                     TURB1430
      E = 15.89 E6                                                       TURB1440
      GO TO 70                                                           TURB1450
   60 RHOMTL = 0.29                                                      TURB1460
      E = 28.86E6                                                        TURB1470
   70 TC = 2.725 * DTANK / E**0.4                                        TURB1480
      IF (TC .LT. 0.03) TC = 0.03                                        TURB1490
      XLTW = 0.6667 * XINLET                                             TURB1500
      IF (KENG .GT. 1) XLTW = 0.5 * XINLET                               TURB1510
      TERMA = (0.5 * DTANK - TC - 0.03)**2                               TURB1520
      XLEH = 0.5 * DTANK/REH                                             TURB1530
      TERMB = (XLEH - TC - 0.03) * PI * 0.6667                           TURB1540
      XLAH = XLEH                                                        TURB1550
      VOLHD = TERMA * TERMB                                              TURB1560
      REH2 = REH * REH                                                   TURB1570
      TERMC = SQRT(REH2 - 1.)                                            TURB1580
      TERMD = 0.3925 / (REH * TERMC)                                     TURB1590
      TERMC = (REH + TERMC) / (REH - TERMC)                              TURB1600
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      SH = DTANK**2 * ( 0.7854 + TERMD * ALOG(TERMC)  )                  TURB1610
      WSH = SH * TC * RHOMTL                                             TURB1620
      XLFS = 0.5 * DTANK / REH                                           TURB1630
      WFS = PI * DTANK * XLFS * RHOMTL * TC                              TURB1640
      WAS = WFS                                                          TURB1650
      RHOF = RHOF / 1728.                                                TURB1660
      WWT = 0.0                                                          TURB1670
      VOLWT = 0.0                                                        TURB1680
      IF (KTANK .GT. 1) GO TO 95                                         TURB1690
C     WEDGE TANK COMPUTATIONS                                            TURB1700
      ABWT = 0.25 * PI * XLTW * DTANK                                    TURB1710
      ALWT = 0.5 * PI * DTANK * XLTW                                     TURB1720
      AWT = ABWT + ALWT                                                  TURB1730
      WLWT=ALWT*RHOMTL*TC                                                TURB1740
      WWT = AWT * RHOMTL * TC                                            TURB1750
      WPWT=WWT-WLWT                                                      TURB1760
      VOLW = 0.125 * PI * XLTW * DTANK**2                                TURB1770
      VOLWT = VOLW + VOLHD                                               TURB1780
      ASKINP = PI * DCASE * (XLENG + 0.5*XLTW + XLMISC)                  TURB1790
      ASKINW=PI*DCASE*XLTW*0.5                                           TURB1800
   65 GO TO (75, 80, 85), ISTR                                           TURB1810
   75 WSTRPS = ASKINP * TC * RHOMTL * KSTR                               TURB1820
      GO TO 90                                                           TURB1830
   80 WSTRPS = ASKINP * WOVAST * KSTR                                    TURB1840
      GO TO 90                                                           TURB1850
   85 WSTRPS = WSTRI                                                     TURB1860
   90 CONTINUE                                                           TURB1870
      WSUM=WPL+WASURF+WMISTJ+WENG+WINL+WSTRPS+WFS                        TURB1880
      IF ( KTANK  .GT.  1  )  GO TO 96                                   TURB1890
      XCYL=(WTTJ - WSUM -WSH-WWT-RHOF*VOLHD-VOLW*RHOF)/(0.7854*DTANK**2  TURB1900
     1 +PI*DTANK*TC*RHOMTL)                                              TURB1910
C                                                                        TURB1920
      VOLTNK = (VOLHD + VOLWT + 0.25*PI*DTANK**2*XCYL) * 0.95            TURB1930
      GO TO 100                                                          TURB1940
   95 ASKINP = PI * DTANK * (XLENG + XLTW + XLMISC - XLAH)               TURB1950
      GO TO 65                                                           TURB1960
   96 XCYL = (WTTJ-WSUM-2.0*WSH-WAS-RHOF*VOLHD*2.0)/(0.7854*DTANK**2+PI  TURB1970
     1*DTANK*TC*RHOMTL)                                                  TURB1980
      IF (XCYL .LE.0.0) GO TO 990                                        TURB1990
   97 VOLCYL = PI*DTANK**2 * XCYL * 0.25                                 TURB2000
      VOLTNK = (VOLHD * 2.0 + VOLCYL) * 0.95                             TURB2010
  100 WFUEL = VOLTNK * RHOF                                              TURB2020
      WCYL = PI * DTANK * XCYL * TC * RHOMTL                             TURB2030
      WTANK=WCYL + WWT + WSH                                             TURB2040
      IF(KTANK.GT.1) WTANK=WCYL + 2.*WSH                                 TURB2050
      WPS = WTTJ - WPL - WASURF                                          TURB2060
      XLPS = XLENG + XLTW + XCYL + XLFH + XLMISC                         TURB2070
      IF ( KTANK.GT.1) XLPS=XLENG+XLTW+XCYL+XLFH+XLMISC                  TURB2080
      XTOTAL = XLPS + XLPAY                                              TURB2090
      DINL=SQRT(4.*TV(8)*144./PI)                                        TURB2100
      XLTANK=XLTW + XCYL + XLFH                                          TURB2110
      IF(KTANK.GT.1) XLTANK=XCYL + XLFH + XLAH                           TURB2120
C     C C OF PROPULSION SYSTEM                                           TURB2130
C     ADD CG COMPUTATIONS HERE                                           TURB2140
      XBAR1=0.5*XLMISC                                                   TURB2150
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      XMOM1=XBAR1*(WMISTJ + PI*DCASE*XLMISC*TC*RHOMTL)                    TURB2160
      XBAR2=XLMISC + 0.5*XLEH                                            TURB2170
      XMOM2=XBAR2*WFS                                                    TURB2180
      XBAR3=XBAR2                                                        TURB2190
      XMOM3=XBAR3*WSH                                                    TURB2200
      XBAR4=XBAR3 + 0.5*(XLEH + XCYL)                                    TURB2210
      XMOM4=XBAR4*WCYL                                                   TURB2220
      IF(KTANK.GT.1) GO TO 110                                           TURB2230
      XBAR5=XBAR4 + 0.5*XCYL + XLTW/3.                                   TURB2240
      XMOM5=XBAR5*WLWT                                                   TURB2250
      XBAR6=XBAR4 + 0.5*XLTW                                             TURB2260
      XMOM6=XBAR6*WBWT                                                   TURB2270
      XBAR7=XLMISC + XLFS + XCYL + XLTW*0.667                            TURB2280
      XMOM7=XBAR7*ASKINW*RHOMTL*TC                                       TURB2290
      GO TO 120                                                          TURB2300
  110 XBAR5=XBAR4 + 0.5*XCYL + C.5*XLAH                                  TURB2310
      XMOM5=XBAR5*WSH                                                    TURB2320
      XBAR6=XBAR5                                                        TURB2330
      XMOM6=XBAR6*WSH                                                    TURB2340
      XBAR7=XBAR6 + 0.5*XLTW                                             TURB2350
      XMOM7=XBAR7*PI*DTANK*RHOMTL*(XLTW-XLAH)                            TURB2360
  120 XBAR8=XLMISC + XLFS + XCYL + 0.5*XLENG + XLTW                      TURB2370
      XMOM8=XBAR8 *(WSTRPS - ASKINW*RHOMTL*TC)                           TURB2380
       XBAR9=XLPS -XLNOZ -0.5*XENG                                       TURB2390
      XMOM9=XBAR9*WENG                                                   TURB2400
      XBARIN=ZCG                                                         TURB2410
      XMOMIN=XBARIN*WEIGHT                                               TURB2420
      XBAR10=XLPS - XLNOZ + XBARNZ                                       TURB2430
      XMOM10=WNOZ + XBAR10                                               TURB2440
      XMOM=XMOM1 + XMOM2 + XMOM3 + XMOM4 + XMOM5 + XMOM6 + XMOM7         TURB2450
     1 +XMOM8 + XMOM9 + XMOM10                                           TURB2460
      XCGPSE=XMOM/WPS                                                    TURB2470
      XBARFL=XBAR4                                                       TURB2480
      IF(KTANK.GT.1)  XBARFL=(VOLHD*RHOF*XBAR3 + RHOF*XBAR4*VOLCYL +     TURB2490
     1 VOLWT*RHOF*(XBAR5 + 0.17*XLTW))/WFUEL                             TURB2500
      XMOMFL=WFUEL*XBARFL                                                TURB2510
      XMOMF=XMOM + XMOMFL                                                TURB2520
      XCGPSF=XMOMF/(WPS + WFUFL)                                         TURB2530
      FNETX = TJTHR                                                      TURB2540
      FMAX = TJTHR                                                       TURB2550
      WTX=WTANK                                                          TURB2560
      WFX = WFUEL                                                        TURB2570
      T4X=T4                                                             TURB2580
      METTJX = METAL                                                     TURB2590
      IF(IPSM.NE.0) WRITE(6,1000)                                        TURB2600
 1000 FORMAT(/9X, 26HTURBOJET DESIGN PARAMETERS  )                       TURB2610
      IF(IPSM.NE.0) WRITE(6,1050) TJMACH,TJALT,TJTHR,T4TJ                TURB2620
 1050 FORMAT(/9X, 13HDESIGN MACH =,F4.2,4X,16HDESIGN ALTITUDE=,F6.0,4H FTURB2630
     1T.,/9X, 14HDESIGN THRUST=,F8.2,5H LBS,4X,11HDESIGN T4 =,F7.2)      TURB2640
      IF(IPSM.NE.0) WRITE(6,1100)                                        TURB2650
 1100 FORMAT(/9X, 10HCOMPONENT ,4X,12HDIAMETER-IN.,4X,10HLENGTH-IN.,4X, TURB2660
     111HWEIGHT-LBS.,4X,17HC.G. LOCATION-IN.  )                          TURB2670
      IF(IPSM.NE.0) WRITE(6,1200) DMAX,XENG,WENG, XBAR9                  TURB2680
 1200 FORMAT(/10X,6HENGINE,10X,F5.2,9X,F6.2,8X,F7.2,10X,F6.2)            TURB2690
      IF(IPSM.NE.0) WRITE(6,1300)DNOZ,XLNOZ,WNOZ,XBAR10                  TURB2700
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 1300 FORMAT(/10X,6HNOZZLE,10X,F5.2,9X,F6.2,8X,F7.2,10X,F6.2)          TURB2710
      IF(IPSM.NE.0) WRITE(6,1400) DINL,XINLET,WEIGHT,XBARIN            TURB2720
 1400 FORMAT(/10X,5HINLET,11X,F5.2,9X,F6.2,8X,F7.2,10X,F6.2)           TURB2730
      IF(IPSM.NE.0) WRITE(6,1500) DTANK,XLTANK,WTANK                   TURB2740
 1500 FORMAT(/10X,4HTANK,12X,F5.2,9X,F6.2,8X,F7.2,10X,F6.2)            TURB2750
      IF(IPSM.NE.0) WRITE(6,1600) WSTRPS,XBAR7                         TURB2760
 1600 FORMAT(/10X,4HSTR.,40X,F7.2,10X,F6.2)                            TURB2770
      IF(IPSM.NE.0) WRITE(6,1700) WMISTJ,XBAR8                         TURB2780
 1700 FORMAT(/10X,5HMISC.,39X,F7.2,10X,F6.2)                           TURB2790
      IF(IPSM.NE.0) WRITE(6,1800) DMAX,XLPS,WPS,XCGPSE                 TURB2800
 1800 FORMAT(/10X,10HPROP SYS.,6X,F5.2,9X,F6.2,8X,F7.2,10X,F6.2)       TURB2810
      IF(IPSM.NE.0) WRITE(6,1900) DTANK,XLTANK,WFUEL,XBAR5             TURB2820
 1900 FORMAT(/10X,4HFUEL,12X,F5.2,9X,F6.2,8X,F7.2,10X,F6.2)            TURB2830
      GO TO 9951                                                       TURB2840
  950 KFAIL = 1                                                        TURB2850
      IF ( IPSM  .LE. 0 )  GO TO 1177                                  TURB2860
      WRITE(6,1)                                                       TURB2870
    1 FORMAT(30HTANK CYLINDER LENGTH .LE. ZERO)                        TURB2880
      GO TO 996                                                        TURB2890
  955 CONTINUE                                                         TURB2900
      KFAIL=1                                                          TURB2910
 9951 CONTINUE                                                         TURB2920
      IF ( IPSM  .LE. 0 )  GO TO 1177                                  TURB2930
      WRITE(6,TANK)                                                    TURB2940
 1177 CONTINUE                                                         TURB2950
  996 CONTINUE                                                         TURB2960
      RHOF = RHZF                                                      TURB2970
      RETURN                                                           TURB2980
      END                                                              TURB2990


      SUBROUTINE  CARD(N5,N6,NX, CLAS,PCODE)                           CARD0010
C   PGM=MAINAA(TYPE B)  L.D.G.    VER. 2  10-25-74  FORT IV   EBCD     CARD0020
C   TO READ CARD IMAGES FROM N5, COPY ONTO NX,  AND PRINT ON N6        CARD0030
 1000  FORMAT(20A4)                                                    CARD0040
 1001  FORMAT(1X,19A4,A3)                                              CARD0050
 2000  FORMAT(I6,1H.,2CA4)                                             CARD0060
 2001  FORMAT(I6,1H.,1X,19A4,A3)                                       CARD0070
 2002  FORMAT(6X,17HINPUT CARD IMAGES/)                                CARD0080
       DIMENSION  KARD(20),CLAS(20),PCODE(20)                          CARD0090
       DATA  KZIP,K10/4HZIP ,4H10  /                                   CARD0100
       K1     = 1                                                      CARD0110
       KCARD = 2                                                       CARD0120
       NLINE = 2                                                       CARD0130
       WRITE(N6,2002)                                                  CARD0140
       WRITE(NX, 1001) CLAS, PCODE                                     CARD0150
       WRITE(N6,2001) K1, CLAS, KCARD, PCODE                           CARD0160
       GO TO 2                                                         CARD0170
 1     NLINE = 0                                                       CARD0180
       WRITE(N6,2002)                                                  CARD0190
 2     NLINE = NLINE + 1                                               CARD0200
       KCARD = KCARD + 1                                               CARD0210
       READ (N5,1000) KARD                                             CARD0220
       WRITE(NX, 1000)KARD                                             CARD0230
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AD-A048 366 LTV AEROSPACE CORP DALLAS TEX VOUGHT SYSTEMS DIV F/G 15/7
SEATIDE ANALYSIS PROCESS. VOLUME III E. CRUISE MISSILE - CONCEP--ETC(U)
FEB 75 R K MCDONOUGH DAAB09-72-C-0062
UNCLASSIFIED VSD-00.1636-VOL-3E-REV-A NL

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END
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      WRITE(N6,2000) KCARD, KARD                                        CARD0240
      IF (KARD(1).EQ.KZIP.AND.KARD(2).EQ.K10)  GO TO 8                  CARD0250
      IF (NLINE.LT.50)  GO TO 2                                         CARD0260
      CALL PAGE                                                         CARD0270
      GO TO 1                                                           CARD0280
    8 END FILE NX                                                       CARD0290
      REWIND   NX                                                       CARD0300
      RETURN                                                            CARD0310
      END                                                               CARD0320


      SUBROUTINE INCOST(IZIP,INPRIN)                                    INC00010
      REAL NOZWT,MP                                                     INC00020
      COMMON /CONLY/ KINDPS,DIAERT,SWMC,SDTHRT,SRNOZI,SWM,SCMMOR(4)     INC00030
      COMMON /SCRNNL/ NPTS(20),PARVNL(7,20),DWNL(7,20),DUMMY(50)        INC00040
     1  ,NSCOST,IDU4M4(4)                                              INC00050
      COMMON /GUIDCO/ COSN,NSCRC,WTGUID,SAWTI(3),SAWTJ(3),SAFCI(3),     INC00060
     1  SAFCJ(3),KSASTB,KSAAGT,NSACHN,KSASGT,AWTI(3),AWTJ(3),           INC00070
     2  APPEKI(3),APPEKJ(3),AFCI,AFCJ,KASTB,KAAGT,NACHN,KASGT,          INC00080
     3  GIRWT(3),GIRBSP(3),GIRNDT(3),GIRFC(3),KGTABL,KGTYPE,            INC00090
     4  DUMGX(9)                                                       INC00100
      COMMON /COMVLS/ WTANK,VFXIN,VREQ,GGW,HPPUMP,WTFUEL,WCOMM,VCOMI,   INC00110
     1 R5,Y1,WNOZ,KFM,MATTK,A,DCOM,WMC,VBI,DTHRT,RNOZI,NCZWT,MP,CASFM,  INC00120
     2 ENET,WT,WF,FMAX,S,T4,METTJ,ZXNB,D,WM,FC,PPEAK,BSP,NCET,QA,WCS,   INC00130
     3 WWH,WTC,WTP,WGG,WSC,WLV,VGT,WC,WP,DP,WN,METAL,NCONFG             INC00140
      COMMON /COSTIN/   PRIA1,PRIA2,PRJC,PRIA3,PRIB3,PRIA4,PRIE4,PRIA5, INC00150
     1PRIA6,PRIA7,PRIA8,PRIB8,PRIA9,PRIG9,PRIA10,PRIA11,PRIG11,PRIA12,  INC00160
     2PRIB12,PRIE12,PRIA13,PRIE13,PRIA14,PRIE14,PRIA15,PRIE15,PRIA16,   INC00170
     3PRIE16,PRIA17,PRIF17,PRIA18,PRIB18,PRIE18,PRIA19,PRIE19,PRIA20,   INC00180
     4PRIA21,PRIA22,PRIB22,PRIA23,PRIB23,PRIC23,PRIA24,PRIC24,PRIA25,   INC00190
     5PRIB25,PRIA26,PRIB26,PRIC26,PRNA1,PRNA2,PRNA3,PRNB3,PRNA4,PRNE4,  INC00200
     6PRNA5,PRNA6,PRNA7,PRNA8,PRNB8,PRNA9,PRNG9,PRNA10,PRNA11,PRNG11,   INC00210
     7PRNA12,PRNB12,PRNE12,PRNA13,PRNE13,PRNA14,PRNE14,PRNA15,PRNA16,   INC00220
     8PRNA17,PRNA18,PRNB18,PRNA19,PRNB19,PRNC19,PRNA20,PRNC20,PRNA21,   INC00230
     9PRNB21,PRNA22,PRNB22,PRNC22,PLPC,PLA1,PLA3,PLB3,PLA4,PLA6,PLA8,   INC00240
     APLB8,PLA9,PLA11,PLB11,PLA13,PLB13,PLC13,PLD13,PLA14,PLD14,PLA15,  INC00250
     BPLB15,PLE15,PLF15,PLA16,PLE16,PLA17,PLA18,PLB18,PLC18,PLA19,PLA20,INC00260
     CPLB20,PLA21,PLB21,PLC21,PTA1,PTD1,PTA4,PTB4,PTA5,PTB5,PTE5,PTA6,  INC00270
     DPTE6,PTA7,PTB7,PTC7,PTJC,PTA8,PTD8,PTA9,PTB9,PTA10,PTB10,PTC10,   INC00280
     EPEA3,PEB3,PEA4,PEE4,PEA5,PEF5,PEA6,PEB6,PEE6,PEA7,PEE7,PEA8,PEA9, INC00290
     FPEA10,PEB10,PEC10,PEA11,PEB11,PEE11,PFBC,PSPC,PSA3,PSB3,PSA4,PSE4,INC00300
     GPSA5,PSE5,PSA6,PSF6,PSG6,PSA7,PSF7,PSA8,PSA9,PSA10,PSB10,PSC10,   INC00310
     HPSA11,PSB11,PSF11,CFT,PFT,CFCASE,PFCASE,CFC,PFC,CFM,PFM,IYEAR     INC00320
      COMMON /COSTIN/   PRIB1,PRIC1,PRIB2,PRIC2,PRIB4,PRIC4,PRID4,PRIB5,INC00330
     1PRIC5,PRIB9,PRIC9,PRID9,PRIE9,PRIF9,PRIB11,PRIC11,PRID11,PRIE11,  INC00340
     2PRIF11,PRIC12,PRID12,PRIB13,PRIC13,PRID13,PRIB14,PRIC14,PRID14,   INC00350
     3PRIB15,PRIC15,PRID15,PRIB16,PRIC16,PRID16,PRIB17,PRIC17,PRID17,   INC00360
     4PRIE17,PRIC18,PRID18,PRIB19,PRIC19,PRID19,PRIB24,PRNB1,PRNC1,PRNB2INC00370
     5,PRNC2,PRNB4,PRNC4,PRND4,PRNB5,PRNC5,PRNB9,PRNC9,PRND9,PRNE9,PRNF9INC00380
     6,PRNB11,PRNC11,PRND11,PRNE11,PRNF11,PRNC12,PRND12,PRNB13,PRNC13,  INC00390
     7PRND13,PRNB14,PRNC14,PRND14,PRNB15,PRNC15,PRND15,PRNB16,PRNC16,   INC00400
     8PRND16,PRNB17,PRNC17,PRND17,PRNE17,PRNB20,PLB1,PLC1,PLA2,PLB2,PLB4INC00410
     9,PLC4,PLA5,PLB5,PLB6,PLC6,PLA7,PLB7,PLB9,PLC9,PLA10,PLB10,PLA12,  INC00420
     APLB12,PLB14,PLC14,PLC15,PLD15,PLB16,PLC16,PLD16,PLB19,PLC19,PTB1,  INC00430
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EPTC1,PTA2,PTB2,PTA3,PTB3,PTC5,PTD5,PTB6,PTC6,PTD6,PTB8,PTC8,PEA1,  INC00440
CPEB1,PEC1,PEA2,PEB2,PEC2,PEB4,PEC4,PED4,PEB5,PEC5,PED5,PEE5,PEC6,  INC00450
CPED6,PEB7,PEC7,PED7,PEC11,PED11,PSA1,PSB1,PSC1,PSA2,PSB2,PSC2,PSB4INC00460
E,PSC4,PSD4,PSB5,PSC5,PSD5,PSE5,PSB6,PSC6,PSD6,PSE6,PSB7,PSC7,PSC7, INC00470
FPSE7,PSC11,PSD11,PRND22,PLD21,PLE21,PTD10,PTE10,PRID26               INC00480
 COMMON /COSTIN/   PROFIT,QD,R,AFA1,AFB1,AFC1,AFD1,AFI1,AFA2,AFB2,   INC00490
1AFG2,AFA3,AFB3,AFG3,AFA4,AFB4,AFC4,AFD4,AFJ4,AFA5,AFB5,AFC5,AFH5,   INC00500
2AFA6,AFB6,AFG6,AFA7,AFC7,AFD7,AFA8,AFB8,AFC8,AFD8,AFI8,AFA9,AFB9,   INC00510
3AFC9,AFD9,AFJ9,AFA10,AFB10,AFC10,AFH10,AFA11,AFB11,AFG11,AFA12,     INC00520
4AFC12,AFD12,AFA13,AFB13,AFC13,AFA14,AFB14,AFC14,KFUZE,WA1,WE1,WF1,  INC00530
5WA2,WD2,WE2,KGAIN,CA1,CE1,CF1,CA2,CE2,CF2,CA3,CE3,CF3,GA1,GB1,GF1,  INC00540
6KLE6,KGT6,KSTAB,KAGATE,NCHAN,KSGATE,GA2,GB2,GK2,GA3,GB3,GQ3,GA4,    INC00550
7GB4,GM4,GA5,GB5,GH5,KG,KC,KW,KA,KP,IGTYPE,ICTYPE,IPRCST              INC00560
 COMMON /COSTIN/   AFE1,AFF1,AFG1,AFH1,AFC2,AFD2,AFE2,AFF2,AFC3,     INC00570
1AFD3,AFE3,AFF3,AFE4,AFF4,AFG4,AFH4,AFI4,AFD5,AFE5,AFF5,AFG5,AFC6,   INC00580
2AFD6,AFE6,AFF6,AFB7,AFE8,AFF8,AFG8,AFH8,AFE9,AFF9,AFG9,AFH9,AFI9,   INC00590
3AFD10,AFE10,AFF10,AFG10,AFC11,AFD11,AFE11,AFF11,AFB12,WB1,WC1,WD1,  INC00600
4WP2,WC2,CB1,CC1,CD1,CB2,CC2,CD2,CB3,CC3,CD3,GC1,GD1,GE1,GC2,GD2,    INC00610
5GF2,GE2,GG2,GH2,GI2,GJ2,GC3,GD3,GE3,GF3,GG3,GH3,GI3,GJ3,GK3,GL3,    INC00620
6GM3,GN3,GP3,GC4,GD4,GE4,GF4,GG4,GH4,GI4,GJ4,GK4,GL4,GC5,GD5,GE5,    INC00630
7GF5,GG5,CFTTAB(11),PFTTAB(11)                                       INC00640
 COMMON /CSTPRV/ CBLC,CBMC,CCASE,CCFU,CCL,CCM,CCOMI,CCOML,CCOMM,     INC00650
1 CCONT,CCRD,CEBFU,CEBRD,CFTJ,CEXIN,CGFU,CGRD,                       INC00660
2 CGT,CGTOT,CIGN,CIRJFU,      CIRJRD,      CLF,CLFL,CLGG,CLI,CLM,    INC00670
3              CLRFU,CLRRD,CLRT,CLTC,CLTP,CM,CMGG,CMM,CMTC,CMTP,     INC00680
4 CMV,CNOZ,CNRJFU,      CNRJRD,      CP,CPAFI,CPENG,CPL,CPLC,       INC00690
5 CPMFGL,CPMFGM,CPQA,CPR,CPRC,CPS,CPSMGG,CPSN2,CPSRAM,CPSSGG,        INC00700
6 CPTOOL,CRAFI,CRDFV,CREG,CRENG,CRFTO,CRJC,CRMFGL,CRMFGM,CRQA,       INC00710
7 CRTOOL,CSA,CSRFU,CSRRD,CSRT,CT,CTAFI,CTC,CTEB,CTIRJ,CTJFU,         INC00720
8 CTJLF,CTJLFL,CTJRD,CTJT,      CTL,CTM,CTNRJ,CTP,CWH,CWHFU,CWHR,    INC00730
9 CBOOC,CRPS,CPFU,PROFPR,PRFUAF,PRRAF,CCLB,CCMB,CTCB,CLIB,CNOZB,     INC00740
A CPRB,CPLB,CIGNB,CSAB,PROFEX                                        INC00750
 COMMON /CODEXX/ II(16)                                              INC00760
 EQUIVALENCE (II(1),KIND)                                            INC00770
 COMMON /NFILES/ N5,N6,N7,N11,N12,N1                                 INC00780
 NAMELIST /NAMCST/   QD,   R,IYEAR,NSCRC,NSCOST,KGTABL,              INC00790
1   KGTYPE,WTGUID,FC,BSP,PPEAK,NDET,KSTAB,KAGATE,NCHAN,KSGATE,       INC00800
2  ICTYPE,KGAIN,KFUZE                                                INC00810
 NAMELIST/NAMCBY/WTANK,VEXIN,VREQ,GGW,HPPUMP,WTFUEL,WCOMM,VCOMI,     INC00820
1 R5,Y1,WNOZ,KFM,MATTK,  DCOM,WMC,VBI,DTHRT,RNOZI,NCZWT,MP,CASEM,    INC00830
2 FNET,WT,WF,FMAX,  T4,METTJ,ZXNB,  WM,                      WCS,    INC00840
3 WWH,WTC,WTP,WGG,WSC,WLV,VGT,WO,WP,DP,WN,METAL,                     INC00850
4   A,D,DIAFRT,KINDPS                                                INC00860
5  ,SWMC,SDTHRT,SRNOZI,SWM,KG,KC,KW,KA,KP                            INC00870
5   ,QA,S                                                            INC00880
 NAMELIST /NAMCPS/ PRIA1,PRIA2,PRJC,PRIA3,PRIB3,PRIA4,PRIE4,PRIA5,   INC00890
1PRIA6,PRIA7,PRIA8,PRIB8,PRIA9,PRIG9,PRIA10,PRIA11,PRIG11,PRIA12,    INC00900
2PRIB12,PRIE12,PRIA13,PRIE13,PRIA14,PRIE14,PRIA15,PRIE15,PRIA16,     INC00910
3PRIE16,PRIA17,PRIF17,PRIA18,PRIB18,PRIE18,PRIA19,PRIE19,PRIA20,     INC00920
4PRIA21,PRIA22,PRIB22,PRIA23,PRIB23,PRIC23,PRIA24,PRIC24,PRIA25,     INC00930
5PRIB25,PRIA26,PRIB26,PRIC26,PRNA1,PRNA2,PRNA3,PRNB3,PRNA4,PRNE4,    INC00940
6PRNA5,PRNA6,PRNA7,PRNA8,PRNB8,PRNA9,PRNG9,PRNA10,PRNA11,PRNG11,     INC00950
7PRNA12,PRNB12,PRNE12,PRNA13,PRNE13,PRNA14,PRNE14,PRNA15,PRNA16,     INC00960
8PRNA17,PRNA18,PRNB18,PRNA19,PRNB19,PRNC19,PRNA20,PRNC20,PRNA21,     INC00970
9PRNB21,PRNA22,PRNB22,PRNC22,PLPC,PLA1,PLA3,PLB3,PLA4,PLA6,PLA8,     INC00980
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      APLB8,PLA9,PLA11,PLB11,PLA13,PLB13,PLC13,PLD13,PLA14,PLD14,PLA15,   INC00990
      PPLB15,PLE15,PLF15,PLA16,PLE16,PLA17,PLA18,PLB18,PLC18,PLA19,PLA20, INC01000
      CPLB20,PLA21,PLB21,PLC21,PTA1,PTD1,PTA4,PTB4,PTA5,PTB5,PTE5,PTA6,   INC01010
      CPTF6,PTA7,PTB7,PTC7,PTJC,PTA8,PTD8,PTA9,PTB9,PTA10,PTB10,PTC10,    INC01020
      EPEA3,PEB3,PEA4,PEE4,PEA5,PEF5,PEA6,PEB6,PEE6,PEA7,PEE7,PEA8,PEA9,  INC01030
      FPEA10,PEB10,PEC10,PEA11,PEB11,PEF11,PEBC,PSPC,PSA3,PSB3,PSA4,PSE4, INC01040
      GPSA5,PSE5,PSA6,PSF6,PSG6,PSA7,PSF7,PSA8,PSA9,PSA10,PSB10,PSC10,    INC01050
      HPSA11,PSB11,PSE11,CFT,PFT,CFCASE,PFCASE,CFC,PFC,CFM,PFM            INC01060
      X    ,PLC14                                                         INC01070
       NAMELIST /NAMCCP/ PRIB1,PRIC1,PRIB2,PRIC2,PRIB4,PRIC4,PRID4,PRIP5, INC01080
      1PRIC5,PRIB9,PRIC9,PRID9,PRIE9,PRIF9,PRIB11,PRIC11,PRID11,PRIE11,   INC01090
      2PRIF11,PRIC12,PRID12,PRIB13,PRIC13,PRID13,PRIB14,PRIC14,PRID14,    INC01100
      3PRIB15,PRIC15,PRID15,PRIB16,PRIC16,PRID16,PRIB17,PRIC17,PRID17,    INC01110
      4PPIF17,PRIC18,PRID18,PRIB19,PRIC19,PRID19,PRIB24,PRNB1,PRNC1,PRNB2 INC01120
      5,PRNC2,PRNB4,PRNC4,PRND4,PRNB5,PRNC5,PRNB9,PRNC9,PRND9,PRNE9,PRNF9 INC01130
      6,PRNB11,PRNC11,PRND11,PRNE11,PRNF11,PRNC12,PRND12,PRNB13,PRNC13,   INC01140
      7PRND13,PRNB14,PRNC14,PRND14,PRNB15,PRNC15,PRND15,PRNB16,PRNC16,    INC01150
      8PRND16,PRNB17,PRNC17,PRND17,PRNF17,PRNB20,PLB1,PLC1,PLA2,PLB2,PLB4 INC01160
      9,PLC4,PLA5,PLB5,PLB6,PLC6,PLA7,PLB7,PLB9,PLC9,PLA10,PLB10,PLA12,   INC01170
      APLB12,PLB14,      PLC15,PLD15,PLB16,PLC16,PLD16,PLB19,PLC19,        INC01180
      B      PTA2,PTB2,PTA3,PTB3,PTC5,PTD5,PTB6,PTC6,PTD6,PTB8,PTC8,PEA1,  INC01190
      CPFB1,PFC1,PFA2,PEB2,PFC2,PEB4,PEC4,PED4,PEB5,PEC5,PFD5,PFE5,PFC6,   INC01200
      DPFD6,PFB7,PFC7,PFD7,PFC11,PFD11,PSA1,PSB1,PSC1,PSA2,PSB2,PSC2,PSB4 INC01210
      E,PSC4,PSD4,PSB5,PSC5,PSD5,PSE5,PSB6,PSC6,PSD6,PSF6,PSB7,PSC7,PSD7, INC01220
      FPSF7,PSC11,PSD11,PRND22,PLD21,PLE21,PTD10,PTE10,PRIC26              INC01230
      X   ,PTB1,PTC1                                                       INC01231
       NAMELIST /NAMCNP/ PROFIT,      AFA1,AFB1,AFC1,AFD1,AFI1,AFA2,AFB2,  INC01240
      1AFG2,AFA3,AFB3,AFG3,AFA4,AFB4,AFC4,AFD4,AFJ4,AFA5,AFB5,AFC5,AFH5,   INC01250
      2AFA6,AFB6,AFG6,AFA7,AFC7,AFD7,AFA8,AFB8,AFC8,AFD8,AFI8,AFA9,AFB9,   INC01260
      3AFC9,AFD9,AFJ9,AFA10,AFB10,AFC10,AFH10,AFA11,AFB11,AFG11,AFA12,     INC01270
      4AFC12,AFD12,AFA13,AFB13,AFC13,AFA14,AFB14,AFC14,       WA1,WE1,WF1, INC01280
      5WA2,WD2,WE2,       CA1,CE1,CF1,CA2,CE2,CF2,CA3,CE3,CF3,GA1,GB1,GF1, INC01290
      6                                  GA2,GB2,GK2,GA3,GB3,GQ3,GA4,      INC01300
      7GP4,GM4,GA5,GB5,GH5                                                 INC01310
       NAMELIST /NAMCCN/ AFE1,AFF1,AFG1,AFH1,AFC2,AFD2,AFE2,AFF2,AFC3,     INC01320
      1AFD3,AFE3,AFF3,AFE4,AFF4,AFG4,AFH4,AFI4,AFD5,AFE5,AFF5,AFG5,AFC6,   INC01330
      2AFD6,AFF6,AFF6,AFB7,AFE8,AFF8,AFG8,AFH8,AFE9,AFF9,AFG9,AFH9,AFI9,   INC01340
      3AFD10,AFE10,AFF10,AFG10,AFC11,AFD11,AFE11,AFF11,AFB12,WB1,WC1,WD1,  INC01350
      4WP2,WC2,CB1,CC1,CD1,CB2,CC2,CD2,CB3,CC3,CD3,GC1,GD1,GE1,GC2,GD2,    INC01360
      5GE2,GF2,GG2,GH2,GI2,GJ2,GC3,GD3,GE3,GF3,GG3,GH3,GI3,GJ3,GK3,GL3,    INC01370
      6GM3,GN3,GP3,GC4,GD4,GE4,GF4,GG4,GH4,GI4,GJ4,GK4,GL4,GC5,GD5,GE5,    INC01380
      7CF5,GG5                                                             INC01390
C                                                                          INC01400
       GO TO (30,40,50,60,70,80),IZIP                                      INC01410
 30    READ(N5,NAMCNP)                                                     INC01420
       IF(INPRIN.GT.0) WRITE(N6,NAMCNP)                                    INC01430
       GO TO 10                                                            INC01440
   40  READ(N5,NAMCCN)                                                     INC01450
       IF(INPRIN.GT.0) WRITE(N6,NAMCCN)                                    INC01460
       GO TO 10                                                            INC01470
 50    READ(N5,NAMCPS)                                                     INC01480
       IF(INPRIN.GT.0) WRITE(N6,NAMCPS)                                    INC01490
       GO TO 10                                                            INC01500
 60    READ(N5,NAMCCP)                                                     INC01510
       IF(INPRIN.GT.0) WRITE(N6,NAMCCP)                                    INC01520
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      GO TO 10                                                          INC01530
 7C   READ(N5,NAMCBY)                                                   INC01540
      FMAX = FNET                                                       INC01550
      IF(INPRIN.GT.C) WRITE(N6,NAMCBY)                                  INC01560
      GO TO 1C                                                          INC01570
   80 CONTINUE                                                          INC01580
      READ(N5,NAMCST)                                                   INC01590
      IF(KGTABL .LE. 0) GO TO 2498                                      INC01600
      NV=3                                                              INC01610
      IF(KGTYPE .GT. 12 ) GO TO 2428                                    INC01620
      IF ( KGTYPE .NE. 11 ) GO TO 2408                                  INC01630
C     I BAND PASSIVE - SEMIACTIVE                                       INC01640
      CALL SLU(NV,SAWTI,SAFCI,WTGUID,FC,ILO,IHI)                        INC01650
      GO TO 2418                                                        INC01660
C     J BAND PASSIVE - SEMIACTIVE                                       INC01670
 2408 CONTINUE                                                          INC01680
      CALL SLU(NV,SAWTJ,SAFCJ,WTGUID,FC,ILO,IHI)                        INC01690
 2418 CONTINUE                                                          INC01700
      KSTAB=KSASTB                                                      INC01710
      KAGATE = KSAAGT                                                   INC01720
      NCHAN = NSACHN                                                    INC01730
      KSGATE = KSASGT                                                   INC01740
      GO TO 2498                                                        INC01750
 2428 CONTINUE                                                          INC01760
      IF ( KGTYPE .GT. 22 ) GO TO 2458                                  INC01770
      IF ( KGTYPE .NE. 21 ) GO TO 2438                                  INC01780
C     I BAND ACTIVE                                                     INC01790
      CALL SLU(NV,AWTI,APPEKI,WTGUID,PPEAK,ILO,IHI)                     INC01800
      FC=AFCI                                                           INC01810
      GO TO 2448                                                        INC01820
 2438 CONTINUE                                                          INC01830
C     J BAND ACTIVE                                                     INC01840
      CALL SLU(NV,AWTJ,APPEKJ,WTGUID,PPEAK,ILO,IHI)                     INC01850
      FC=AFCJ                                                           INC01860
 2448 CONTINUE                                                          INC01870
      KSTAB=KASTB                                                       INC01880
      KAGATE = KAAGT                                                    INC01890
      NCHAN = NACHN                                                     INC01900
      KSGATE = KASGT                                                    INC01910
      GO TO 2498                                                        INC01920
 2458 CONTINUE                                                          INC01930
      IF ( KGTYPE .GT. 31 ) GO TO 2498                                  INC01940
C     IR SYSTEM                                                         INC01950
      CALL SLU(NV,GIRWT,GIRBSP,WTGUID,BSP ,ILO,IHI)                     INC01960
      CALL SLU(NV,GIRWT,GIRNDT,WTGUID,NDET,ILO,IHI)                     INC01970
      CALL SLU(NV,GIRWT,GIRFC ,WTGUID,FC  ,ILO,IHI)                     INC01980
 2498 CONTINUE                                                          INC01990
      IGTYPE = 1                                                        INC02000
      IF ( (KGTYPE.GT.12) .AND. (KGTYPE.LT.31) ) IGTYPE = 2             INC02010
      IF(KGTYPE.GE.31) IGTYPE=4                                         INC02020
      IF(INPRIN.GT.0) WRITE(N6,NAMCST)                                  INC02030
   10 CONTINUE                                                          INC02040
      RETURN                                                            INC02050
      END                                                               INC02060
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      SUBROUTINE COST(ICNO)                                              COST0010
      COMMON /COSTSC/ CTOT,CPTOT,CRTOT,COMPC(17)                         COST0020
      COMMON /CONLY/ KIND,DIAFRT,SOMMOR(8)                               COST0030
      COMMON /SCRNNL/ SCR351(351), IDU4M4(4)                             COST0040
      EQUIVALENCE ( IDU4M4(3), ICOST )                                   COST0050
      COMMON /QACOST/ QMAXQ, VMAXQ, DUMQA(8)                             COST0060
      COMMON /BASVAR/ DBAS8(8), TAREA, DBAS11(11)                        COST0070
      REAL NOZWT,MP                                                      COST0080
      COMMON /COMVLS/ WTANK,VEXIN,VREQ,GGW,HPPUMP,WTFUEL,WCOMM,VCOMI,    COST0090
     1 R5,Y1,WNOZ,KFM,MATTK,A,DCOM,WMC,VBI,DTHRT,RNOZI,NCZWT,MP,CASEM,   COST0100
     2 FNET,WT,WF,FMAX,S,T4,MFTTJ,ZXNB,D,WM,FC,PPEAK,BSP,NDET,QA,WCS,    COST0110
     3 WWH,WTC,WTP,WGG,WSC,WLV,VGT,WO,WP,DP,WN,METAL,NCONFG              COST0120
      COMMON /COSTIN/   PRIA1,PRIA2,PRJC,PRIA3,PRIB3,PRIA4,PRIE4,PRIA5,  COST0130
     1PRIA6,PRIA7,PRIA8,PRIB8,PRIA9,PRIG9,PRIA10,PRIA11,PRIG11,PRIA12,   COST0140
     2PRIB12,PRIE12,PRIA13,PRIE13,PRIA14,PRIE14,PRIA15,PRIE15,PRIA16,    COST0150
     3PRIE16,PRIA17,PRIF17,PRIA18,PRIB18,PRIE18,PRIA19,PRIE19,PRIA20,    COST0160
     4PRIA21,PRIA22,PRIB22,PRIA23,PRIB23,PRIC23,PRIA24,PRIC24,PRIA25,    COST0170
     5PRIB25,PRIA26,PRIB26,PRIC26,PRNA1,PRNA2,PRNA3,PRNB3,PRNA4,PRNE4,   COST0180
     6PRNA5,PRNA6,PRNA7,PRNA8,PRNB8,PRNA9,PRNG9,PRNA10,PRNA11,PRNG11,    COST0190
     7PRNA12,PRNB12,PRNE12,PRNA13,PRNE13,PRNA14,PRNE14,PRNA15,PRNA16,    COST0200
     8PRNA17,PRNA18,PRNB18,PRNA19,PRNB19,PRNC19,PRNA20,PRNC20,PRNA21,    COST0210
     9PRNB21,PRNA22,PRNB22,PRNC22,PLPC,PLA1,PLA3,PLB3,PLA4,PLA6,PLA8,    COST0220
     APLB8,PLA9,PLA11,PLB11,PLA13,PLB13,PLC13,PLD13,PLA14,PLD14,PLA15,   COST0230
     BPLB15,PLE15,PLF15,PLA16,PLE16,PLA17,PLA18,PLB18,PLC18,PLA19,PLA20,COST0240
     CPLB20,PLA21,PLB21,PLC21,PTA1,PTD1,PTA4,PTB4,PTA5,PTB5,PTE5,PTA6,   COST0250
     DPTE6,PTA7,PTB7,PTC7,PTJC,PTA8,PTD8,PTA9,PTB9,PTA10,PTB10,PTC10,    COST0260
     EPEA3,PEB3,PEA4,PEE4,PEA5,PEE5,PEA6,PEB6,PEE6,PEA7,PEE7,PEA8,PEA9,  COST0270
     FPEA10,PEB10,PEC10,PEA11,PEB11,PEE11,PEBC,PSPC,PSA3,PSB3,PSA4,PSE4,COST0280
     GPSA5,PSE5,PSA6,PSF6,PSG6,PSA7,PSF7,PSA8,PSA9,PSA10,PSB10,PSC10,    COST0290
     HPSA11,PSB11,PSE11,CFT,PFT,CFCASE,PFCASE,CFC,PFC,CFM,PFM,IYEAR      COST0300
      COMMON /COSTIN/   PRIB1,PRIC1,PRIB2,PRIC2,PRIB4,PRIC4,PRID4,PRIB5,COST0310
     1PRIC5,PRIB9,PRIC9,PRID9,PRIE9,PRIF9,PRIB11,PRIC11,PRID11,PRIF11,   COST0320
     2PRIF11,PRIC12,PRID12,PRIB13,PRIC13,PRID13,PRIB14,PRIC14,PRID14,    COST0330
     3PRIB15,PRIC15,PRID15,PRIB16,PRIC16,PRID16,PRIB17,PRIC17,PRID17,    COST0340
     4PRIF17,PRIC18,PRID18,PRIB19,PRIC19,PRID19,PRIB24,PRNB1,PRNC1,PRNB2COST0350
     5,PRNC2,PRNB4,PRNC4,PRND4,PRNB5,PRNC5,PRNB9,PRNC9,PRND9,PRNE9,PRNF9COST0360
     6,PRNB11,PRNC11,PRND11,PRNE11,PRNF11,PRNC12,PRND12,PRNB13,PRNC13,   COST0370
     7PRND13,PRNB14,PRNC14,PRND14,PRNB15,PRNC15,PRND15,PRNB16,PRNC16,    COST0380
     8PRND16,PRNB17,PRNC17,PRND17,PRNE17,PRNB20,PLB1,PLC1,PLA2,PLB2,PLB4COST0390
     9,PLC4,PLA5,PLB5,PLB6,PLC6,PLA7,PLB7,PLB9,PLC9,PLA10,PLB10,PLA12,   COST0400
     APLB12,PLB14,PLC14,PLC15,PLD15,PLB16,PLC16,PLD16,PLB19,PLC19,PTB1,  COST0410
     BPTC1,PTA2,PTB2,PTA3,PTB3,PTC5,PTD5,PTB6,PTC6,PTD6,PTB8,PTC8,PEA1,  COST0420
     CPEB1,PEC1,PEA2,PEB2,PEC2,PEB4,PEC4,PED4,PEB5,PEC5,PED5,PEE5,PEC6,  COST0430
     DPED6,PEB7,PEC7,PED7,PEC11,PED11,PSA1,PSB1,PSC1,PSA2,PSB2,PSC2,PSB4COST0440
     E,PSC4,PSD4,PSB5,PSC5,PSD5,PSE5,PSB6,PSC6,PSD6,PSE6,PSB7,PSC7,PSD7,COST0450
     FPSE7,PSC11,PSD11,PRND22,PLD21,PLE21,PTD10,PTE10,PRID26             COST0460
      COMMON /COSTIN/   PROFIT,QD,R,AFA1,AFB1,AFC1,AFD1,AFI1,AFA2,AFB2,  COST0470
     1AFG2,AFA3,AFB3,AFG3,AFA4,AFB4,AFC4,AFD4,AFJ4,AFA5,AFB5,AFC5,AFH5,  COST0480
     2AFA6,AFB6,AFG6,AFA7,AFC7,AFD7,AFA8,AFB8,AFC8,AFD8,AFI8,AFA9,AFB9,  COST0490
     3AFC9,AFD9,AFJ9,AFA10,AFB10,AFC10,AFH10,AFA11,AFB11,AFG11,AFA12,    COST0500
     4AFC12,AFD12,AFA13,AFB13,AFC13,AFA14,AFB14,AFC14,KFUZE,WA1,WE1,WF1,COST0510
     5WA2,WD2,WE2,KGAIN,CA1,CE1,CF1,CA2,CE2,CF2,CA3,CE3,CF3,GA1,GB1,GF1,COST0520
     6KLE6,KGT6,KSTAB,KAGATE,NCHAN,KSGATE,GA2,GB2,GK2,GA3,GB3,GQ3,GA4,   COST0530
     7GB4,GM4,GA5,GB5,GH5,KG,KC,KW,KA,KP,IGTYPE,ICTYPE,IPRCST            COST0540
      COMMON /COSTIN/   AFE1,AFF1,AFG1,AFH1,AFC2,AFD2,AFE2,AFF2,AFC3,    COST0550
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     1AFC3,AFE3,AFF3,AFE4,AFF4,AFG4,AFH4,AFI4,AFD5,AFE5,AFF5,AFG5,AFC6,  COST0560
     2AFD6,AFE6,AFF6,AFB7,AFE8,AFF8,AFG8,AFH8,AFE9,AFF9,AFG9,AFH9,AFI9,  COST0570
     3AFD10,AFE10,AFF10,AFG10,AFC11,AFD11,AFE11,AFF11,AFB12,WB1,WC1,WD1,COST0580
     4WB2,WC2,CB1,CC1,CD1,CB2,CC2,CD2,CB3,CC3,CD3,GC1,GD1,GE1,GC2,GD2,   COST0590
     5GE2,GF2,GG2,GH2,GI2,GJ2,GC3,GD3,GE3,GF3,GG3,GH3,GI3,GJ3,GK3,GL3,   COST0600
     6GM3,GN3,GP3,GC4,GD4,GE4,GF4,GG4,GH4,GI4,GJ4,GK4,GL4,GC5,GD5,GE5,   COST0610
     7GF5,GG5,CFTTAB(11),PFTTAB(11)                                      COST0620
      COMMON /CSTPRV/ CBLC,CBMC,CCASE,CCFU,CCL,CCM,CCOMI,CCOML,CCOMM,     COST0630
     1 CCONT,CCRD,CEBFU,CEBRD,CETJ,CEXIN,CGFU,CGRD,                       COST0640
     2 CGT,CGTOT,CIGN,CIRJFU,      CIRJRD,      CLF,CLFL,CLGG,CLI,CLM,   COST0650
     3              CLRFU,CLRRD,CLRT,CLTC,CLTP,CM,CMGG,CMM,CMTC,CMTP,     COST0660
     4 CMV,CNOZ,CNRJFU,      CNRJRD,      CP,CPAFI,CPENG,CPL,CPLC,       COST0670
     5 CPMFGL,CPMFGM,CPQA,CPR,CPRC,CPS,CPSMGG,CPSN2,CPSRAM,CPSSGG,        COST0680
     6 CPTOOL,CRAFI,CRDEV,CREG,CRENG,CRFTO,CRJC,CRMFGL,CRMFGM,CRQA,       COST0690
     7 CRTOOL,CSA,CSRFU,CSRRD,CSRT,CT,CTAFI,CTC,CTEB,CTIRJ,CTJFU,         COST0700
     8 CTJLF,CTJLFL,CTJRD,CTJT,      CTL,CTM,CTNRJ,CTP,CWH,CWHFU,CWHR,    COST0710
     9 CBOOC,CRPS,CPFU,PROFPR,PRFUAF,PRRAF,CCLB,CCMB,CTCB,CLIB,CNOZB,     COST0720
     A CPRB,CPLB,CIGNB,CSAB,PROFEX                                        COST0730
      DIMENSION DUMMY(1)                                                  COST0740
      EQUIVALENCE (CBLC,DUMMY(1))                                         COST0750
      DIMENSION COMV(51), ICOMV(51)                                       COST0760
      EQUIVALENCE ( COMV(1), WTANK), ( ICOMV(1), WTANK )                  COST0770
      NAMELIST /NCOUT/ COMV,ICOMV,KSTAB,KAGATE,NCHAN,KSGATE,              COST0780
     1  KG,KC,KW,KA,KP,IGTYPE,ICTYPE                                      COST0790
     2   ,KIND,DIAERT,SOMMOR                                             COST0800
     3  ,QMAXQ,VMAXQ,DUMQA,TAREA,QASAV,SSAV                              COST0810
      QASAV = QA                                                          COST0820
      SSAV = S                                                            COST0830
      IF ( QMAXQ .GT. 0.0 ) QA = QMAXQ * TAREA / 144./ 1000.              COST0840
      IF ( VMAXQ .GT. 0.0 ) S = VMAXQ * 3600. / 6076.1155                 COST0850
      IF ( ICOST.NE.0) CALL PAGE                                          COST0860
      IF(ICOST.GT.1) WRITE(6,NCOUT)                                       COST0870
      DO 80 I=1,104                                                       COST0880
80    DUMMY(I)=0.0                                                        COST0890
      WTANX=0.0                                                           COST0900
      IF ((KIND .GE. 20) .AND. (KIND .LT. 30)) WTANX=WT                   COST0910
      IF ((KIND .GE. 40) .AND. (KIND .LT. 50)) WTANX=WTANK                COST0920
      IF (KIND .GE. 50) WTANX=WT                                          COST0930
      AZ=A+WTANX                                                          COST0940
      IF (KG .EQ. 0) CALL GUCOST                                          COST0950
      IF (KC .EQ. 0) CALL CTCOST                                          COST0960
      IF (KW .EQ. 0) CALL WHCOST                                          COST0970
      IF (KA .EQ. 0) CALL AAICST(AZ,DUMMY,1)                              COST0980
      IF (KP .NE. 0) GO TO 50                                             COST0990
      IF (KIND .NE. 10 .AND. KIND .NE. 13) GO TO 10                       COST1000
      CALL PSRCST                                                         COST1010
      IF (KIND .EQ. 13) CALL PEBCST                                       COST1020
      GO TO 50                                                            COST1030
10    IF (KIND .NE. 20 .AND. KIND .NE. 23) GO TO 20                       COST1040
      CALL PLRCST                                                         COST1050
      IF (KIND .EQ. 23) CALL PEBCST                                       COST1060
      GO TO 50                                                            COST1070
20    IF (KIND .NE. 41) GO TO 30                                          COST1080
      CALL PIRCST                                                         COST1090
      GO TO 50                                                            COST1100
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30    IF (KIND .NE. 43 .AND. KIND .NE. 44) GO TO 40                    COST1110
      CALL PNRCST                                                      COST1120
      IF (KIND .EQ. 43) CALL PEBCST                                    COST1130
      GO TO 50                                                         COST1140
40    IF (KIND .NE. 50 .AND. KIND .NE. 53) GO TO 50                    COST1150
      CALL PTJCST                                                      COST1160
      IF (KIND .EQ. 53) CALL PEBCST                                    COST1170
   50 CONTINUE                                                         COST1180
      CPSINT = ( CPFU - PROFPR ) * 0.15 / 1.15                         COST1190
      CPFU = CPFU + CEBFU                                              COST1200
      CPPS = CPPS + CEBPD                                              COST1210
      CPTOT = CPAFI + CPFU + CGFU + CCFU + CWHFU                       COST1220
      CRTOT = CRAFI + CRPS + CGRD + CCRD + CWHR                        COST1230
      CTOT  = CPTOT + CRTOT                                            COST1240
      COMPC( 1)=CPAFI                                                  COST1250
      COMPC( 2)=CPFU                                                   COST1260
      COMPC( 3)=CGFU                                                   COST1270
      COMPC( 4)=CCFU                                                   COST1280
      COMPC( 5)=CWHFU                                                  COST1290
      COMPC( 6)=CRAFI                                                  COST1300
      COMPC( 7)=CPPS                                                   COST1310
      COMPC( 8)=CGRD                                                   COST1320
      COMPC( 9)=CCRD                                                   COST1330
      COMPC(10)=CWHR                                                   COST1340
      NTEN = 10                                                        COST1350
      NKIND = MOD(KIND,NTEN)                                           COST1360
      IF (ICOST .EQ. 0 ) GO TO 9876                                    COST1370
      WRITE(6,5111) NCONFG                                             COST1380
5111  FORMAT( // 8X, 13HCONFIGURATION,   I5  )                         COST1390
      WRITE(6,4210) IYEAR                                              COST1400
4210  FORMAT(///23X23HRELATIVE COST SUMMARY  /                         COST1410
     1     16X22H(COSTS IN THOUSANDS OF , I5, 1X8HDOLLARS) / )         COST1420
      WRITE(6,4212) CRTOT,CRAFI,CRPS,CGRD,CCRD,CWHR                    COST1430
4212  FORMAT(  / 8X25HMISSILE DEVELOPMENT COSTS, F35.2 /               COST1440
     1     19X22HAIRFRAME + INTEGRATION , F14.2 / 19X17HPROPULSION SYSTEMCOST1450
     2     ,F19.2 / 19X15HGUIDANCE SYSTEM,F21.2/ 19X15HCONTROLS SYSTEM,  COST1460
     3      F21.2 / 19X7HWARHEAD,F29.2 )                              COST1470
      WRITE(6,4214) CPTOT,CPAFI,CPFU,CGFU,CCFU,CWHFU                   COST1480
4214  FORMAT(     8X35HMISSILE FIRST UNIT PRODUCTION COSTS , F25.2 /   COST1490
     1  19X22HAIRFRAME + INTEGRATION,F14.2/ 19X17HPROPULSION SYSTEM ,  COST1500
     2  F19.2 / 19X15HGUIDANCE SYSTEM,F21.2/ 19X15HCONTROLS SYSTEM ,   COST1510
     3  F21.2 / 19X7HWARHEAD,F29.2 )                                  COST1520
      WRITE(6,4216) CTOT                                               COST1530
4216  FORMAT(     8X40HTOTAL COST THROUGH FIRST UNIT PRODUCTION , F20.2) COST1540
      IF (ICOST .LE. 0 ) GO TO 9876                                    COST1550
      CALL PAGE                                                        COST1560
      WRITE (6,5111) NCONFG                                            COST1570
      WRITE(6,5210) IYEAR                                              COST1580
5210  FORMAT(     15X37HRELATIVE COST BREAKDOWN - DEVELOPMENT   /      COST1590
     1     16X22H(COSTS IN THOUSANDS OF ,I5, 1X8HDOLLARS)   )         COST1600
      WRITE(6,5212) CRAFI,CRENG,CRDEV,CRFTO,CRTOOL,CRMFGL,CRMFGM,CROA, COST1610
     1     PRRAF                                                       COST1620
5212  FORMAT(      8X22HAIRFRAME + INTEGRATION ,F37.2 /                COST1630
     1  19X11HENGINEERING,F25.2 / 19X11HDEVELOPMENT, F25.2 /           COST1640
     2  19X16HFLIGHT TEST OPS. ,F20.2 / 19X7HTOOLING, F29.2  /         COST1650
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     3  19X10HMFG. LABOR, F26.2 / 19X14HMFG. MATERIALS,F22.2 /                COST1660
     4  19X17HQUALITY ASSURANCE, F19.2 / 19X6HPROFIT, F30.2    )              COST1670
      WRITE(6,5214) CRPS,CGRD,CCRD,CWHR,CRTOT                                COST1680
 5214 FORMAT(     8X17HPROPULSION SYSTEM,F42.2 /                             COST1690
     1   8X15HGUIDANCE SYSTEM ,F44.2 / 8X15HCONTROLS SYSTEM,F44.2 /          COST1700
     2   8X7HWARHEAD,F52.2 / 8X5HTOTAL,F54.2  )                             COST1710
      WRITE(6,3110)IYEAR,CPAFI                                               COST1720
 3110 FORMAT(/   14X,47HRELATIVE COST BREAKDOWN - FIRST UNIT PRODUCTION      COST1730
     1    /  19X,22H(COSTS IN THOUSANDS OF  ,I5, 1X, 8HDOLLARS)  /          COST1740
     2    8X24HAIRFRAME AND INTEGRATION   , F35.2   )                       COST1750
      WRITE(6,3111) CPENG,CPTOOL,CPMFGL,CPMFGM,CPQA,PRFUAF                   COST1760
 3111 FORMAT(  19X11HENGINEERING,F25.2 / 19X7HTOOLING,F29.2 /                COST1770
     1    19X10HMFG. LABOR , F26.2 / 19X14HMFG. MATERIALS , F22.2 /          COST1780
     2    19X17HQUALITY ASSURANCE , F19.2 / 19X6HPROFIT , F30.2  )           COST1790
      WRITE(6,3120) CGFU,CCFU,CWHFU,CPFU                                     COST1800
 3120 FORMAT(   8X15HGUIDANCE SYSTEM , F45.2 /  8X15HCONTROLS SYSTEM ,       COST1810
     1    F45.2 /  8X7HWARHEAD , F53.2 /  8X17HPROPULSION SYSTEM ,F43.2)    COST1820
      IF( NKIND .EQ. 3 ) WRITE(6,3130) CEBFU                                 COST1830
 3130 FORMAT(  13X16HEXTERNAL BOOSTER , F31.2 )                              COST1840
      IF (NKIND.EQ. 3) WRITE (6,3140) CTCB,CLIB,CNOZB,CPRB,CPLB,CIGNB,       COST1850
     1 CSAB,PROFEX                                                           COST1860
 3140 FORMAT(19X4HCASE,F32.2 / 19X10HINSULATION,F26.2 /                      COST1870
     1    19X6HNOZZLE,F30.2 / 19X10HPROPELLANT, F26.2 /                      COST1880
     2   19X13HPROP. LOADING ,F23.2 / 19X7HIGNITER, F29.2 /                  COST1890
     3   19X10HSAFE + ARM, F26.2  / 19X6HPROFIT, F30.2   )                   COST1900
      IF ( KIND .LT. 20 ) WRITE(6,3150)  CSRFU                               COST1910
 3150 FORMAT(     13X22HSOLID ROCKET SUSTAINER , F25.2   )                   COST1920
      IF ( KIND .LT. 20 ) WRITE(6,3140)CCASE,CLI,CNOZ,CPRC,                  COST1930
     1    CPLC,CIGN,CSA,PROFPR                                               COST1940
      IF( (KIND.LT.30).AND.(KIND.GE.20) ) WRITE(6,3160) CLRFU,CTC,CTP,       COST1950
     1    CM,CPS,CT,CP,CPL,CSA,PROFPR                                        COST1960
 3160 FORMAT(     13X23HLIQUID ROCKET SUSTAINER ,F24.2 /                     COST1970
     1  19X14HTHRUST CHAMBER ,F22.2  / 19X9HTURBOPUMP , F27.2 /              COST1980
     2  19X15HMISC. EQUIPMENT , F21.2 / 19X21HPRESSURIZATION SYSTEM  ,       COST1990
     3  F15.2 / 19X7HTANKAGE , F29.2 / 19X7HFUEL/OX , F29.2 /                COST2000
     4  19X13HPROP. LOADING , F23.2  /  19X10HSAFE + ARM , F26.2 /           COST2010
     5  19X6HPROFIT , F30.2   )                                             COST2020
      IF( KIND .GE. 50 ) WRITE(6,3170) CTJFU,CETJ,CT,CTJLF,CTJLFL,PROFPR     COST2030
 3170 FORMAT(    13X18HTURBOJET SUSTAINER , F29.2 / 19X6HENGINE, F30.2/      COST2040
     1    19X7HTANKAGE ,F29.2 / 19X4HFUEL, F32.2 / 19X13HFUEL LOADING ,      COST2050
     2    F23.2 /  19X6HPROFIT, F30.2  )                                     COST2060
      IPOUT=0                                                                COST2070
      IF( (KIND.GE.40) .AND. (KIND.LT.50) ) IPOUT=1                          COST2080
      IF(KIND.EQ.41) IPOUT=IPOUT + 1                                         COST2090
      IF(IPOUT.EQ.1) WRITE(6,3210) CNRJFU                                    COST2100
 3210 FORMAT(     13X25HNON-INT. RAMJET SUSTAINER   , F22.2 )                COST2110
      IF(IPOUT.EQ.2) WRITE(6,3230) CIRJFU                                    COST2120
 3230 FORMAT(     13X25HINTEGRAL RAMJET SUSTAINER, F22.2 )                   COST2130
      IF( IPOUT.GT.0)WRITE(6,3211) CT,CEXIN,CPS,CLF,CLFL                     COST2140
 3211 FORMAT(19X7HTANKAGE ,F29.2 / 19X15HEXT. INSULATION, F21.2 /            COST2150
     1    19X21HPRESSURIZATION SYSTEM  ,F15.2 / 19X4HFUEL, F32.2 /           COST2160
     2    19X12HFUEL LOADING , F24.2  )                                      COST2170
      IF(IPOUT.EQ.1)WRITE(6,3220) CRJC,CCOML,CCOMM,CCOMI,CNCZ,PROFPR         COST2180
 3220 FORMAT( 19X9HCOMBUSTOR,F27.2 / 22X5HLABOR,F16.2 /                      COST2190
     1    22X8HMATERIAL,F13.2/ 22X10HINSULATION,F11.2 /                      COST2200
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     2    22X6HNOZZLE,F15.2  / 19X6HPROFIT,F30.2  )                          COST2210
      IF(IPOUT.EQ.2) WRITE(6,3240) CBOOC,CBLC,CBMC,CLI,CNCZ,CPRC,            COST2220
     1       CPLC,CIGN,CSA,PROFPR                                            COST2230
 3240 FORMAT(19X17HBOOSTER/COMBUSTOR,F19.2 / 22X10HCASE LABOR,F11.2 /        COST2240
     1    22X10HCASE MATL.,F11.2 / 22X10HCASE INSUL,F11.2 /                  COST2250
     2    22X6HNOZZLE,F15.2 / 22X9HBOO. PROP,F12.2/ 22X11HB. P. LOAD. ,      COST2260
     3    F10.2 / 22X7HIGNITER,F14.2 / 22X10HSAFE + ARM, F11.2 /             COST2270
     4    19X6HPROFIT, F30.2  )                                              COST2280
      WRITE(6,3366) CPSINT                                                   COST2290
 3366 FORMAT(19X11HINTEGRATION    , F25.2   )                               COST2300
 9876 CONTINUE                                                               COST2310
      QA = QASAV                                                             COST2320
      S = SSAV                                                               COST2330
      RETURN                                                                 COST2340
      END                                                                    COST2350


      SUBROUTINE AAICST(ASUPLD,TEMP8,INDI)                                   AAIC0010
C                                                                            AAIC0020
C          AIRFRAME AND INTEGRATION COST                                     AAIC0030
C                                                                            AAIC0040
      REAL NOZWT,MP                                                          AAIC0050
      COMMON /COMVLS/ WTANK,VEXIN,VREQ,GGW,HPPUMP,WTFUEL,WCOMM,VCOMI,        AAIC0060
     1 R5,Y1,WNOZ,KEM,MATTK,A,DCOM,WMC,VBI,DTHRT,RNOZI,NOZWT,MP,CASEM,       AAIC0070
     2 ENET,WT,WF,FMAX,S,T4,METTJ,ZXNB,D,WM,FC,PPEAK,BSP,NDET,QA,WCS,        AAIC0080
     3 WWH,WTC,WTP,WGG,WSC,WLV,VGT,WC,WP,DP,WN,METAL,NCONFG                  AAIC0090
      COMMON /COSTIN/   PRIA1,PRIA2,PRJC,PRIA3,PRIB3,PRIA4,PRIE4,PRIA5,      AAIC0100
     1PRIA6,PRIA7,PRIA8,PRIB8,PRIA9,PRIG9,PRIA10,PRIA11,PRIG11,PRIA12,       AAIC0110
     2PRIB12,PRIE12,PRIA13,PRIE13,PRIA14,PRIE14,PRIA15,PRIE15,PRIA16,        AAIC0120
     3PRIE16,PRIA17,PRIE17,PRIA18,PRIB18,PRIE18,PRIA19,PRIE19,PRIA20,        AAIC0130
     4PRIA21,PRIA22,PRIB22,PRIA23,PRIB23,PRIC23,PRIA24,PRIC24,PRIA25,        AAIC0140
     5PRIB25,PRIA26,PRIB26,PRIC26,PRNA1,PRNA2,PRNA3,PRNB3,PRNA4,PRNE4,       AAIC0150
     6PRNA5,PRNA6,PRNA7,PRNA8,PRNB8,PRNA9,PRNG9,PRNA10,PRNA11,PRNG11,        AAIC0160
     7PRNA12,PRNB12,PRNE12,PRNA13,PRNE13,PRNA14,PRNE14,PRNA15,PRNA16,        AAIC0170
     8PRNA17,PRNA18,PRNB18,PRNA19,PRNB19,PRNC19,PRNA20,PRNC20,PRNA21,        AAIC0180
     9PRNB21,PRNA22,PRNB22,PRNC22,PLPC,PLA1,PLA3,PLB3,PLA4,PLA6,PLA8,        AAIC0190
     APLB8,PLA9,PLA11,PLB11,PLA13,PLB13,PLC13,PLD13,PLA14,PLD14,PLA15,       AAIC0200
     BPLB15,PLE15,PLF15,PLA16,PLE16,PLA17,PLA18,PLB18,PLC18,PLA19,PLA20,     AAIC0210
     CPLB20,PLA21,PLB21,PLC21,PTA1,PTD1,PTA4,PTB4,PTA5,PTB5,PTE5,PTA6,       AAIC0220
     DPTE6,PTA7,PTB7,PTC7,PTJC,PTA8,PTD8,PTA9,PTB9,PTA10,PTB10,PTC10,        AAIC0230
     EPEA3,PEB3,PEA4,PEE4,PEA5,PEF5,PEA6,PEB6,PEE6,PEA7,PEE7,PEA8,PEA9,      AAIC0240
     FPEA10,PEB10,PEC10,PEA11,PEB11,PEE11,PEBC,PSPC,PSA3,PSB3,PSA4,PSE4,     AAIC0250
     GPSA5,PSF5,PSA6,PSF6,PSG6,PSA7,PSF7,PSA8,PSA9,PSA10,PSB10,PSC10,        AAIC0260
     HPSA11,PSB11,PSE11,CFT,PFT,CFCASE,PFCASE,CFC,PFC,CFM,PFM,IYEAR          AAIC0270
      COMMON /COSTIN/   PRIB1,PRIC1,PRIB2,PRIC2,PRIB4,PRIC4,PRID4,PRIB5,     AAIC0280
     1PRIC5,PRIB9,PRIC9,PRID9,PRIE9,PRIF9,PRIB11,PRIC11,PRID11,PRIF11,       AAIC0290
     2PRIF11,PRIC12,PRID12,PRIB13,PRIC13,PRID13,PRIB14,PRIC14,PRID14,        AAIC0300
     3PRIB15,PRIC15,PRID15,PRIB16,PRIC16,PRID16,PRIB17,PRIC17,PRID17,        AAIC0310
     4PRIE17,PRIC18,PRID18,PRIB19,PRIC19,PRID19,PRIB24,PRNB1,PRNC1,PRNP2     AAIC0320
     5,PRNC2,PRNB4,PRNC4,PRND4,PRNB5,PRNC5,PRNB9,PRNC9,PRND9,PRNE9,PRNF9     AAIC0330
     6,PRNB11,PRNC11,PRND11,PRNE11,PRNF11,PRNC12,PRND12,PRNB13,PRNC13,       AAIC0340
     7PRND13,PRNB14,PRNC14,PRND14,PRNB15,PRNC15,PRND15,PRNB16,PRNC16,        AAIC0350
     8PRND16,PRNB17,PRNC17,PRND17,PRNE17,PRNB20,PLB1,PLC1,PLA2,PLB2,PLB4     AAIC0360
     9,PLC4,PLA5,PLB5,PLB6,PLC6,PLA7,PLB7,PLB9,PLC9,PLA10,PLB10,PLA12,       AAIC0370
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     APLB12,PLB14,PLC14,PLC15,PLD15,PLB16,PLC16,PLD16,PLB19,PLC19,PTB1,  AAIC0380
     BPTC1,PTA2,PTB2,PTA3,PTB3,PTC5,PTD5,PTB6,PTC6,PTD6,PTB8,PTC8,PEA1,  AAIC0390
     CPEB1,PEC1,PEA2,PEB2,PEC2,PEB4,PEC4,PED4,PEB5,PEC5,PEC5,PEE5,PEC6,  AAIC0400
     DPED6,PEB7,PEC7,PED7,PEC11,PED11,PSA1,PSB1,PSC1,PSA2,PSB2,PSC2,PSP4AAIC0410
     E,PSC4,PSD4,PSB5,PSC5,PSD5,PSE5,PSB6,PSC6,PSD6,PSE6,PSB7,PSC7,PSD7,AAIC0420
     FPSE7,PSC11,PSD11,PRND22,PLD21,PLE21,PTD10,PTE10,PRID26              AAIC0430
      COMMON /COSTIN/    PROFIT,QD,R,AFA1,AFB1,AFC1,AFD1,AFI1,AFA2,AFB2,  AAIC0440
     1AFG2,AFA3,AFB3,AFG3,AFA4,AFB4,AFC4,AFD4,AFJ4,AFA5,AFB5,AFC5,AFH5,  AAIC0450
     2AFA6,AFB6,AFG6,AFA7,AFC7,AFD7,AFA8,AFB8,AFC8,AFD8,AFI8,AFA9,AFB9,  AAIC0460
     3AFC9,AFD9,AFJ9,AFA10,AFB10,AFC10,AFH10,AFA11,AFB11,AFG11,AFA12,    AAIC0470
     4AFC12,AFD12,AFA13,AFB13,AFC13,AFA14,AFB14,AFC14,KFUZE,WA1,WF1,WF1,AAIC0480
     5WA2,WD2,WF2,KGAIN,CA1,CE1,CF1,CA2,CE2,CF2,CA3,CE3,CF3,GA1,GB1,GF1,AAIC0490
     6KLF6,KGT6,KSTAB,KAGATE,NCHAN,KSGATE,GA2,GB2,GK2,GA3,GB3,GQ3,GA4,   AAIC0500
     7GB4,GM4,GA5,GB5,GH5,KG,KC,KW,KA,KP,IGTYPE,ICTYPE,IPRCST             AAIC0510
      COMMON /COSTIN/    AFE1,AFF1,AFG1,AFH1,AFC2,AFD2,AFE2,AFF2,AFC3,    AAIC0520
     1AFD3,AFE3,AFF3,AFE4,AFF4,AFG4,AFH4,AFI4,AFD5,AFE5,AFF5,AFG5,AFC6,  AAIC0530
     2AFD6,AFE6,AFF6,AFB7,AFE8,AFF8,AFG8,AFH8,AFE9,AFF9,AFG9,AFH9,AFI9,  AAIC0540
     3AFD10,AFE10,AFF10,AFG10,AFC11,AFD11,AFE11,AFF11,AFB12,WB1,WC1,WD1,AAIC0550
     4WB2,WC2,CB1,CC1,CD1,CB2,CC2,CD2,CB3,CC3,CD3,GC1,GD1,GE1,GC2,GD2,   AAIC0560
     5GE2,GF2,GG2,GH2,GI2,GJ2,GC3,GD3,GE3,GF3,GG3,GH3,GI3,GJ3,GK3,GL3,   AAIC0570
     6GM3,GN3,GP3,GC4,GD4,GE4,GF4,GG4,GH4,GI4,GJ4,GK4,GL4,GC5,GD5,GE5,   AAIC0580
     7GF5,GG5,CFTTAB(11),PFTTAB(11)                                       AAIC0590
      COMMON /CSTPRV/ CBLC,CBMC,CCASE,CCFU,CCL,CCM,CCOMI,CCOML,CCOMM,     AAIC0600
     1 CCONT,CCRD,CEBFU,CEBRD,CETJ,CEXIN,CGFU,CGRD,                       AAIC0610
     2 CGT,CGTOT,CIGN,CIRJFU,      CIRJRD,      CLF,CLFL,CLGG,CLI,CLM,   AAIC0620
     3            CLRFU,CLRRD,CLRT,CLTC,CLTP,CM,CMGG,CMM,CMTC,CMTP,       AAIC0630
     4 CMV,CNOZ,CNRJFU,      CNRJRD,      CP,CPAFI,CPENG,CPL,CPLC,        AAIC0640
     5 CPMFGL,CPMFGM,CPQA,CPR,CPRC,CPS,CPSMGG,CPSN2,CPSRAM,CPSSGG,        AAIC0650
     6 CPTOOL,CRAFI,CRDEV,CREG,CRENG,CRFTO,CRJC,CRMFGL,CRMFGM,CRQA,       AAIC0660
     7 CRTOOL,CSA,CSRFU,CSRRD,CSRT,CT,CTAFI,CTC,CTEB,CTIRJ,CTJFU,         AAIC0670
     8 CTJLF,CTJLFL,CTJRD,CTJT,      CTL,CTM,CTNRJ,CTP,CWH,CWHFU,CWHR,    AAIC0680
     9 CBOOC,CRPS,CPFU,PROFPR,PRFUAF,PRRAF,CCLB,CCMB,CTCB,CLIB,CNOZB,     AAIC0690
     A CPRB,CPLB,CIGNB,CSAB,PROFEX                                        AAIC0700
      NAMELIST /ERRPRT/ CRENG,CRDEV,CRFTO,CRTOOL,CRMFGL,CRMFGM,CRQA,      AAIC0710
     1 CRAFI,CPENG,CPTOOL,CPMFGL,CPMFGM,CPQA,CPAFI,CTAFI                  AAIC0720
1     TEMP1=AFA1*AFB1*AFC1*AFD1*(AFE1*ASUPLD**AFF1*S**AFG1*QD**AFH1       AAIC0730
     1 /1000.)+AFI1*AFD1                                                  AAIC0740
2     TEMP2=AFA2*AFB2*1.163*(AFC2*ASUPLD**AFD2*S**AFE2*QD**AFF2/1000.)    AAIC0750
     1 +AFB2*AFG2                                                         AAIC0760
3     TEMP3=AFA3*AFB3*1.163*(AFC3*ASUPLD**AFD3*S**AFE3*QD**AFF3/1000.)    AAIC0770
     1 +AFB3*AFG3                                                         AAIC0780
4     TEMP4=AFA4*AFB4*AFC4*AFD4*(AFE4*ASUPLD**AFF4*S**AFG4*QD**AFH4*R     AAIC0790
     1 **AFI4/1000.)+AFJ4*AFC4                                            AAIC0800
5     TEMP5=AFA5*AFB5*AFC5*(AFD5*ASUPLD**AFE5*S**AFF5*QD**AFG5/1000.)     AAIC0810
     1 +AFC5*AFH5                                                         AAIC0820
6     TEMP6=AFA6*AFB6*1.163*(AFC6*ASUPLD**AFD6*S**AFE6*QD**AFF6/1000.)    AAIC0830
     1 +AFB6*AFG6                                                         AAIC0840
7     TEMP7=AFA7*AFB7*TEMP5+AFC7*AFD7                                      AAIC0850
14    TEMP8=AFA14*(1.+PROFIT)*(TEMP1+TEMP4+TEMP5+TEMP6+TEMP7+TEMP2         AAIC0860
     1 +TEMP3)+AFB14*AFC14                                                AAIC0870
      IF (INDI .EQ. 0) RETURN                                             AAIC0880
      CRENG=TEMP1                                                         AAIC0890
      CRDEV=TEMP2                                                         AAIC0900
      CRFTO=TEMP3                                                         AAIC0910
      CRTOOL=TEMP4                                                        AAIC0920
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      CPMFGL=TEMP5                                                      AAIC0930
      CPMFGM=TEMP6                                                      AAIC0940
      CPQA=TEMP7                                                        AAIC0950
      CPAFI=TEMP8                                                       AAIC0960
      PPRAF=(CRAFI-AFB14*AFC14)*PROFIT/(1.+PROFIT)                      AAIC0970
    8 CPENG=AFA8*AFB8*AFC8*AFD8*(AFE8*A**AFF8*S**AFG8*((QD+1.)**AFH8    AAIC0980
     1 -QD**AFH8)/1000.)+AFI8*AFD8                                      AAIC0990
    9 CPTOOL=AFA9*AFB9*AFC9*AFD9*(AFE9*A**AFF9*S**AFG9*((QD+1.)**AFH9   AAIC1000
     1 -QD**AFH9)*R**AFI9/1000.)+AFJ9*AFC9                              AAIC1010
   10 CPMFGL=AFA10*AFB10*AFC10*(AFD10*A**AFE10*S**AFF10*((QD+1.)**AFG10 AAIC1020
     1 -QD**AFG10)/1000.)+AFC10*AFH10                                   AAIC1030
   11 CPMFGM=AFA11*AFB11*1.163*(AFC11*A**AFD11*S**AFE11*((QD+1.)**AFF11 AAIC1040
     1 -QD**AFF11)/1000.)+AFB11*AFG11                                   AAIC1050
   12 CPQA=AFA12*AFB12*CPMFGL+AFC12*AFD12                               AAIC1060
   13 CPAFI=AFA13*(1.+PROFIT)*(CPENG+CPTOOL+CPMFGL+CPMFGM+CPQA)         AAIC1070
     1 +AFB13*AFC13                                                     AAIC1080
      PPFUAF=(CPAFI-AFB13*AFC13)*PROFIT/(1.+PROFIT)                     AAIC1090
   15 CTAFI=CPAFI+CRAFI                                                 AAIC1100
      IF (IPPCST .NE. 0) WRITE (6,ERRPRT)                               AAIC1110
      RETURN                                                            AAIC1120
      END                                                               AAIC1130


      SUBROUTINE GUCOST                                                 GUC00010
C                                                                       GUC00020
C          GUIDANCE SYSTEM COST                                         GUC00030
C                                                                       GUC00040
      REAL NOZWT,MP                                                     GUC00050
      COMMON /COMVLS/ WTANK,VEXIN,VREQ,GGW,HPPUMP,WTFUEL,WCCMM,VCCMI,   GUC00060
     1 RS,Y1,WNOZ,KFM,MATTK,A,DCOM,WMC,VBI,DTHRT,RNOZI,NCZWT,MP,CASEM,  GUC00070
     2 FNET,WT,WF,FMAX,S,T4,METTJ,ZXNB,D,WM,FC,PPEAK,BSP,NDET,QA,WCS,   GUC00080
     3 WWH,WTC,WTP,WGG,WSC,WLV,VGT,WO,WP,DP,WN,METAL,NCONFG             GUC00090
      COMMON /COSTIN/   PRIA1,PRIA2,PRJC,PRIA3,PRIB3,PRIA4,PRIE4,PRIA5, GUC00100
     1PRIA6,PRIA7,PRIA8,PRIB8,PRIA9,PRIG9,PRIA10,PRIA11,PRIG11,PRIA12,  GUC00110
     2PRIB12,PRIE12,PRIA13,PRIE13,PRIA14,PRIE14,PRIA15,PRIE15,PRIA16,   GUC00120
     3PRIF16,PRIA17,PRIF17,PRIA18,PRIB18,PRIE18,PRIA19,PRIE19,PRIA20,   GUC00130
     4PRIA21,PRIA22,PRIB22,PRIA23,PRIB23,PRIC23,PRIA24,PRIC24,PRIA25,   GUC00140
     5PRIB25,PRIA26,PRIB26,PRIC26,PRNA1,PRNA2,PRNA3,PRNB3,PRNA4,PRNE4,  GUC00150
     6PRNA5,PRNA6,PRNA7,PRNA8,PRNB8,PRNA9,PRNG9,PRNA10,PRNA11,PRNG11,   GUC00160
     7PRNA12,PRNB12,PRNE12,PRNA13,PRNE13,PRNA14,PRNE14,PRNA15,PRNA16,   GUC00170
     8PRNA17,PRNA18,PRNB18,PRNA19,PRNB19,PRNC19,PRNA20,PRNC20,PRNA21,   GUC00180
     9PRNB21,PRNA22,PRNB22,PRNC22,PLPC,PLA1,PLA3,PLB3,PLA4,PLA6,PLA8,   GUC00190
     APLB8,PLA9,PLA11,PLB11,PLA13,PLB13,PLC13,PLD13,PLA14,PLD14,PLA15,  GUC00200
     BPLB15,PLE15,PLF15,PLA16,PLE16,PLA17,PLA18,PLB18,PLC18,PLA19,PLA20,GUC00210
     CPLB20,PLA21,PLB21,PLC21,PTA1,PTD1,PTA4,PTB4,PTA5,PTB5,PTE5,PTA6,  GUC00220
     DPTE6,PTA7,PTB7,PTC7,PTJC,PTA8,PTD8,PTA9,PTB9,PTA10,PTB10,PTC10,   GUC00230
     EPEA3,PEB3,PEA4,PEE4,PEA5,PEE5,PEA6,PEB6,PEE6,PEA7,PEE7,PEA8,PEA9, GUC00240
     FPEA10,PEB10,PEC10,PEA11,PEB11,PEE11,PEBC,PSPC,PSA3,PSB3,PSA4,PSE4,GUC00250
     GPSA5,PSE5,PSA6,PSE6,PSG6,PSA7,PSE7,PSA8,PSA9,PSA10,PSB10,PSC10,   GUC00260
     HPSA11,PSB11,PSE11,CFT,PFT,CFCASE,PFCASE,CFC,PFC,CFM,PFM,IYEAR     GUC00270
      COMMON /COSTIN/   PRIB1,PRIC1,PRIB2,PRIC2,PRIB4,PRIC4,PRID4,PRIB5,GUC00280
     1PRIC5,PRIB9,PRIC9,PRID9,PRIE9,PRIF9,PRIB11,PRIC11,PRID11,PRIE11,  GUC00290
     2PRIF11,PRIC12,PRID12,PRIB13,PRIC13,PRID13,PRIB14,PRIC14,PRID14,   GUC00300
     3PRIB15,PRIC15,PRID15,PRIB16,PRIC16,PRID16,PRIB17,PRIC17,PRID17,   GUC00310
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     4PRIE17,PRIC18,PRID18,PRIB19,PRIC19,PRID19,PRIB24,PRNB1,PRNC1,PRNB2GUC00320
     5,PRNC2,PRNB4,PRNC4,PRND4,PRNB5,PRNC5,PRNB9,PRNC9,PRND9,PRNE9,PRNF9GUC00330
     6,PRNB11,PRNC11,PRND11,PRNE11,PRNF11,PRNC12,PRND12,PRNB13,PRNC13,  GUC00340
     7PRND13,PRNB14,PRNC14,PRND14,PRNB15,PRNC15,PRND15,PRNB16,PRNC16,   GUC00350
     8PRND16,PRNB17,PRNC17,PRND17,PRNE17,PRNB20,PLB1,PLC1,PLA2,PLB2,PLB4GUC00360
     9,PLC4,PLA5,PLB5,PLB6,PLC6,PLA7,PLB7,PLB9,PLC9,PLA10,PLB10,PLA12,  GUC00370
     APLB12,PLB14,PLC14,PLC15,PLD15,PLB16,PLC16,PLD16,PLB19,PLC19,PTB1,  GUC00380
     BPTC1,PTA2,PTB2,PTA3,PTB3,PTC5,PTD5,PTB6,PTC6,PTD6,PTB8,PTC8,PEA1,  GUC00390
     CPEB1,PEC1,PEA2,PEB2,PEC2,PEB4,PEC4,PED4,PEB5,PEC5,PED5,PEE5,PEC6,  GUC00400
     DPED6,PEB7,PEC7,PED7,PEC11,PED11,PSA1,PSB1,PSC1,PSA2,PSB2,PSC2,PSB4GUC00410
     E,PSC4,PSD4,PSB5,PSC5,PSD5,PSE5,PSB6,PSC6,PSD6,PSE6,PSB7,PSC7,PSD7,GUC00420
     FPSE7,PSC11,PSD11,PRND22,PLD21,PLE21,PTD10,PTE10,PRID26             GUC00430
      COMMON /COSTIN/   PROFIT,QD,R,AFA1,AFB1,AFC1,AFD1,AFI1,AFA2,AFB2,  GUC00440
     1AFG2,AFA3,AFB3,AFG3,AFA4,AFB4,AFC4,AFD4,AFJ4,AFA5,AFB5,AFC5,AFH5,  GUC00450
     2AFA6,AFB6,AFG6,AFA7,AFC7,AFD7,AFA8,AFB8,AFC8,AFD8,AFI8,AFA9,AFB9,  GUC00460
     3AFC9,AFD9,AFJ9,AFA10,AFB10,AFC10,AFH10,AFA11,AFB11,AFG11,AFA12,    GUC00470
     4AFC12,AFD12,AFA13,AFB13,AFC13,AFA14,AFB14,AFC14,KFUZE,WA1,WE1,WF1,GUC00480
     5WA2,WC2,WE2,KGAIN,CA1,CE1,CF1,CA2,CE2,CF2,CA3,CE3,CF3,GA1,GB1,GF1,GUC00490
     6KLE6,KGT6,KSTAB,KAGATE,NCHAN,KSGATE,GA2,GB2,GK2,GA3,GB3,GQ3,GA4,   GUC00500
     7GB4,GM4,GA5,GB5,GH5,KG,KC,KW,KA,KP,IGTYPE,ICTYPE,IPRCST            GUC00510
      COMMON /COSTIN/   AFE1,AFF1,AFG1,AFH1,AFC2,AFD2,AFE2,AFF2,AFC3,    GUC00520
     1AFD3,AFE3,AFF3,AFE4,AFF4,AFG4,AFH4,AFI4,AFD5,AFE5,AFF5,AFG5,AFC6,  GUC00530
     2AFD6,AFE6,AFF6,AFB7,AFE8,AFF8,AFG8,AFH8,AFE9,AFF9,AFG9,AFH9,AFI9,  GUC00540
     3AFD10,AFF10,AFF10,AFG10,AFC11,AFD11,AFE11,AFF11,AFB12,WB1,WC1,WD1,GUC00550
     4WB2,WC2,CB1,CC1,CD1,CB2,CC2,CD2,CB3,CC3,CD3,GC1,GD1,GE1,GC2,GD2,   GUC00560
     5CE2,CF2,GG2,GH2,GI2,GJ2,GC3,GD3,GE3,GF3,GG3,GH3,GI3,GJ3,GK3,GL3,   GUC00570
     6GM3,GN3,GP3,GC4,GD4,GE4,GF4,GG4,GH4,GI4,GJ4,GK4,GL4,GC5,GD5,GE5,   GUC00580
     7CF5,GG5,CFTTAB(11),PFTTAB(11)                                      GUC00590
      COMMON /CSTPRV/ CBLC,CBMC,CCASE,CCFU,CCL,CCM,CCOMI,CCOML,CCOMM,    GUC00600
     1 CCONT,CCRD,CFBFU,CFBRD,CFTJ,CEXIN,CGFU,CGRD,                      GUC00610
     2 CGT,CGTOT,CIGN,CIRJFU,       CIRJRD,       CLF,CLFL,CLGG,CLI,CLM,  GUC00620
     3              CLRFU,CLRRD,CLRT,CLTC,CLTP,CM,CMGG,CMM,CMTC,CMTP,    GUC00630
     4 CMV,CNOZ,CNRJFU,       CNRJRD,       CP,CPAFI,CPENG,CPL,CPLC,    GUC00640
     5 CPMFGL,CPMFGM,CPQA,CPR,CPRC,CPS,CPSMGG,CPSN2,CPSRAM,CPSSGG,       GUC00650
     6 CPTOOL,CRAFI,CRDEV,CREG,CRENG,CRFTO,CRJC,CRMFGL,CRMFGM,CRQA,      GUC00660
     7 CRTOOL,CSA,CSRFU,CSRRD,CSRT,CT,CTAFI,CTC,CTEB,CTIRJ,CTJFU,        GUC00670
     8 CTJLF,CTJLFL,CTJRD,CTJT,       CTL,CTM,CTNRJ,CTP,CWH,CWHFU,CWHR,  GUC00680
     9 CBOOC,CRPS,CPFU,PROFPR,PRFUAF,PRRAF,CCLB,CCMB,CTCB,CLIB,CNCZB,    GUC00690
     A CPRB,CPLB,CIGNB,CSAB,PROFEX                                       GUC00700
      NAMELIST /ERRPRT/ CGFUP,CGFUA,CGFUX,CGFUI,CGRD,CGTCT               GUC00710
      XNDET=NDET                                                         GUC00720
      XSTAB=KSTAB                                                        GUC00730
      XAGATE=KAGATE                                                      GUC00740
      XCHAN=NCHAN                                                        GUC00750
      XSGATE=KSGATE                                                      GUC00760
      XKLE6=1.                                                           GUC00770
      XKGT6=0.                                                           GUC00780
C          FC IS ASSUMED IN GHZ                                          GUC00790
      IF (FC .LE. 6.) GO TO 1000                                         GUC00800
      XKLE6=0.                                                           GUC00810
      XKGT6=1.                                                           GUC00820
 1000 IF ( IGTYPE .EQ. 3 ) GO TO 1                                       GUC00830
      GO TO (2,3,4,5), IGTYPE                                            GUC00840
C          PASSIVE/SEMI-ACTIVE RADAR SEEKER                              GUC00850
    2 CX=GC2*XKLE6*FC**GD2+GE2*XKGT6*FC**GF2+GG2*XSTAB+GH2*XAGATE+GI2    GUC00860
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     1 *XCHAN*XSGATE+GJ2*XSGATE                                                GUCD0870
       CGFUP=CA2*(1.16*GB2*CX/350.+GK2)                                        GUCD0880
       GO TO 1                                                                 GUCD0890
C          ACTIVE RADAR (MAGNETRON)                                           GUCD0900
  3    CX=GC3*XKLE6*EC**GD3+GF3*XKGT6*EC**GF3+GG3*XSTAB+GH3*XAGATE+GI3         GUCD0910
     1 *XCHAN*XSGATE+GJ3*XSGATE                                                GUCD0920
       CGFUA=GA3*(1.566*GB3/350.*(CX+GK3+GL3*PPEAK**GM3+GN3*EC**GP3            GUCD0930
     1 *PPEAK)+GQ3)                                                          GUCD0940
       GO TO 1                                                                 GUCD0950
C          X BAND                                                             GUCD0960
  4    CX=GC4*XKLE6*EC**GD4+GF4*XKGT6*EC**GF4+GG4*XSTAB+GH4*XAGATE+GI4         GUCD0970
     1 *XCHAN*XSGATE+GJ4*XSGATE                                                GUCD0980
       CGFUX=GA4*(1.566*GB4/156.*(CX+GK4+GL4*PPEAK)+GM4)                       GUCD0990
       GO TO 1                                                                 GUCD1000
C          PASSIVE IR SEEKER                                                  GUCD1010
  5    CGFUI=GA5*(1.16*GB5/350.*(GC5*EC**GD5*BSP**GE5+GF5*(XDET-1.)            GUCD1020
     1 +GG5)+GH5)                                                            GUCD1030
  1    IF (IGTYPE .EQ. 1) CGFU=CGFUP                                           GUCD1040
       IF (IGTYPE .EQ. 2) CGFU=CGFUA                                           GUCD1050
       IF (IGTYPE .EQ. 3) CGFU=CGFUX                                           GUCD1060
       IF (IGTYPE .EQ. 4) CGFU=CGFUI                                           GUCD1070
       CGRD=GA1*(GB1*(EXP(GC1+GD1*CGFU*GE1))+GF1)                              GUCD1080
  6    CGTOT=CGRD+CGFU                                                         GUCD1090
       IF (IPRCST .NE. 0) WRITE (6,ERRPRT)                                     GUCD1100
       RETURN                                                                  GUCD1110
       END                                                                     GUCD1120


       SUBROUTINE CTCOST                                                       CTC00010
C                                                                              CTC00020
C          CONTROLS COST                                                       CTC00030
C                                                                              CTC00040
       REAL NOZWT,MP                                                           CTC00050
       COMMON /COMVLS/ WTANK,VEXIN,VREQ,GGW,HPPUMP,WTFUEL,WCOMM,VCOMI,         CTC00060
     1 R5,Y1,WNOZ,KFM,MATTK,A,DCOM,WMC,VBI,DTHRT,RNOZI,NC7WT,MP,CASEM,         CTC00070
     2 FNET,WT,WF,FMAX,S,T4,METTJ,ZXNB,D,WM,FC,PPEAK,BSP,NDET,QA,WCS,          CTC00080
     3 WWH,WTC,WTP,WGG,WSC,WLV,VGT,WO,WP,DP,WN,METAL,NCONFG                    CTC00090
       COMMON /COSTIN/   PRIA1,PRIA2,PRJC,PRIA3,PRIB3,PRIA4,PRIE4,PRIA5,      CTC00100
     1PRIA6,PRIA7,PRIA8,PRIB8,PRIA9,PRIG9,PRIA10,PRIA11,PRIG11,PRIA12,         CTC00110
     2PRIB12,PRIE12,PRIA13,PRIE13,PRIA14,PRIE14,PRIA15,PRIE15,PRIA16,          CTC00120
     3PRIE16,PRIA17,PRIE17,PRIA18,PRIB18,PRIE18,PRIA19,PRIE19,PRIA20,          CTC00130
     4PRIA21,PRIA22,PRIB22,PRIA23,PRIB23,PRIC23,PRIA24,PRIC24,PRIA25,          CTC00140
     5PRIB25,PRIA26,PRIB26,PRIC26,PRNA1,PRNA2,PRNA3,PRNB3,PRNA4,PRNE4,         CTC00150
     6PRNA5,PRNA6,PRNA7,PRNA8,PRNB8,PRNA9,PRNG9,PRNA10,PRNA11,PRNG11,          CTC00160
     7PRNA12,PRNB12,PRNE12,PRNA13,PRNE13,PRNA14,PRNE14,PRNA15,PRNA16,          CTC00170
     8PRNA17,PRNA18,PRNB18,PRNA19,PRNB19,PRNC19,PRNA20,PRNC20,PRNA21,          CTC00180
     9PRNB21,PRNA22,PRNB22,PRNC22,PLPC,PLA1,PLA3,PLB3,PLA4,PLA6,PLA8,          CTC00190
     APLB8,PLA9,PLA11,PLB11,PLA13,PLB13,PLC13,PLD13,PLA14,PLD14,PLA15,         CTC00200
     BPLB15,PLE15,PLF15,PLA16,PLE16,PLA17,PLA18,PLB18,PLC18,PLA19,PLA20,       CTC00210
     CPLB20,PLA21,PLB21,PLC21,PTA1,PTD1,PTA4,PTB4,PTA5,PTB5,PTE5,PTA6,         CTC00220
     DPTE6,PTA7,PTB7,PTC7,PTJC,PTA8,PTD8,PTA9,PTB9,PTA10,PTB10,PTC10,          CTC00230
     EPEA3,PEB3,PEA4,PEE4,PEA5,PEF5,PEA6,PEB6,PEE6,PEA7,PEE7,PEA8,PEA9,        CTC00240
     FPEA10,PEB10,PEC10,PEA11,PEB11,PEE11,PEBC,PSPC,PSA3,PSB3,PSA4,PSF4,       CTC00250
     GPSA5,PSF5,PSA6,PSF6,PSG6,PSA7,PSF7,PSA8,PSA9,PSA10,PSB10,PSC10,          CTC00260
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     HPSA11,PSR11,PSE11,CFT,PFT,CFCASE,PFCASE,CFC,PFC,CFM,PFM,IYEAR      CTC00270
      COMMON /COSTIN/   PRIB1,PRIC1,PRIB2,PRIC2,PRIB4,PRIC4,PRID4,PRIB5,CTC00280
     1PRIC5,PRIB9,PRIC9,PRID9,PRIE9,PRIF9,PRIB11,PRIC11,PRID11,PRIE11,  CTC00290
     2PRIF11,PRIC12,PRID12,PRIB13,PRIC13,PRID13,PRIB14,PRIC14,PRID14,   CTC00300
     3PRIB15,PRIC15,PRID15,PRIB16,PRIC16,PRID16,PRIB17,PRIC17,PRID17,   CTC00310
     4PRIE17,PRIC18,PRID18,PRIB19,PRIC19,PRID19,PRIB24,PRNB1,PRNC1,PRNB2CTC00320
     5,PRNC2,PRNB4,PRNC4,PRND4,PRNB5,PRNC5,PRNB9,PRNC9,PRND9,PRNE9,PRNF9CTC00330
     6,PRNB11,PRNC11,PRND11,PRNE11,PRNF11,PRNC12,PRND12,PRNB13,PRNC13,  CTC00340
     7PRND13,PRNB14,PRNC14,PRND14,PRNB15,PRNC15,PRND15,PRNB16,PRNC16,   CTC00350
     8PRND16,PRNB17,PRNC17,PRND17,PRNE17,PRNB20,PLB1,PLC1,PLA2,PLB2,PLB4CTC00360
     9,PLC4,PLA5,PLB5,PLB6,PLC6,PLA7,PLB7,PLB9,PLC9,PLA10,PLB10,PLA12,  CTC00370
     APLB12,PLB14,PLC14,PLC15,PLD15,PLB16,PLC16,PLD16,PLB19,PLC19,PTB1,  CTC00380
     BPTC1,PTA2,PTB2,PTA3,PTB3,PTC5,PTD5,PTB6,PTC6,PTD6,PTB8,PTC8,PEA1,  CTC00390
     CPEB1,PEC1,PEA2,PEB2,PEC2,PEB4,PEC4,PED4,PEB5,PEC5,PED5,PEE5,PEC6,  CTC00400
     DPED6,PEB7,PEC7,PED7,PEC11,PED11,PSA1,PSB1,PSC1,PSA2,PSB2,PSC2,PSB4CTC00410
     E,PSC4,PSD4,PSB5,PSC5,PSD5,PSE5,PSB6,PSC6,PSD6,PSE6,PSB7,PSC7,PSC7,CTC00420
     FPSE7,PSC11,PSD11,PRND22,PLD21,PLE21,PTD10,PTE10,PRID26             CTC00430
      COMMON /COSTIN/   PROFIT,QD,R,AFA1,AFB1,AFC1,AFD1,AFI1,AFA2,AFB2,  CTC00440
     1AFG2,AFA3,AFB3,AFG3,AFA4,AFB4,AFC4,AFD4,AFJ4,AFA5,AFB5,AFC5,AFH5,  CTC00450
     2AFA6,AFB6,AFG6,AFA7,AFC7,AFD7,AFA8,AFB8,AFC8,AFD8,AFI8,AFA9,AFB9,  CTC00460
     3AFC9,AFD9,AFJ9,AFA10,AFB10,AFC10,AFH10,AFA11,AFB11,AFG11,AFA12,    CTC00470
     4AFC12,AFD12,AFA13,AFB13,AFC13,AFA14,AFB14,AFC14,KFUZE,WA1,WE1,WF1,CTC00480
     5WA2,WD2,WE2,KGAIN,CA1,CE1,CF1,CA2,CE2,CF2,CA3,CE3,CF3,GA1,GB1,GF1,CTC00490
     6KLE6,KGT6,KSTAB,KAGATE,NCHAN,KSGATE,GA2,GB2,GK2,GA3,GB3,GQ3,GA4,   CTC00500
     7GB4,GM4,GA5,GB5,GH5,KG,KC,KW,KA,KP,IGTYPE,ICTYPE,IPRCST            CTC00510
      COMMON /COSTIN/   AFE1,AFF1,AFG1,AFH1,AFC2,AFD2,AFE2,AFF2,AFC3,    CTC00520
     1AFD3,AFE3,AFF3,AFF4,AFF4,AFG4,AFH4,AFI4,AFD5,AFE5,AFF5,AFG5,AFC6,  CTC00530
     2AFD6,AFE6,AFF6,AFB7,AFE8,AFF8,AFG8,AFH8,AFE9,AFF9,AFG9,AFH9,AFI9,  CTC00540
     3AFD10,AFE10,AFF10,AFG10,AFC11,AFD11,AFE11,AFF11,AFB12,WB1,WC1,WD1,CTC00550
     4WB2,WC2,CB1,CC1,CD1,CB2,CC2,CD2,CB3,CC3,CD3,GC1,GD1,GF1,GC2,GD2,   CTC00560
     5CE2,CF2,GG2,GH2,GI2,GJ2,GC3,GD3,GE3,GF3,GG3,GH3,GI3,GJ3,GK3,GL3,   CTC00570
     6GM3,GN3,GP3,GC4,GD4,GE4,GF4,GG4,GH4,GI4,GJ4,GK4,GL4,GC5,GD5,GF5,   CTC00580
     7GF5,GG5,CFTTAB(11),PFTTAB(11)                                      CTC00590
      COMMON /CSTPRV/ CBLC,CBMC,CCASE,CCFU,CCL,CCM,CCOMI,CCOML,CCOMM,    CTC00600
     1 CCONT,CCRD,CEBFU,CEBRD,CETJ,CEXIN,CGFU,CGRD,                      CTC00610
     2 CGT,CGTOT,CIGN,CIRJFU,       CIRJRD,       CLF,CLFL,CLGG,CLI,CLM,CTC00620
     3              CLRFU,CLRRD,CLRT,CLTC,CLTP,CM,CMGG,CMM,CMTC,CMTP,    CTC00630
     4 CMV,CNOZ,CNRJFU,       CNRJRD,       CP,CPAFI,CPENG,CPL,CPLC,     CTC00640
     5 CPMFGL,CPMFGM,CPQA,CPR,CPRC,CPS,CPSMGG,CPSN2,CPSRAM,CPSSGG,       CTC00650
     6 CPTOOL,CRAFI,CRDEV,CREG,CRENG,CRFTO,CRJC,CRMFGL,CRMFGM,CRQA,      CTC00660
     7 CRTOOL,CSA,CSRFU,CSRRD,CSRT,CT,CTAFI,CTC,CTEB,CTIRJ,CTJFU,        CTC00670
     8 CTJLF,CTJLFL,CTJRD,CTJT,       CTL,CTM,CTNRJ,CTP,CWH,CWHFU,CWHR,  CTC00680
     9 CBODC,CRPS,CPFU,PROFPR,PRFUAF,PRRAF,CCLB,CCMB,CTCB,CLIB,CNOZR,    CTC00690
     A CPRB,CPLB,CIGNB,CSAB,PROFEX                                       CTC00700
      NAMELIST /ERRPRT/ CCFU,CCRD,CCONT                                  CTC00710
      XGAIN=KGAIN                                                        CTC00720
      GO TO (2,3),ICTYPE                                                 CTC00730
C         WITH AUTOPILOT                                                 CTC00740
   2  CCFU=CA2*(1.16*(CB2*WCS+CC2*QA-CD2)*CE2/198.+CF2)                  CTC00750
      GO TO 1                                                            CTC00760
C         WITHOUT AUTOPILOT                                              CTC00770
   3  CCFU=CA3*(1.16*(CB3*WCS+CC3*QA+CD3)*CE3/198.+CF3)                  CTC00780
   1  CCRD=CA1*((CB1+CC1*QA+CD1*XGAIN)*CE1+CF1)                          CTC00790
   4  CCONT=CCRD+CCFU                                                    CTC00800
      IF (IPRCST .NE. 0) WRITE (6,ERRPRT)                                CTC00810
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      RETURN                                                                CTC00820
      END                                                                   CTC00830


      SUBROUTINE WHCOST                                                     WHC00010
C                                                                           WHC00020
C         WARHEAD COST                                                      WHC00030
C                                                                           WHC00040
      REAL NOZWT,MP                                                         WHC00050
      COMMON /COMVLS/ WTANK,VFXIN,VREQ,GGW,HPPUMP,WTFUEL,WCOMM,VCOMI,       WHC00060
     1 R5,Y1,WNOZ,KFM,MATTK,A,DCOM,WMC,VBI,DTHRT,RNOZI,NOZWT,MP,CASEM,      WHC00070
     2 FNET,WT,WF,FMAX,S,T4,METTJ,ZXNB,D,WM,FC,PPEAK,BSP,NDET,QA,WCS,       WHC00080
     3 WWH,WTC,WTP,WGG,WSC,WLV,VGT,WO,WP,DP,WN,METAL,NCONFG                 WHC00090
      COMMON /COSTIN/   PRIA1,PRIA2,PRJC,PRIA3,PRIB3,PRIA4,PRIE4,PRIA5,     WHC00100
     1PRIA6,PRIA7,PRIA8,PRIB8,PRIA9,PRIG9,PRIA10,PRIA11,PRIG11,PRIA12,      WHC00110
     2PRIB12,PRIE12,PRIA13,PRIE13,PRIA14,PRIE14,PRIA15,PRIE15,PRIA16,       WHC00120
     3PRIE16,PRIA17,PRIF17,PRIA18,PRIB18,PRIE18,PRIA19,PRIE19,PRIA20,       WHC00130
     4PRIA21,PRIA22,PRIB22,PRIA23,PRIB23,PRIC23,PRIA24,PRIC24,PRIA25,       WHC00140
     5PRIB25,PRIA26,PRIB26,PRIC26,PRNA1,PRNA2,PRNA3,PRNB3,PRNA4,PRNE4,      WHC00150
     6PRNA5,PRNA6,PRNA7,PRNA8,PRNB8,PRNA9,PRNG9,PRNA10,PRNA11,PRNG11,       WHC00160
     7PRNA12,PRNB12,PRNE12,PRNA13,PRNE13,PRNA14,PRNE14,PRNA15,PRNA16,       WHC00170
     8PRNA17,PRNA18,PRNB18,PRNA19,PRNB19,PRNC19,PRNA20,PRNC20,PRNA21,       WHC00180
     9PRNB21,PRNA22,PRNB22,PRNC22,PLPC,PLA1,PLA3,PLB3,PLA4,PLA6,PLA8,       WHC00190
     APLB8,PLA9,PLA11,PLB11,PLA13,PLB13,PLC13,PLD13,PLA14,PLD14,PLA15,      WHC00200
     BPLB15,PLE15,PLF15,PLA16,PLE16,PLA17,PLA18,PLB18,PLC18,PLA19,PLA20,    WHC00210
     CPLB20,PLA21,PLB21,PLC21,PTA1,PTD1,PTA4,PTB4,PTA5,PTB5,PTE5,PTA6,      WHC00220
     DPTE6,PTA7,PTB7,PTC7,PTJC,PTA8,PTD8,PTA9,PTB9,PTA10,PTB10,PTC10,       WHC00230
     EPEA3,PEB3,PEA4,PEE4,PEA5,PEE5,PEA6,PEB6,PEE6,PEA7,PEE7,PEA8,PEA9,     WHC00240
     FPEA10,PEB10,PEC10,PEA11,PEB11,PEE11,PEBC,PSPC,PSA3,PSB3,PSA4,PSE4,    WHC00250
     GPSA5,PSE5,PSA6,PSF6,PSG6,PSA7,PSF7,PSA8,PSA9,PSA10,PSB10,PSC10,       WHC00260
     HPSA11,PSB11,PSE11,CET,PET,CFCASE,PFCASE,CFC,PFC,CFM,PFM,IYEAR         WHC00270
      COMMON /COSTIN/   PRIB1,PRIC1,PRIB2,PRIC2,PRIB4,PRIC4,PRID4,PRIB5,    WHC00280
     1PRIC5,PRIB9,PRIC9,PRID9,PRIE9,PRIF9,PRIB11,PRIC11,PRID11,PRIE11,      WHC00290
     2PRIF11,PRIC12,PRID12,PRIB13,PRIC13,PRID13,PRIB14,PRIC14,PRID14,       WHC00300
     3PRIB15,PRIC15,PRID15,PRIB16,PRIC16,PRID16,PRIB17,PRIC17,PRID17,       WHC00310
     4PRIE17,PRIC18,PRID18,PRIB19,PRIC19,PRID19,PRIB24,PRNB1,PRNC1,PRNB2    WHC00320
     5,PRNC2,PRNB4,PRNC4,PRND4,PRNB5,PRNC5,PRNB9,PRNC9,PRND9,PRNE9,PRNF9    WHC00330
     6,PRNB11,PRNC11,PRND11,PRNE11,PRNF11,PRNC12,PRND12,PRNB13,PRNC13,      WHC00340
     7PRND13,PRNB14,PRNC14,PRND14,PRNB15,PRNC15,PRND15,PRNB16,PRNC16,       WHC00350
     8PRND16,PRNB17,PRNC17,PRND17,PRNE17,PRNB20,PLB1,PLC1,PLA2,PLB2,PLB4    WHC00360
     9,PLC4,PLA5,PLB5,PLB6,PLC6,PLA7,PLB7,PLB9,PLC9,PLA10,PLB10,PLA12,      WHC00370
     APLB12,PLB14,PLC14,PLC15,PLD15,PLB16,PLC16,PLD16,PLB19,PLC19,PTB1,     WHC00380
     BPTC1,PTA2,PTB2,PTA3,PTB3,PTC5,PTD5,PTB6,PTC6,PTD6,PTB8,PTC8,PEA1,     WHC00390
     CPEB1,PEC1,PEA2,PEB2,PEC2,PEB4,PEC4,PED4,PEB5,PEC5,PED5,PEE5,PEC6,     WHC00400
     DPED6,PEB7,PEC7,PED7,PEC11,PED11,PSA1,PSB1,PSC1,PSA2,PSB2,PSC2,PSB4    WHC00410
     E,PSC4,PSD4,PSB5,PSC5,PSD5,PSE5,PSB6,PSC6,PSD6,PSE6,PSB7,PSC7,PSD7,    WHC00420
     FPSE7,PSC11,PSD11,PRND22,PLD21,PLE21,PTD10,PTE10,PRID26                WHC00430
      COMMON /COSTIN/   PROFIT,QD,R,AFA1,AFB1,AFC1,AFD1,AFI1,AFA2,AFB2,     WHC00440
     1AFG2,AFA3,AFB3,AFG3,AFA4,AFB4,AFC4,AFD4,AFJ4,AFA5,AFB5,AFC5,AFH5,     WHC00450
     2AFA6,AFB6,AFG6,AFA7,AFC7,AFD7,AFA8,AFB8,AFC8,AFD8,AFI8,AFA9,AFB9,     WHC00460
     3AFC9,AFD9,AFJ9,AFA10,AFB10,AFC10,AFH10,AFA11,AFB11,AFG11,AFA12,       WHC00470
     4AFC12,AFD12,AFA13,AFB13,AFC13,AFA14,AFB14,AFC14,KFUZE,WA1,WE1,WF1,    WHC00480
     5WA2,WD2,WF2,KGAIN,CA1,CE1,CF1,CA2,CE2,CF2,CA3,CE3,CF3,GA1,GB1,GF1,    WHC00490
     6KLE6,KGT6,KSTAB,KAGATE,NCHAN,KSGATE,GA2,GB2,GK2,GA3,GB3,GQ3,GA4,      WHC00500
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     7CR4,CM4,CA5,GR5,GH5,KG,KC,KW,KA,KP,IGTYPE,ICTYPE,IPRCST                WHC00510
      COMMON /COSTIN/   AFE1,AFF1,AFG1,AFH1,AFC2,AFD2,AFF2,AFF2,AFC3,       WHC00520
     1AFD3,AFE3,AFF3,AFE4,AFF4,AFG4,AFH4,AFI4,AFD5,AFE5,AFF5,AFG5,AFC6,     WHC00530
     2AFD6,AFE6,AFF6,AFB7,AFE8,AFF8,AFG8,AFH8,AFF9,AFF9,AFG9,AFH9,AFI9,     WHC00540
     3AFD10,AFE10,AFF10,AFG10,AFC11,AFD11,AFE11,AFF11,AFB12,WB1,WC1,WC1,    WHC00550
     4WP2,WC2,CB1,CC1,CD1,CB2,CC2,CD2,CB3,CC3,CD3,GC1,GD1,GF1,GC2,GD2,      WHC00560
     5CF2,CF2,CG2,GH2,GI2,GJ2,GC3,GD3,GE3,GF3,GG3,GH3,GI3,GJ3,GK3,GL3,      WHC00570
     6GM3,GN3,GP3,GC4,GD4,GE4,GF4,GG4,GH4,GI4,GJ4,GK4,GL4,GC5,GD5,GF5,      WHC00580
     7CF5,GG5,CFTTAB(11),PFTTAB(11)                                         WHC00590
      COMMON /CSTPRV/ CBLC,CBMC,CCASE,CCFU,CCL,CCM,CCCMI,CCCML,CCCMM,       WHC00600
     1 CCONT,CCRD,CEBFU,CEBRD,CETJ,CEXIN,CGFU,CGRD,                         WHC00610
     2 CGT,CGTOT,CIGN,CIRJFU,       CIRJRD,       CLF,CLFL,CLGG,CLI,CLM,    WHC00620
     3              CLRFU,CLRRD,CLRT,CLTC,CLTP,CM,CMGG,CMM,CMTC,CMTP,       WHC00630
     4 CMV,CNOZ,CNRJFU,       CNRJRD,       CP,CPAFI,CPENG,CPL,CPLC,        WHC00640
     5 CPMFGL,CPMFGM,CPQA,CPR,CPRC,CPS,CPSMGG,CPSN2,CPSRAM,CPSSGG,          WHC00650
     6 CPTOOL,CRAFI,CRDEV,CREG,CRENG,CRFTO,CRJC,CRMFGL,CRMFGM,CRQA,         WHC00660
     7 CRTOOL,CSA,CSRFU,CSRRD,CSRT,CT,CTAFI,CTC,CTEB,CTIRJ,CTJFU,           WHC00670
     8 CTJLF,CTJLFL,CTJRD,CTJT,       CTL,CTM,CTNRJ,CTP,CWH,CWHFU,CWHR,     WHC00680
     9 CBODC,CRPS,CPFU,PROFPR,PRFUAF,PRRAF,CCLB,CCMB,CTCB,CLIB,CNCZB,       WHC00690
     A CPRB,CPLB,CIGNB,CSAB,PROFEX                                          WHC00700
      NAMELIST /ERRPRT/ CWHR,CWHFU,CWH                                      WHC00710
      XFUZE=KFUZE                                                           WHC00720
   1  CWHP=WA1*((WB1+WC1*WWH+WD1*XFUZE)*WE1+WF1)                            WHC00730
   2  CWHFU=WA2*(1.28*(WB2+WC2*SQRT(WWH))*WD2/600.+WE2)                     WHC00740
   3  CWH=CWHR+CWHFU                                                        WHC00750
      IF (IPRCST .NE. C) WRITE (6,ERRPRT)                                   WHC00760
      RETURN                                                                WHC00770
      END                                                                   WHC00780


      SUBROUTINE PLRCST                                                     PLRC0010
C                                                                           PLRC0020
C          LIQUID ROCKET PROPULSION COST                                    PLRC0030
C                                                                           PLRC0040
      REAL NOZWT,MP                                                         PLRC0050
      COMMON /COMVLS/ WTANK,VEXIN,VREQ,GGW,HPPUMP,WTFUEL,WCOMM,VCOMI,       PLRC0060
     1 P5,Y1,WNOZ,KEM,MATTK,A,DCOM,WMC,VBI,DTHRT,RNOZI,NCZWT,MP,CASEM,      PLRC0070
     2 ENET,WT,WF,EMAX,S,T4,METTJ,ZXNB,D,WM,FC,PPEAK,BSP,ADET,CA,WCS,       PLRC0080
     3 WWH,WTC,WTP,WGG,WSC,WLV,VGT,WO,WP,DP,WN,METAL,NCONFG                 PLRC0090
      COMMON /COSTIN/   PRIA1,PRIA2,PRJC,PRIA3,PRIB3,PRIA4,PRIE4,PRIA5,     PLRC0100
     1PRIA6,PRIA7,PRIA8,PRIB8,PRIA9,PRIG9,PRIA10,PRIA11,PRIG11,PRIA12,      PLRC0110
     2PRIB12,PRIE12,PRIA13,PRIE13,PRIA14,PRIE14,PRIA15,PRIE15,PRIA16,       PLRC0120
     3PRIF16,PRIA17,PRIF17,PRIA18,PRIB18,PRIE18,PRIA19,PRIE19,PRIA20,       PLRC0130
     4PPIA21,PRIA22,PRIB22,PRIA23,PRIB23,PRIC23,PRIA24,PRIC24,PRIA25,       PLRC0140
     5PRIB25,PRIA26,PRIB26,PRIC26,PRNA1,PRNA2,PRNA3,PRNB3,PRNA4,PRNE4,      PLRC0150
     6PRNA5,PRNA6,PRNA7,PRNA8,PRNB8,PRNA9,PRNG9,PRNA10,PRNA11,PRNG11,       PLRC0160
     7PRNA12,PRNB12,PRNE12,PRNA13,PRNE13,PRNA14,PRNE14,PRNA15,PRNA16,       PLRC0170
     8PRNA17,PRNA18,PRNB18,PRNA19,PRNB19,PRNC19,PRNA20,PRNC20,PRNA21,       PLRC0180
     9PRNB21,PRNA22,PRNB22,PRNC22,PLPC,PLA1,PLA3,PLB3,PLA4,PLA6,PLA8,       PLRC0190
     APLB8,PLA9,PLA11,PLB11,PLA13,PLB13,PLC13,PLD13,PLA14,PLD14,PLA15,      PLRC0200
     BPLB15,PLE15,PLF15,PLA16,PLE16,PLA17,PLA18,PLB18,PLC18,PLA19,PLA20,    PLRC0210
     CPLB20,PLA21,PLB21,PLC21,PTA1,PTD1,PTA4,PTB4,PTA5,PTB5,PTE5,PTA6,      PLRC0220
     DPTE6,PTA7,PTB7,PTC7,PTJC,PTA8,PTD8,PTA9,PTB9,PTA10,PTB10,PTC10,       PLRC0230
     EPEA3,PEB3,PEA4,PEE4,PEA5,PEF5,PEA6,PEB6,PEE6,PEA7,PEE7,PEA8,PEA9,     PLRC0240
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     FPEA10,PEB10,PEC10,PEA11,PEB11,PEE11,PERC,PSPC,PSA3,PSB3,PSA4,PSE4,PLRC0250
     GPSA5,PSE5,PSA6,PSF6,PSG6,PSA7,PSF7,PSA8,PSA9,PSA10,PSB10,PSC10,    PLRC0260
     HPSA11,PSB11,PSE11,CFT,PFT,CFCASE,PFCASE,CFC,PFC,CFM,PFM,IYEAR      PLRC0270
      COMMON /COSTIN/    PRIB1,PRIC1,PRIB2,PRIC2,PRIB4,PRIC4,PRID4,PRIB5,PLRC0280
     1PRIC5,PRIB9,PRIC9,PRID9,PRIE9,PRIF9,PRIB11,PRIC11,PRID11,PRIE11,   PLRC0290
     2PRIF11,PRIC12,PRID12,PRIB13,PRIC13,PRID13,PRIB14,PRIC14,PRID14,    PLRC0300
     3PRIB15,PRIC15,PRID15,PRIB16,PRIC16,PRID16,PRIB17,PRIC17,PRID17,    PLRC0310
     4PRIE17,PRIC18,PRID18,PRIB19,PRIC19,PRID19,PRIB24,PRNB1,PRNC1,PRNB2PLRC0320
     5,PRNC2,PRNB4,PRNC4,PRND4,PRNB5,PRNC5,PRNB9,PRNC9,PRND9,PRNE9,PRNF9PLRC0330
     6,PRNB11,PRNC11,PRND11,PRNE11,PRNF11,PRNC12,PRND12,PRNB13,PRNC13,   PLRC0340
     7PRND13,PRNB14,PRNC14,PRND14,PRNB15,PRNC15,PRND15,PRNB16,PRNC16,    PLRC0350
     8PRND16,PRNB17,PRNC17,PRND17,PRNE17,PRNB20,PLB1,PLC1,PLA2,PLB2,PLB4PLRC0360
     9,PLC4,PLA5,PLB5,PLB6,PLC6,PLA7,PLB7,PLB9,PLC9,PLA10,PLB10,PLA12,   PLRC0370
     APLB12,PLB14,PLC14,PLC15,PLD15,PLB16,PLC16,PLD16,PLB19,PLC19,PTB1,  PLRC0380
     BPTC1,PTA2,PTB2,PTA3,PTB3,PTC5,PTD5,PTB6,PTC6,PTD6,PTB8,PTC8,PEA1,  PLRC0390
     CPEB1,PEC1,PEA2,PEB2,PEC2,PEB4,PEC4,PED4,PEB5,PEC5,PED5,PEE5,PEC6,  PLRC0400
     DPED6,PEF7,PEC7,PED7,PEC11,PED11,PSA1,PSB1,PSC1,PSA2,PSB2,PSC2,PSB4PLRC0410
     E,PSC4,PSD4,PSB5,PSC5,PSD5,PSE5,PSB6,PSC6,PSD6,PSE6,PSB7,PSC7,PSD7,PLRC0420
     FPSE7,PSC11,PSD11,PRND22,PLD21,PLE21,PTD10,PTE10,PRID26             PLRC0430
      COMMON /COSTIN/    PROFIT,QD,R,AFA1,AFB1,AFC1,AFD1,AFI1,AFA2,AFB2,  PLRC0440
     1AFC2,AFA3,AFB3,AFG3,AFA4,AFB4,AFC4,AFD4,AFJ4,AFA5,AFB5,AFC5,AFH5,  PLRC0450
     2AFA6,AFB6,AFG6,AFA7,AFC7,AFD7,AFA8,AFB8,AFC8,AFD8,AFI8,AFA9,AFB9,  PLRC0460
     3AFC9,AFD9,AFJ9,AFA10,AFB10,AFC10,AFH10,AFA11,AFB11,AFG11,AFA12,    PLRC0470
     4AFC12,AFD12,AFA13,AFB13,AFC13,AFA14,AFB14,AFC14,KFUZE,WA1,WB1,WF1,PLRC0480
     5WA2,WC2,WB2,KGAIN,CA1,CB1,CF1,CA2,CB2,CF2,CA3,CB3,CF3,GA1,GB1,GF1,PLRC0490
     6KLB6,KGT6,KSTAB,KAGATE,NCHAN,KSGATE,GA2,GB2,GK2,GA3,GB3,GQ3,GA4,   PLRC0500
     7GR4,GM4,GA5,GB5,GH5,KG,KC,KW,KA,KP,IGTYPE,ICTYPE,IPRCST            PLRC0510
      COMMON /COSTIN/    AFE1,AFF1,AFG1,AFH1,AFC2,AFD2,AFE2,AFF2,AFC3,    PLRC0520
     1AFD3,AFE3,AFF3,AFF4,AFF4,AFG4,AFH4,AFI4,AFD5,AFE5,AFF5,AFG5,AFC6,  PLRC0530
     2AFD6,AFE6,AFF6,AFB7,AFE8,AFF8,AFG8,AFH8,AFE9,AFF9,AFG9,AFH9,AFI9,  PLRC0540
     3AFD10,AFE10,AFF10,AFG10,AFC11,AFD11,AFF11,AFF11,AFB12,WB1,WC1,WD1,PLRC0550
     4WP2,WC2,CB1,CC1,CD1,CB2,CC2,CD2,CB3,CC3,CD3,GC1,GD1,GE1,GC2,GD2,   PLRC0560
     5GF2,GF2,GG2,GH2,GI2,GJ2,GC3,GD3,GE3,GF3,GG3,GH3,GI3,GJ3,GK3,GL3,   PLRC0570
     6GM3,GN3,GP3,GC4,GD4,GE4,GF4,GG4,GH4,GI4,GJ4,GK4,GL4,GC5,GD5,GE5,   PLRC0580
     7GF5,GG5,CFTTAB(11),PFTTAB(11)                                      PLRC0590
      COMMON /CSTPRV/ CBLC,CBMC,CCASE,CCFU,CCL,CCM,CCOMI,CCOML,CCOMM,     PLRC0600
     1 CCONT,CCRD,CEBFU,CEBRD,CFTJ,CEXIN,CGFU,CGRD,                      PLRC0610
     2 CGT,CGTOT,CIGN,CIRJFU,       CIRJRD,       CLF,CLFL,CLGG,CLI,CLM,  PLRC0620
     3              CLRFU,CLRRD,CLPT,CLTC,CLTP,CM,CMGG,CMM,CMTC,CMTP,     PLRC0630
     4 CMV,CNOZ,CNRJFU,       CNRJRD,       CP,CPAFI,CPENG,CPL,CPLC,     PLRC0640
     5 CPMFGL,CPMFGM,CPQA,CPR,CPRC,CPS,CPSMGG,CPSN2,CPSRAM,CPSSGG,       PLRC0650
     6 CPTOOL,CRAFI,CRDFV,CREG,CRENG,CRFTO,CRJC,CRMFGL,CRMFGM,CRQA,      PLRC0660
     7 CRTOOL,CSA,CSRFU,CSRRD,CSRT,CT,CTAFI,CTC,CTEB,CTIRJ,CTJFU,        PLRC0670
     8 CTJLF,CTJLFL,CTJRD,CTJT,       CTL,CTM,CTNRJ,CTP,CWH,CWHFU,CWHR,  PLRC0680
     9 CBOOC,CRPS,CPFU,PROFPR,PRFUAF,PRRAF,CCLB,CCMB,CTCB,CLIB,CNOZR,     PLRC0690
     A CPRB,CPLB,CIGNB,CSAB,PROFEX                                       PLRC0700
      DIMENSION PLB14A(3)                                                PLRC0710
      NAMELIST /ERRPRT/ CLTC,CMTC,CTC,CLTP,CMTP,CLGG,CMGG,CTP,CLM,CMM,   PLRC0720
     1 CM,CGT,CPS,CT,CP,CPL,CSA,CLRFU,          CLRRD,CLRT               PLRC0730
      DATA PLB14A/2165.,16499.,7191./                                    PLRC0740
      PLB14U=PLB14A(METAL)                                               PLRC0750
      PLC14U=.2608                                                       PLRC0760
      IF (PLB14 .NE. 0.) PLB14U=PLB14                                    PLRC0770
      IF (PLC14 .NE. 0.) PLC14U=PLC14                                    PLRC0780
     1    CLTC=PLA1*PLB1*WTC**PLC1/1000.                                 PLRC0790
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2     CMTC=PLA2*1.35*WTC**PLB2/1000.                                          PLRC0800
3     CTC=PLA3*(CLTC+CMTC)+PLB3                                               PLRC0810
4     CLTP=PLA4*PLB4*(WTP-WGG-WSC)**PLC4/1000.                                PLRC0820
5     CMTP=PLA5*1.35*(WTP-WGG-WSC)**PLB5/1000.                                PLRC0830
6     CLGG=PLA6*PLB6*(WGG+WSC)**PLC6/1000.                                    PLRC0840
7     CMGG=PLA7*1.35*(WGG+WSC)**PLB7/1000.                                    PLRC0850
8     CTP=PLA8*(CLTP+CMTP+CLGG+CMGG)+PLB8                                     PLRC0860
9     CLM=PLA9*PLB9*WLV**PLC9/1000.                                           PLRC0870
10    CMM=PLA10*1.35*WLV**PLB10/1000.                                         PLRC0880
11    CM=PLA11*(CLM+CMM)+PLB11                                                PLRC0890
12    CCT=PLA12*1.059*VGT**PLB12/1000.                                        PLRC0900
13    CPS=PLA13*(CGT+PLB13+PLC13)+PLD13                                       PLRC0910
14    CT=PLA14*PLB14U*1.1*WT**PLC14U/1000.+PLD14                              PLRC0920
15    CP=PLA15*(PLB15*(PLC15/WO)**PLD15*WO+PLE15*(PLC15/WF)**PLD15*WF)        PLRC0930
     1 /1000.+PLF15                                                           PLRC0940
16    CPL=PLA16*PLB16*1.1*(PLC16/WP)**PLD16*WP+PLE16                          PLRC0950
17    CSA=PLA17                                                               PLRC0960
18    CLRFU=(PLA18*1.15*PLB18*(CTC+CTP+CM+CPS+CT+CP+CPL+CSA)+PLA18*PLC18PLRC0970
     1 )*(1.+PLPC)                                                            PLRC0980
      CPFU=CLRFU                                                              PLRC0990
      PROFPR=CLRFU*PLPC/(1.+PLPC)                                             PLRC1000
21    CLRRD=PLA21*(PLB21*(1.462*PLD21*FMAX+PLE21)+PLC21)*(1.+PLPC)            PLRC1010
      CRPS=CLRRD                                                              PLRC1020
22    CLRT=CLRRD+CLRFU                                                        PLRC1030
      CLTC=CLTC*PLA18                                                         PLRC1040
      CMTC=CMTC*PLA18                                                         PLRC1050
      CTC=CTC*PLA18                                                           PLRC1060
      CLTP=CLTP*PLA18                                                         PLRC1070
      CMTP=CMTP*PLA18                                                         PLRC1080
      CLGG=CLGG*PLA18                                                         PLRC1090
      CMGG=CMGG*PLA18                                                         PLRC1100
      CTP=CTP*PLA18                                                           PLRC1110
      CLM=CLM*PLA18                                                           PLRC1120
      CMM=CMM*PLA18                                                           PLRC1130
      CM=CM*PLA18                                                             PLRC1140
      CGT=CGT*PLA18                                                           PLRC1150
      CPS=CPS*PLA18                                                           PLRC1160
      CT=CT*PLA18                                                             PLRC1170
      CP=CP*PLA18                                                             PLRC1180
      CPL=CPL*PLA18                                                           PLRC1190
      CSA=CSA*PLA18                                                           PLRC1200
      IF (IPRCST .NE. 0) WRITE (6,ERRPRT)                                     PLRC1210
      RETURN                                                                  PLRC1220
      END                                                                     PLRC1230


      SUBROUTINE PEBCST                                                       PEBC0010
C                                                                             PEBC0020
C         EXTERNAL BOOSTER PROPULSION COST                                    PEBC0030
C                                                                             PEBC0040
      COMMON   /CONLY/ KPUTG,  DIAFRT,  SOMMOR(8)                             PEBC0050
      REAL NOZWT,MP                                                           PEBC0060
      COMMON /COMVLS/ WTANK,VEXIN,VREQ,GGW,HPPUMP,WTFUEL,WCOMM,VCCMI,         PEBC0070
     1 R5,Y1,WNOZ,KFM,MATTK,A,DCOM,WMC,VBI,DTHRT,RNOZI,NCZWT,MP,CASEM,        PEBC0080
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2 ENET,WT,WF,FMAX,S,T4,METTJ,ZXNB,D,WM,FC,PPEAK,BSP,NDET,QA,WCS,    PEBC0090
3 WWH,WTC,WTP,WGG,WSC,WLV,VGT,WO,WP,DP,WN,METAL,NCONFG              PEBC0100
 COMMON /COSTIN/   PRIA1,PRIA2,PRJC,PRIA3,PRIB3,PRIA4,PRIE4,PRIA5,  PEBC0110
1PRIA6,PRIA7,PRIA8,PRIB8,PRIA9,PRIG9,PRIA10,PRIA11,PRIG11,PRIA12,   PEBC0120
2PRIB12,PRIE12,PRIA13,PRIE13,PRIA14,PRIE14,PRIA15,PRIE15,PRIA16,    PEBC0130
3PRIE16,PRIA17,PRIF17,PRIA18,PRIB18,PRIE18,PRIA19,PRIE19,PRIA20,    PEBC0140
4PRIA21,PRIA22,PRIB22,PRIA23,PRIB23,PRIC23,PRIA24,PRIC24,PRIA25,    PEBC0150
5PRIB25,PRIA26,PRIB26,PRIC26,PRNA1,PRNA2,PRNA3,PRNB3,PRNA4,PRNE4,   PEBC0160
6PRNA5,PRNA6,PRNA7,PRNA8,PRNB8,PRNA9,PRNG9,PRNA10,PRNA11,PRNG11,    PEBC0170
7PRNA12,PRNB12,PRNE12,PRNA13,PRNE13,PRNA14,PRNE14,PRNA15,PRNA16,    PEBC0180
8PRNA17,PRNA18,PRNB18,PRNA19,PRNB19,PRNC19,PRNA20,PRNC20,PRNA21,    PEBC0190
9PRNB21,PRNA22,PRNB22,PRNC22,PLPC,PLA1,PLA3,PLB3,PLA4,PLA6,PLA8,    PEBC0200
APLB8,PLA9,PLA11,PLB11,PLA13,PLB13,PLC13,PLD13,PLA14,PLD14,PLA15,   PEBC0210
BPLB15,PLE15,PLF15,PLA16,PLE16,PLA17,PLA18,PLB18,PLC18,PLA19,PLA20, PEBC0220
CPLB20,PLA21,PLB21,PLC21,PTA1,PTD1,PTA4,PTB4,PTA5,PTB5,PTE5,PTA6,   PEBC0230
DPTE6,PTA7,PTB7,PTC7,PTJC,PTA8,PTD8,PTA9,PTB9,PTA10,PTB10,PTC10,    PEBC0240
EPEA3,PEB3,PEA4,PEE4,PEA5,PEF5,PEA6,PEB6,PEF6,PEA7,PEE7,PEA8,PEA9,  PEBC0250
FPEA10,PEB10,PEC10,PEA11,PEB11,PEE11,PEBC,PSPC,PSA3,PSB3,PSA4,PSE4, PEBC0260
GPSA5,PSE5,PSA6,PSF6,PSG6,PSA7,PSF7,PSA8,PSA9,PSA10,PSB10,PSC10,    PEBC0270
HPSA11,PSB11,PSE11,CFT,PFT,CFCASE,PFCASE,CFC,PFC,CFM,PFM,IYEAR      PEBC0280
 COMMON /COSTIN/   PRIB1,PRIC1,PRIB2,PRIC2,PRIB4,PRIC4,PRID4,PRIE5, PEBC0290
1PRIC5,PRIB9,PRIC9,PRID9,PRIE9,PRIF9,PRIB11,PRIC11,PRID11,PRIE11,   PEBC0300
2PRIF11,PRIC12,PRID12,PRIB13,PRIC13,PRID13,PRIB14,PRIC14,PRID14,    PEBC0310
3PRIB15,PRIC15,PRID15,PRIB16,PRIC16,PRID16,PRIB17,PRIC17,PRID17,    PEBC0320
4PRIE17,PRIC18,PRID18,PRIB19,PRIC19,PRID19,PRIB24,PRNB1,PRNC1,PRNB2 PEBC0330
5,PRNC2,PRNB4,PRNC4,PRND4,PRNB5,PRNC5,PRNB9,PRNC9,PRND9,PRNE9,PRNF9 PEBC0340
6,PRNB11,PRNC11,PRND11,PRNF11,PRNF11,PRNC12,PRND12,PRNB13,PRNC13,   PEBC0350
7PRND13,PRNB14,PRNC14,PRND14,PRNB15,PRNC15,PRND15,PRNB16,PRNC16,    PEBC0360
8PRND16,PRNB17,PRNC17,PRND17,PRNE17,PRNB20,PLB1,PLC1,PLA2,PLB2,PLB4 PEBC0370
9,PLC4,PLA5,PLB5,PLB6,PLC6,PLA7,PLB7,PLB9,PLC9,PLA10,PLB10,PLA12,   PEBC0380
APLB12,PLB14,PLC14,PLC15,PLD15,PLB16,PLC16,PLD16,PLB19,PLC19,PTB1,  PEBC0390
BPTC1,PTA2,PTB2,PTA3,PTB3,PTC5,PTD5,PTB6,PTC6,PTD6,PTB8,PTC8,PEA1,  PEBC0400
CPEB1,PEC1,PEA2,PEB2,PEC2,PEB4,PEC4,PED4,PEB5,PEC5,PED5,PEE5,PEC6,  PEBC0410
DPED6,PEB7,PEC7,PED7,PEC11,PED11,PSA1,PSB1,PSC1,PSA2,PSB2,PSC2,PSB4 PEBC0420
E,PSC4,PSD4,PSB5,PSC5,PSD5,PSE5,PSB6,PSC6,PSD6,PSE6,PSB7,PSC7,PSD7, PEBC0430
FPSE7,PSC11,PSD11,PRND22,PLD21,PLE21,PTD10,PTE10,PRID26             PEBC0440
 COMMON /COSTIN/   PROFIT,QD,R,AFA1,AFB1,AFC1,AFD1,AFI1,AFA2,AFB2,  PEBC0450
1AFG2,AFA3,AFB3,AFG3,AFA4,AFB4,AFC4,AFD4,AFJ4,AFA5,AFB5,AFC5,AFH5,  PEBC0460
2AFA6,AFB6,AFG6,AFA7,AFC7,AFD7,AFA8,AFB8,AFC8,AFD8,AFI8,AFA9,AFB9,  PEBC0470
3AFC9,AFD9,AFJ9,AFA10,AFB10,AFC10,AFH10,AFA11,AFB11,AFG11,AFA12,    PEBC0480
4AFC12,AFD12,AFA13,AFB13,AFC13,AFA14,AFB14,AFC14,KFUZE,WA1,WE1,WF1, PEBC0490
5WA2,WD2,WE2,KGAIN,CA1,CE1,CF1,CA2,CE2,CF2,CA3,CE3,CF3,GA1,GB1,GF1, PEBC0500
6KLF6,KGT6,KSTAB,KAGATE,NCHAN,KSGATE,GA2,GB2,GK2,GA3,GB3,GQ3,GA4,   PEBC0510
7GB4,GM4,GA5,GB5,GH5,KG,KC,KW,KA,KP,IGTYPE,ICTYPE,IPRCST            PEBC0520
 COMMON /COSTIN/   AFE1,AFF1,AFG1,AFH1,AFC2,AFD2,AFE2,AFF2,AFC3,    PEBC0530
1AFD3,AFE3,AFF3,AFF4,AFF4,AFG4,AFH4,AFI4,AFD5,AFE5,AFF5,AFG5,AFC6,  PEBC0540
2AFD6,AFE6,AFF6,AFB7,AFE8,AFF8,AFG8,AFH8,AFE9,AFF9,AFG9,AFH9,AFI9,  PEBC0550
3AFD10,AFE10,AFF10,AFG10,AFC11,AFD11,AFE11,AFF11,AFB12,WB1,WC1,WD1, PEBC0560
4WB2,WC2,CB1,CC1,CD1,CB2,CC2,CD2,CB3,CC3,CD3,GC1,GD1,GE1,GC2,GD2,   PEBC0570
5GE2,GF2,GG2,GH2,GI2,GJ2,GC3,GD3,GE3,GF3,GG3,GH3,GI3,GJ3,GK3,GL3,   PEBC0580
6GM3,GN3,GP3,GC4,GD4,GE4,GF4,GG4,GH4,GI4,GJ4,GK4,GL4,GC5,GD5,GE5,   PEBC0590
7GF5,GG5,CFTTAB(11),PFTTAB(11)                                      PEBC0600
 COMMON /CSTPRV/ CBLC,CBMC,CCASE,CCFU,CCL,CCM,CCCMI,CCOML,CCOMM,    PEBC0610
1 CCONT,CCRD,CEBFU,CEBRD,CETJ,CEXIN,CGFU,CGRD,                      PEBC0620
2 CGT,CGTOT,CIGN,CIRJFU,      CIRJRD,      CLF,CLFL,CLGG,CLI,CLM,   PEBC0630
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     3              CLRFU,CLRRD,CLRT,CLTC,CLTP,CM,CMGG,CMM,CMTC,CMTP,      PEBC0640
     4 CMV,CNOZ,CNRJFU,       CNRJRD,       CP,CPAFI,CPENG,CPL,CPLC,      PEBC0650
     5 CPMFGL,CPMFGM,CPQA,CPR,CPRC,CPS,CPSMGG,CPSN2,CPSRAM,CPSSGG,         PEBC0660
     6 CPTOOL,CRAFI,CRDEV,CREG,CRENG,CRFTQ,CRJC,CRMFGL,CRMFGM,CRQA,        PEBC0670
     7 CRTOOL,CSA,CSRFU,CSRRD,CSRT,CT,CTAFI,CTC,CTEB,CTIRJ,CTJFU,          PEBC0680
     8 CTJLF,CTJLFL,CTJRD,CTJT,       CTL,CTM,CTNRJ,CTP,CWH,CWHFU,CWHR,    PEBC0690
     9 CBODC,CRPS,CPFU,PROFPR,PRFUAF,PRRAF,CCLB,CCMB,CTCB,CLIB,CNOZB,      PEBC0700
     A CPRB,CPLB,CIGNB,CSAB,PROFEX                                         PEBC0710
      NAMELIST /ERRPRT/ CCLB,CCMB,CTCB,CLIB,CNOZB,CPRB,CPLB,CIGNB,CSAB,    PEBC0720
     1 CEBFU,CEBRD,CTEB                                                    PEBC0730
      DSLIK = D                                                            PEBC0740
      D = D * DIAFRT                                                       PEBC0750
      I=CASEM                                                              PEBC0760
      CFMU=CFTTAB(I)                                                       PEBC0770
      PFMU=PFTTAB(I)                                                       PEBC0780
      IF (CFM .NE. 0.) CFMU=CFM                                            PEBC0790
      IF (PFM .NE. 0.) PFMU=PFM                                            PEBC0800
  1   CCLB=PEA1*CFMU*(PEB1/WMC)**PEC1*WMC                                  PEBC0810
  2   CCMB=1.1*PEA2*PFMU*(PEB2/WMC)**PEC2*WMC                              PEBC0820
  3   CTCB=PEA3*(CCLB+CCMB)+PEB3                                           PEBC0830
  4   CLIB=1.1*PEA4*PEB4*(PEC4/VBI)**PED4*VBI+PEE4                         PEBC0840
  5   CNOZB=1.1*PEA5*PEB5*(PEC5+PED5*DTHRT+PEE5*RNOZI)*NCZWT+PEF5          PEBC0850
  6   CPRB=PEA6*PEB6*MP/1000.*(PEC6/MP)**PED6+PEE6                         PEBC0860
  7   CPLB=1.1*PEA7*PEB7*MP*(PEC7/MP)**PED7+PEE7                           PEBC0870
  8   CIGNB=PEA8                                                           PEBC0880
  9   CSAB=PEA9                                                            PEBC0890
 10   CEBFU=ZXNB*(PEA10*(PEB10*(CTCB+CLIB+CNOZB+CPRB+CPLB+CIGNB+CSAB)      PEBC0900
     1 +PEC10)*(1.+PEBC))                                                  PEBC0910
      PROFEX=CEBFU*PEBC/(1.+PEBC)                                          PEBC0920
 11   CEBRD=PEA11*(PEB11*PEC11*(D*WM)**PED11*1.462+PEE11)*(1.+PFBC)        PEBC0930
 12   CTEB=CEBRD+CEBFU                                                     PEBC0940
      CCLB=CCLB*PEA10                                                      PEBC0950
      CCMB=CCMB*PEA10                                                      PEBC0960
      CTCB=CTCB*PEA10                                                      PEBC0970
      CLIB=CLIB*PEA10                                                      PEBC0980
      CNOZB=CNOZB*PEA10                                                    PEBC0990
      CPRB=CPRB*PEA10                                                      PEBC1000
      CPLB=CPLB*PEA10                                                      PEBC1010
      CIGNB=CIGNB*PEA10                                                    PEBC1020
      CSAB=CSAB*PEA10                                                      PEBC1030
      IF (IPRCST .NE. 0) WRITE (6,ERRPRT)                                  PEBC1040
      D = DSLIK                                                            PEBC1050
      RETURN                                                               PEBC1060
      END                                                                  PEBC1070


      SUBROUTINE PSRCST                                                    PSRC0010
C                                                                          PSRC0020
C         SOLID SUSTAINER PROPULSION COST                                  PSRC0030
C                                                                          PSRC0040
      COMMON /CONLY/ KINDPS,DIAFRT,SWMC,SDTHRT,SRNOZI,SWM,SCMMOR(4)       PSRC0050
      REAL NCZWT,MP                                                        PSRC0060
      COMMON /COMVLS/ WTANK,VEXIN,VREQ,GGW,HPPUMP,WTFUEL,WCOMP,VCCMI,      PSRC0070
     1 R5,Y1,WNOZ,KFM,MATTK,A,DCOM,WMC,VBI,DTHRT,RNOZI,NCZWT,MP,CASEM,     PSRC0080
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2 ENET,WT,WF,EMAX,S,T4,METTJ,ZXNB,D,WM,EC,PPEAK,BSP,NDET,QA,WCS,    PSRC0090
3 WWH,WTC,WTP,WGG,WSC,WLV,VGT,WO,WP,DP,WN,METAL,NCONFG              PSRC0100
 COMMON /COSTIN/   PRIA1,PRIA2,PRJC,PRIA3,PRIB3,PRIA4,PRIE4,PRIA5,  PSRC0110
1PRIA6,PRIA7,PRIA8,PRIB8,PRIA9,PRIG9,PRIA10,PRIA11,PRIG11,PRIA12,   PSRC0120
2PRIB12,PRIE12,PRIA13,PRIE13,PRIA14,PRIE14,PRIA15,PRIE15,PRIA16,    PSRC0130
3PRIE16,PRIA17,PRIF17,PRIA18,PRIB18,PRIE18,PRIA19,PRIE19,PRIA20,    PSRC0140
4PRIA21,PRIA22,PRIB22,PRIA23,PRIB23,PRIC23,PRIA24,PRIC24,PRIA25,    PSRC0150
5PRIB25,PRIA26,PRIB26,PRIC26,PRNA1,PRNA2,PRNA3,PRNB3,PRNA4,PRNE4,   PSRC0160
6PRNA5,PRNA6,PRNA7,PRNA8,PRNB8,PRNA9,PRNG9,PRNA10,PRNA11,PRNG11,    PSRC0170
7PRNA12,PRNB12,PRNE12,PRNA13,PRNE13,PRNA14,PRNE14,PRNA15,PRNA16,    PSRC0180
8PRNA17,PRNA18,PRNB18,PRNA19,PRNB19,PRNC19,PRNA20,PRNC20,PRNA21,    PSRC0190
9PRNB21,PRNA22,PRNB22,PRNC22,PLPC,PLA1,PLA3,PLB3,PLA4,PLA6,PLA8,    PSRC0200
APLB8,PLA9,PLA11,PLB11,PLA13,PLB13,PLC13,PLD13,PLA14,PLD14,PLA15,   PSRC0210
BPLB15,PLE15,PLF15,PLA16,PLE16,PLA17,PLA18,PLB18,PLC18,PLA19,PLA20,PSRC0220
CPLB20,PLA21,PLB21,PLC21,PTA1,PTD1,PTA4,PTB4,PTA5,PTB5,PTE5,PTA6,   PSRC0230
DPTE6,PTA7,PTB7,PTC7,PTJC,PTA8,PTD8,PTA9,PTB9,PTA10,PTB10,PTC10,    PSRC0240
EPEA3,PEB3,PEA4,PEE4,PEA5,PEF5,PEA6,PEB6,PEE6,PEA7,PEE7,PEA8,PEA9,  PSRC0250
FPEA10,PEB10,PEC10,PEA11,PEB11,PEE11,PEBC,PSPC,PSA3,PSB3,PSA4,PSE4,PSRC0260
GPSA5,PSE5,PSA6,PSF6,PSG6,PSA7,PSF7,PSA8,PSA9,PSA10,PSB10,PSC10,    PSRC0270
HPSA11,PSP11,PSE11,CFT,PFT,CFCASE,PFCASE,CFC,PFC,CFM,PFM,IYEAR      PSRC0280
 COMMON /COSTIN/   PRIB1,PRIC1,PRIB2,PRIC2,PRIB4,PRIC4,PRID4,PRIE5,PSRC0290
1PRIC5,PRIB9,PRIC9,PRID9,PRIE9,PRIF9,PRIB11,PRIC11,PRID11,PRIE11,   PSRC0300
2PRIF11,PRIC12,PRID12,PRIB13,PRIC13,PRID13,PRIB14,PRIC14,PRID14,    PSRC0310
3PRIB15,PRIC15,PRID15,PRIB16,PRIC16,PRID16,PRIB17,PRIC17,PRID17,    PSRC0320
4PRIE17,PRIC18,PRID18,PRIB19,PRIC19,PRID19,PRIB24,PRNB1,PRNC1,PRNB2PSRC0330
5,PRNC2,PRNB4,PRNC4,PRND4,PRNB5,PRNC5,PRNB9,PRNC9,PRND9,PRNE9,PRNF9PSRC0340
6,PRNB11,PRNC11,PRND11,PRNE11,PRNF11,PRNC12,PRND12,PRNB13,PRNC13,   PSRC0350
7PRND13,PRNB14,PRNC14,PRND14,PRNB15,PRNC15,PRND15,PRNB16,PRNC16,    PSRC0360
8PRND16,PRNB17,PRNC17,PRND17,PRNE17,PRNB20,PLB1,PLC1,PLA2,PLB2,PLB4PSRC0370
9,PLC4,PLA5,PLB5,PLB6,PLC6,PLA7,PLB7,PLB9,PLC9,PLA10,PLB10,PLA12,   PSRC0380
APLB12,PLB14,PLC14,PLC15,PLD15,PLB16,PLC16,PLD16,PLB19,PLC19,PTB1,  PSRC0390
BPTC1,PTA2,PTB2,PTA3,PTB3,PTC5,PTD5,PTB6,PTC6,PTD6,PTB8,PTC8,PEA1,  PSRC0400
CPEB1,PEC1,PEA2,PEB2,PEC2,PEB4,PEC4,PED4,PEB5,PEC5,PED5,PEE5,PEC6,  PSRC0410
DPED6,PEB7,PEC7,PED7,PEC11,PED11,PSA1,PSB1,PSC1,PSA2,PSB2,PSC2,PSB4PSRC0420
E,PSC4,PSD4,PSB5,PSC5,PSD5,PSE5,PSB6,PSC6,PSD6,PSE6,PSB7,PSC7,PSD7,PSRC0430
FPSE7,PSC11,PSD11,PRND22,PLD21,PLE21,PTD10,PTE10,PRID26              PSRC0440
 COMMON /COSTIN/   PROFIT,QD,R,AFA1,AFB1,AFC1,AFD1,AFI1,AFA2,AFB2,   PSRC0450
1AFG2,AFA3,AFB3,AFG3,AFA4,AFB4,AFC4,AFD4,AFJ4,AFA5,AFB5,AFC5,AFH5,  PSRC0460
2AFA6,AFB6,AFG6,AFA7,AFC7,AFD7,AFA8,AFB8,AFC8,AFD8,AFI8,AFA9,AFB9,  PSRC0470
3AFC9,AFD9,AFJ9,AFA10,AFB10,AFC10,AFH10,AFA11,AFB11,AFG11,AFA12,    PSRC0480
4AFC12,AFD12,AFA13,AFB13,AFC13,AFA14,AFB14,AFC14,KFUZE,WA1,WE1,WF1,PSRC0490
5WA2,WD2,WE2,KGAIN,CA1,CE1,CF1,CA2,CE2,CF2,CA3,CE3,CF3,GA1,GB1,GF1,PSRC0500
6KLF6,KGT6,KSTAB,KAGATE,NCHAN,KSGATE,GA2,GB2,GK2,GA3,GB3,GQ3,GA4,   PSRC0510
7GB4,GM4,GA5,GB5,GH5,KG,KC,KW,KA,KP,IGTYPE,ICTYPE,IPRCST            PSRC0520
 COMMON /COSTIN/   AFE1,AFF1,AFG1,AFH1,AFC2,AFD2,AFE2,AFF2,AFC3,    PSRC0530
1AFD3,AFE3,AFF3,AFE4,AFF4,AFG4,AFH4,AFI4,AFD5,AFE5,AFF5,AFG5,AFC6,  PSRC0540
2AFD6,AFE6,AFF6,AFB7,AFF8,AFF8,AFG8,AFH8,AFE9,AFF9,AFG9,AFH9,AFI9,  PSRC0550
3AFD10,AFE10,AFF10,AFG10,AFC11,AFD11,AFE11,AFF11,AFB12,WB1,WC1,WD1,PSRC0560
4WB2,WC2,CB1,CC1,CD1,CB2,CC2,CD2,CB3,CC3,CD3,GC1,GD1,GE1,GC2,GD2,   PSRC0570
5GF2,GF2,GG2,GH2,GI2,GJ2,GC3,GD3,GE3,GF3,GG3,GH3,GI3,GJ3,GK3,GL3,   PSRC0580
6GM3,GN3,GP3,GC4,GD4,GE4,GF4,GG4,GH4,GI4,GJ4,GK4,GL4,GC5,GD5,GE5,   PSRC0590
7GF5,GG5,CFTTAB(11),PFTTAB(11)                                      PSRC0600
 COMMON /CSTPRV/ CBLC,CBMC,CCASE,CCFU,CCL,CCM,CCOMI,CCOML,CCOMM,    PSRC0610
1 CCONT,CCRD,CEBFU,CEBRD,CETJ,CEXIN,CGFU,CGRD,                      PSRC0620
2 CGT,CGTOT,CIGN,CIRJFU,      CIRJRD,      CLF,CLFL,CLGG,CLI,CLM,   PSRC0630
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     3              CLRFU,CLRRD,CLRT,CLTC,CLTP,CM,CMGG,CMM,CMTC,CMTP,     PSRC0640
     4 CMV,CNOZ,CNRJFU,       CNRJRD,       CP,CPAFI,CPENG,CPL,CPLC,     PSRC0650
     5 CPMFGL,CPMFGM,CPQA,CPR,CPRC,CPS,CPSMGG,CPSN2,CPSRAM,CPSSGG,        PSRC0660
     6 CPTOOL,CRAFI,CRDEV,CREG,CRENG,CRFTO,CRJC,CRMFGL,CRMFGM,CRQA,       PSRC0670
     7 CRTOOL,CSA,CSRFU,CSRRD,CSRT,CT,CTAFI,CTC,CTFB,CTIRJ,CTJFU,         PSRC0680
     8 CTJLF,CTJLFL,CTJRD,CTJT,       CTL,CTM,CTNRJ,CTP,CWH,CWHFU,CWHR,   PSRC0690
     9 CBCDC,CRPS,CPFU,PROFPR,PRFUAF,PRRAF,CCLB,CCMB,CTCB,CLIB,CNOZB,     PSRC0700
     A CPRB,CPLB,CIGNB,CSAB,PRCFEX                                        PSRC0710
      NAMELIST /ERRPRT/ CBLC,CBMC,CCASE,CLI,CNOZ,CPRC,CPLC,CSA,CIGN,      PSRC0720
     1 CSRFU,CSRRD,CSRT                                                   PSRC0730
      ZS = WMC                                                            PSRC0740
      ZSS = DTHRT                                                         PSRC0750
      ZSSS = RNOZI                                                        PSRC0760
      ZSSSS = WM                                                          PSRC0770
      WMC = SWMC                                                          PSRC0780
      DTHRT = SDTHRT                                                      PSRC0790
      RNOZI = SRNOZI                                                      PSRC0800
      WM = SWM                                                            PSRC0810
1     CBLC=PSA1*1.1*(PSB1/WMC)**PSC1*WMC                                  PSRC0820
2     CBMC=1.1*PSA2*(PSB2/WMC)**PSC2*WMC                                  PSRC0830
3     CCASE=PSA3*(CBLC+CBMC)+PSB3                                         PSRC0840
4     CLI=PSA4*PSB4*1.1*(PSC4/DP)**PSD4*DP+PSE4                           PSRC0850
5     CNOZ=PSA5*PSB5*3.3*WN*(PSC5+PSD5*DTHRT+PSE5*RNOZI)+PSF5             PSRC0860
6     CPRC=PSA6*WP*(PSB6/(PSC6*WP))**PSD6*PSF6/PSE6+PSG6                  PSRC0870
7     CPLC=PSA7*1.1*PSB7*WP*(PSC7/(PSD7*WP))**PSE7+PSF7                   PSRC0880
8     CSA=PSA8                                                            PSRC0890
9     CIGN=PSA9                                                           PSRC0900
10    CSRFU=PSA10*(1.+PSPC)*(PSB10*1.15*(CCASE+CLI+CNOZ+CPRC+CPLC+CSA     PSRC0910
     1 +CIGN)+PSC10)                                                      PSRC0920
      CPFU=CSRFU                                                          PSRC0930
      PROFPR=CSRFU*PSPC/(1.+PSPC)                                         PSRC0940
11    CSRRD=PSA11*(1.+PSPC)*(PSB11*PSC11*(D*WM)**PSD11*1.462+PSE11)       PSRC0950
      CRPS=CSRRD                                                          PSRC0960
12    CSRT=CSRFU+CSRRD                                                    PSRC0970
      CBLC=CBLC*PSA10                                                     PSRC0980
      CBMC=CBMC*PSA10                                                     PSRC0990
      CCASE=CCASE*PSA10                                                   PSRC1000
      CLI=CLI*PSA10                                                       PSRC1010
      CNOZ=CNOZ*PSA10                                                     PSRC1020
      CPRC=CPRC*PSA10                                                     PSRC1030
      CPLC=CPLC*PSA10                                                     PSRC1040
      CSA=CSA*PSA10                                                       PSRC1050
      CIGN=CIGN*PSA10                                                     PSRC1060
      IF (IPRCST .NE. 0) WRITE (6,ERRPRT)                                 PSRC1070
      WMC = ZS                                                            PSRC1080
      DTHRT = ZSS                                                         PSRC1090
      RNOZI = ZSSS                                                        PSRC1100
      WM = ZSSSS                                                          PSRC1110
      RETURN                                                              PSRC1120
      END                                                                 PSRC1130


      SUBROUTINE PIRCST                                                   PIRC0010
C                                                                         PIRC0020
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C          INTEGRAL RAMJET PROPULSION COST                                  PIRC0030
C                                                                           PIRC0040
      REAL NOZWT,MP                                                         PIRC0050
      COMMON /COMVLS/ WTANK,VEXIN,VREQ,GGW,HPPUMP,WTFUEL,WCOMM,VCCMI,       PIRC0060
     1 RS,Y1,WNOZ,KEM,MATTK,A,DCOM,WMC,VBI,DTHRT,RNOZI,NCZWT,MP,CASEM,      PIRC0070
     2 ENET,WT,WF,EMAX,S,T4,METTJ,ZXNB,D,WM,FC,PPEAK,BSP,NDET,QA,WCS,       PIRC0080
     3 WWH,WTC,WTP,WGG,WSC,WLV,VGT,WO,WP,DP,WN,METAL,NCCNFG                 PIRC0090
      COMMON /COSTIN/   PRIA1,PRIA2,PRJC,PRIA3,PRIB3,PRIA4,PRIE4,PRIA5,     PIRC0100
     1PRIA6,PRIA7,PRIA8,PRIB8,PRIA9,PRIG9,PRIA10,PRIA11,PRIG11,PRIA12,      PIRC0110
     2PRIB12,PRIE12,PRIA13,PRIE13,PRIA14,PRIE14,PRIA15,PRIE15,PRIA16,       PIRC0120
     3PRIE16,PRIA17,PRIF17,PRIA18,PRIB18,PRIE18,PRIA19,PRIE19,PRIA20,       PIRC0130
     4PRIA21,PRIA22,PRIB22,PRIA23,PRIB23,PRIC23,PRIA24,PRIC24,PRIA25,       PIRC0140
     5PRIB25,PRIA26,PRIB26,PRIC26,PRNA1,PRNA2,PRNA3,PRNB3,PRNA4,PRNE4,      PIRC0150
     6PRNA5,PRNA6,PRNA7,PRNA8,PRNB8,PRNA9,PRNG9,PRNA10,PRNA11,PRNG11,       PIRC0160
     7PRNA12,PRNB12,PRNE12,PRNA13,PRNE13,PRNA14,PRNE14,PRNA15,PRNA16,       PIRC0170
     8PRNA17,PRNA18,PRNB18,PRNA19,PRNB19,PRNC19,PRNA20,PRNC20,PRNA21,       PIRC0180
     9PRNB21,PRNA22,PRNB22,PRNC22,PLPC,PLA1,PLA3,PLB3,PLA4,PLA6,PLA8,       PIRC0190
     APLB8,PLA9,PLA11,PLB11,PLA13,PLB13,PLC13,PLD13,PLA14,PLD14,PLA15,      PIRC0200
     BPLB15,PLE15,PLF15,PLA16,PLF16,PLA17,PLA18,PLB18,PLC18,PLA19,PLA20,    PIRC0210
     CPLB20,PLA21,PLB21,PLC21,PTA1,PTD1,PTA4,PTB4,PTA5,PTB5,PTE5,PTA6,      PIRC0220
     DPTE6,PTA7,PTB7,PTC7,PTJC,PTA8,PTD8,PTA9,PTB9,PTA10,PTB10,PTC10,       PIRC0230
     EPEA3,PEB3,PEA4,PEE4,PEA5,PEE5,PEA6,PEB6,PEE6,PEA7,PEE7,PEA8,PEA9,     PIRC0240
     FPEA10,PEB10,PEC10,PEA11,PEB11,PEE11,PEBC,PSPC,PSA3,PSB3,PSA4,PSE4,    PIRC0250
     GPSA5,PSE5,PSA6,PSE6,PSG6,PSA7,PSE7,PSA8,PSA9,PSA10,PSB10,PSC10,       PIRC0260
     HPSA11,PSB11,PSE11,CFT,PFT,CFCASE,PFCASE,CFC,PFC,CFM,PFM,IYEAR         PIRC0270
      COMMON /COSTIN/   PRIB1,PRIC1,PRIB2,PRIC2,PRIB4,PRIC4,PRID4,PRIB5,    PIRC0280
     1PRIC5,PRIB9,PRIC9,PRID9,PRIE9,PRIF9,PRIB11,PRIC11,PRID11,PRIE11,      PIRC0290
     2PRIF11,PRIC12,PRID12,PRIB13,PRIC13,PRID13,PRIB14,PRIC14,PRID14,       PIRC0300
     3PRIB15,PRIC15,PRID15,PRIB16,PRIC16,PRID16,PRIB17,PRIC17,PRID17,       PIRC0310
     4PRIE17,PRIC18,PRID18,PRIB19,PRIC19,PRID19,PRIB24,PRNB1,PRNC1,PRNB2    PIRC0320
     5,PRNC2,PRNB4,PRNC4,PRND4,PRNB5,PRNC5,PRNB9,PRNC9,PRND9,PRNE9,PRNF9    PIRC0330
     6,PRNB11,PRNC11,PRND11,PRNE11,PRNF11,PRNC12,PRND12,PRNB13,PRNC13,      PIRC0340
     7PRND13,PRNB14,PRNC14,PRND14,PRNB15,PRNC15,PRND15,PRNB16,PRNC16,       PIRC0350
     8PRND16,PRNB17,PRNC17,PRND17,PRNE17,PRNB20,PLB1,PLC1,PLA2,PLB2,PLB4    PIRC0360
     9,PLC4,PLA5,PLB5,PLB6,PLC6,PLA7,PLB7,PLB9,PLC9,PLA10,PLB10,PLA12,      PIRC0370
     APLB12,PLB14,PLC14,PLC15,PLD15,PLB16,PLC16,PLD16,PLB19,PLC19,PTB1,     PIRC0380
     BPTC1,PTA2,PTB2,PTA3,PTB3,PTC5,PTD5,PTB6,PTC6,PTD6,PTB8,PTC8,PEA1,     PIRC0390
     CPEB1,PEC1,PEA2,PEB2,PEC2,PEB4,PEC4,PED4,PEB5,PEC5,PED5,PEE5,PEC6,     PIRC0400
     DPED6,PEB7,PEC7,PED7,PEC11,PED11,PSA1,PSB1,PSC1,PSA2,PSB2,PSC2,PSB4    PIRC0410
     E,PSC4,PSD4,PSB5,PSC5,PSD5,PSE5,PSB6,PSC6,PSD6,PSE6,PSB7,PSC7,PSD7,    PIRC0420
     FPSE7,PSC11,PSD11,PRND22,PLD21,PLE21,PTD10,PTE10,PRID26                PIRC0430
      COMMON /COSTIN/   PROFIT,QD,R,AFA1,AFB1,AFC1,AFD1,AFI1,AFA2,AFB2,     PIRC0440
     1AFG2,AFA3,AFB3,AFG3,AFA4,AFB4,AFC4,AFD4,AFJ4,AFA5,AFB5,AFC5,AFH5,     PIRC0450
     2AFA6,AFB6,AFG6,AFA7,AFC7,AFD7,AFA8,AFB8,AFC8,AFD8,AFI8,AFA9,AFB9,     PIRC0460
     3AFC9,AFD9,AFJ9,AFA10,AFB10,AFC10,AFH10,AFA11,AFB11,AFG11,AFA12,       PIRC0470
     4AFC12,AFD12,AFA13,AFB13,AFC13,AFA14,AFB14,AFC14,KFUZE,WA1,WE1,WF1,    PIRC0480
     5WA2,WD2,WF2,KGAIN,CA1,CF1,CE1,CA2,CE2,CF2,CA3,CE3,CF3,GA1,GB1,GF1,    PIRC0490
     6KLE6,KGT6,KSTAB,KAGATE,NCHAN,KSGATE,GA2,GB2,GK2,GA3,GB3,GQ3,GA4,      PIRC0500
     7GB4,GM4,GA5,GB5,GH5,KG,KC,KW,KA,KP,IGTYPE,ICTYPE,IPRCST               PIRC0510
      COMMON /COSTIN/   AFE1,AFF1,AFG1,AFH1,AFC2,AFD2,AFE2,AFF2,AFC3,       PIRC0520
     1AFD3,AFE3,AFF3,AFE4,AFF4,AFG4,AFH4,AFI4,AFD5,AFE5,AFF5,AFG5,AFC6,     PIRC0530
     2AFD6,AFE6,AFF6,AFB7,AFE8,AFF8,AFG8,AFH8,AFE9,AFF9,AFG9,AFH9,AFI9,     PIRC0540
     3AFD10,AFE10,AFF10,AFG10,AFC11,AFD11,AFE11,AFF11,AFB12,WB1,WC1,WD1,    PIRC0550
     4WB2,WC2,CB1,CC1,CD1,CB2,CC2,CD2,CB3,CC3,CD3,GC1,GD1,GE1,GC2,GD2,      PIRC0560
     5GE2,GF2,GG2,GH2,GI2,GJ2,GC3,GD3,GE3,GF3,GG3,GH3,GI3,GJ3,GK3,GL3,      PIRC0570
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     6GM3,GN3,GP3,GC4,GD4,GE4,GF4,GG4,GH4,GI4,GJ4,GK4,GL4,GC5,GD5,GF5,   PIRC0580
     7GF5,GG5,CFTTAB(11),PFTTAB(11)                                      PIRC0590
      COMMON /CSTPRV/ CBLC,CBMC,CCASE,CCFU,CCL,CCM,CCOMI,CCOML,CCOMM,     PIRC0600
     1 CCONT,CCRD,CFBFU,CFBRD,CFTJ,CFXIN,CGFU,CGRD,                       PIRC0610
     2 CGT,CGTOT,CIGN,CIRJFU,       CIRJRD,       CLF,CLFL,CLGG,CLI,CLM,  PIRC0620
     3             CLRFU,CLRRD,CLRT,CLTC,CLTP,CM,CMGG,CMM,CMTC,CMTP,     PIRC0630
     4 CMV,CNOZ,CNRJFU,       CNRJRD,       CP,CPAFI,CPENG,CPL,CPLC,     PIRC0640
     5 CPMFGL,CPMFGM,CPQA,CPR,CPRC,CPS,CPSMGG,CPSN2,CPSRAM,CPSSGG,        PIRC0650
     6 CPTOOL,CRAFI,CRDEV,CREG,CRENG,CRFTO,CRJC,CRMFGL,CRMFGM,CRQA,       PIRC0660
     7 CRTOOL,CSA,CSRFU,CSRRD,CSRT,CT,CTAFI,CTC,CTFB,CTIRJ,CTJFU,         PIRC0670
     8 CTJLF,CTJLFL,CTJRD,CTJT,       CTL,CTM,CTNRJ,CTP,CWH,CWHFU,CWHR,   PIRC0680
     9 CBOOC,CRPS,CPFU,PROFPR,PRFUAF,PRRAF,CCLB,CCMB,CTCP,CLIB,CNOZB,     PIRC0690
     A CPRB,CPLB,CIGNB,CSAB,PROFFX                                        PIRC0700
      NAMELIST /ERRPRT/ CTL,CTM,CT,CFXIN,CGT,CREG,CMV,CPSN2,CPSSGG,       PIRC0710
     1 CPSMGG,CPSRAM,CLF,CLFL,CBLC,CBMC,CLI,CNOZ,CPRC,CPLC,CIGN,CSA,      PIRC0720
     2 CBOOC,CIRJFU,             CIRJRD,CTIRJ,CPS                        PIRC0730
      CFTU=CFTTAB(MATTK)                                                  PIRC0740
      PFTU=PFTTAB(MATTK)                                                  PIRC0750
      I=CASEM                                                             PIRC0760
      CFCASU=CFTTAB(I)                                                    PIRC0770
      PFCASU=PFTTAB(I)                                                    PIRC0780
      IF (CFT .NE. 0.) CFTU=CFT                                           PIRC0790
      IF (PFT .NE. 0.) PFTU=PFT                                           PIRC0800
      IF (CFCASE .NE. 0.) CFCASU=CFCASE                                   PIRC0810
      IF (PFCASE .NE. 0.) PFCASU=PFCASE                                   PIRC0820
1     CTL=1.059*PRIA1*PRIB1*CFTU*WTANK**PRIC1                             PIRC0830
2     CTM=1.059*PRIA2*PRIB2*PFTU*WTANK**PRIC2                             PIRC0840
3     CT=PRIA3*(CTL+CTM)+PRIB3                                            PIRC0850
      CFXIN = 0.0                                                         PIRC0860
      IF ( VEXIN .EQ. C.0 ) GO TO 9991                                    PIRC0870
4     CFXIN=1.1*PRIA4*PRIB4*(PRIC4/VEXIN)**PRID4*VEXIN+PRIE4              PIRC0880
9991  CONTINUE                                                            PIRC0890
      IF(KFM.NE.1) GO TO 1000                                             PIRC0900
5     CGT=1.059*PRIA5*PRIB5*VREQ**PRIC5/1000.                             PIRC0910
6     CREG=PRIA6                                                          PIRC0920
7     CMV=PRIA7                                                           PIRC0930
8     CPSN2=PRIA8*(CGT+CREG+CMV)+PRIB8                                    PIRC0940
1000  IF(KFM.NE.3) GO TO 2000                                             PIRC0950
9     CPSSGG=1.1*PRIA9*PRIB9*(PRIC9*(PRID9/GGW)**PRIE9*GGW+PRIF9)+PRIG9   PIRC0960
2000  IF(KFM.NE.2) GO TO 3000                                             PIRC0970
10    CPSMGG=PRIA10                                                       PIRC0980
3000  IF(KFM.NE.4) GO TO 4000                                             PIRC0990
11    CPSRAM=1.1*PRIA11*(PRIB11*(PRIC11+PRID11*HPPUMP)-PRIE11*HPPUMP      PIRC1000
     1 **PRIF11)+PRIG11                                                   PIRC1010
4000  CONTINUE                                                            PIRC1020
      CPS=0.                                                              PIRC1030
      IF (KFM .EQ. 1) CPS=CPSN2                                           PIRC1040
      IF (KFM .EQ. 2) CPS=CPSMGG                                          PIRC1050
      IF (KFM .EQ. 3) CPS=CPSSGG                                          PIRC1060
      IF (KFM .EQ. 4) CPS=CPSRAM                                          PIRC1070
12    CLF=PRIA12*PRIB12*(PRIC12/WTFUEL)**PRID12*WTFUEL/1000.+PRIE12       PIRC1080
13    CLFL=1.1*PRIA13*PRIB13*(PRIC13/WTFUEL)**PRID13*WTFUEL+PRIE13        PIRC1090
14    CBLC=1.1*PRIA14*PRIB14*CFCASU*(PRIC14/WMC)**PRID14*WMC+PRIE14       PIRC1100
15    CBMC=1.1*PRIA15*PRIB15*PFCASU*(PRIC15/WMC)**PRID15*WMC+PRIE15       PIRC1110
16    CLI=1.1*PRIA16*PRIB16*(PRIC16/VBI)**PRID16*VBI+PRIE16               PIRC1120
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 17   CNOZ=1.1*PRIA17*PRIB17*(PRIC17+PRID17*2.**R5+PRIE17*Y1)**NOZWT      PIRC1130
     1 +PRIE17                                                           PIRC1140
 18   CPRC=PRIA18*PRIB18/1000.*(PRIC18/MP)**PRID18*MP+PRIE18             PIRC1150
 19   CPLC=1.1*PRIA19*PRIB19*(PRIC19/MP)**PRID19*MP+PRIE19               PIRC1160
 20   CIGN=PRIA20                                                        PIRC1170
 21   CSA=PRIA21                                                         PIRC1180
 22   CBOOC=PRIA22*(CBLC+CBMC+CLI+CNOZ+CPRC+CPLC+CIGN+CSA)+PRIB22        PIRC1190
 23   CIRJFU=PRIA23*(1.+PRJC)*(1.15*PRIB23*(CT+CFXIN+CPS+CLF+CLFL+CBOOC)PIRC1200
     1 +PRIC23)                                                          PIRC1210
      CPFU=CIRJFU                                                       PIRC1220
      PROFPR=CIRJFU*PRJC/(1.+PRJC)                                      PIRC1230
 26   CIRJRD=(1.+PRJC)*PRIA26*(PRIB26*1.184*PRID26*DCOM+PRIC26)          PIRC1240
      CRPS=CIRJRD                                                       PIRC1250
 27   CTIRJ=CIRJFU+CIRJRD                                               PIRC1260
      CTL=CTL*PRIA23                                                    PIRC1270
      CTM=CTM*PRIA23                                                    PIRC1280
      CT=CT*PRIA23                                                      PIRC1290
      CFXIN=CFXIN*PRIA23                                                PIRC1300
      CGT=CGT*PRIA23                                                    PIRC1310
      CREG=CREG*PRIA23                                                  PIRC1320
      CMV=CMV*PRIA23                                                    PIRC1330
      CPSN2=CPSN2*PRIA23                                                PIRC1340
      CPSSGG=CPSSGG*PRIA23                                              PIRC1350
      CPSMGG=CPSMGG*PRIA23                                              PIRC1360
      CPSRAM=CPSRAM*PRIA23                                              PIRC1370
      CPS=CPS*PRIA23                                                    PIRC1380
      CLF=CLF*PRIA23                                                    PIRC1390
      CLFL=CLFL*PRIA23                                                  PIRC1400
      CBLC=CBLC*PRIA23                                                  PIRC1410
      CBMC=CBMC*PRIA23                                                  PIRC1420
      CLI=CLI*PRIA23                                                    PIRC1430
      CNOZ=CNOZ*PRIA23                                                  PIRC1440
      CPRC=CPRC*PRIA23                                                  PIRC1450
      CPLC=CPLC*PRIA23                                                  PIRC1460
      CIGN=CIGN*PRIA23                                                  PIRC1470
      CSA=CSA*PRIA23                                                    PIRC1480
      CBOOC=CBOOC*PRIA23                                                PIRC1490
      IF (IPRCST .NE. 0) WRITE (6,ERRPRT)                               PIRC1500
      RETURN                                                            PIRC1510
      END                                                               PIRC1520


      SUBROUTINE PNRCST                                                 PNRC0010
C                                                                       PNRC0020
C          NON-INTEGRAL RAMJET SUSTAINER PROPULSION COST                PNRC0030
C                                                                       PNRC0040
      REAL NOZWT,MP                                                     PNRC0050
      COMMON /COMVLS/ WTANK,VEXIN,VREQ,GGW,HPPUMP,WTFUEL,WCOMM,VCCMI,   PNRC0060
     1 R5,Y1,WNOZ,KFM,MATTK,A,DCOM,WMC,VBI,DTHRT,RNOZI,NOZWT,MP,CASEM,  PNRC0070
     2 FNET,WT,WF,FMAX,S,T4,METTJ,ZXNB,D,WM,FC,PPEAK,BSP,NDET,QA,WCS,   PNRC0080
     3 WWH,WTC,WTP,WGG,WSC,WLV,VGT,WO,WP,DP,WN,METAL,NCONFG             PNRC0090
      COMMON /COSTIN/   PRIA1,PRIA2,PRJC,PRIA3,PRIB3,PRIA4,PRIE4,PRIA5, PNRC0100
     1PRIA6,PRIA7,PRIA8,PRIB8,PRIA9,PRIG9,PRIA10,PRIA11,PRIG11,PRIA12,  PNRC0110
     2PRIB12,PRIE12,PRIA13,PRIE13,PRIA14,PRIE14,PRIA15,PRIE15,PRIA16,   PNRC0120
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3PRIE16,PRIA17,PRIE17,PRIA18,PRIB18,PRIE18,PRIA19,PRIE19,PRIA20,    PNRC0130
4PRIA21,PRIA22,PRIB22,PRIA23,PRIB23,PRIC23,PRIA24,PRIC24,PRIA25,    PNRC0140
5PRIB25,PRIA26,PRIB26,PRIC26,PRNA1,PRNA2,PRNA3,PRNB3,PRNA4,PRNE4,   PNRC0150
6PRNA5,PRNA6,PRNA7,PRNA8,PRNB8,PRNA9,PRNG9,PRNA10,PRNA11,PRNG11,    PNRC0160
7PRNA12,PRNB12,PRNE12,PRNA13,PRNE13,PRNA14,PRNE14,PRNA15,PRNA16,    PNRC0170
8PRNA17,PRNA18,PRNB18,PRNA19,PRNB19,PRNC19,PRNA20,PRNC20,PRNA21,    PNRC0180
9PRNB21,PRNA22,PRNB22,PRNC22,PLPC,PLA1,PLA3,PLB3,PLA4,PLA6,PLA8,    PNRC0190
APLB8,PLA9,PLA11,PLB11,PLA13,PLB13,PLC13,PLD13,PLA14,PLD14,PLA15,   PNRC0200
BPLB15,PLE15,PLF15,PLA16,PLE16,PLA17,PLA18,PLB18,PLC18,PLA19,PLA20, PNRC0210
CPLB20,PLA21,PLB21,PLC21,PTA1,PTD1,PTA4,PTB4,PTA5,PTB5,PTE5,PTA6,   PNRC0220
DPTE6,PTA7,PTB7,PTC7,PTJC,PTA8,PTD8,PTA9,PTB9,PTA10,PTB10,PTC10,    PNRC0230
EPEA3,PEB3,PEA4,PEE4,PEA5,PEF5,PEA6,PEB6,PEE6,PEA7,PEE7,PEA8,PEA9,  PNRC0240
FPEA10,PEB10,PEC10,PEA11,PEB11,PEE11,PEBC,PSPC,PSA3,PSB3,PSA4,PSE4, PNRC0250
GPSA5,PSE5,PSA6,PSE6,PSG6,PSA7,PSE7,PSA8,PSA9,PSA10,PSB10,PSC10,    PNRC0260
HPSA11,PSB11,PSE11,CFT,PFT,CFCASE,PFCASE,CFC,PFC,CFM,PFM,IYEAR      PNRC0270
 COMMON /COSTIN/   PRIB1,PRIC1,PRIB2,PRIC2,PRIB4,PRIC4,PRID4,PRIB5, PNRC0280
1PRIC5,PRIB9,PRIC9,PRID9,PRIE9,PRIF9,PRIB11,PRIC11,PRID11,PRIE11,   PNRC0290
2PRIF11,PRIC12,PRID12,PRIB13,PRIC13,PRID13,PRIB14,PRIC14,PRID14,    PNRC0300
3PRIB15,PRIC15,PRID15,PRIB16,PRIC16,PRID16,PRIB17,PRIC17,PRID17,    PNRC0310
4PRIF17,PRIC18,PRID18,PRIB19,PRIC19,PRID19,PRIB24,PRNB1,PRNC1,PRNB2 PNRC0320
5,PRNC2,PRNB4,PRNC4,PRND4,PRNB5,PRNC5,PRNB9,PRNC9,PRND9,PRNE9,PRNF9 PNRC0330
6,PRNB11,PRNC11,PRND11,PRNE11,PRNF11,PRNC12,PRND12,PRNB13,PRNC13,   PNRC0340
7PRND13,PRNB14,PRNC14,PRND14,PRNB15,PRNC15,PRND15,PRNB16,PRNC16,    PNRC0350
8PRND16,PRNB17,PRNC17,PRND17,PRNE17,PRNB20,PLB1,PLC1,PLA2,PLB2,PLB4 PNRC0360
9,PLC4,PLA5,PLB5,PLB6,PLC6,PLA7,PLB7,PLB9,PLC9,PLA10,PLB10,PLA12,   PNRC0370
APLB12,PLB14,PLC14,PLC15,PLD15,PLB16,PLC16,PLD16,PLB19,PLC19,PTB1,  PNRC0380
BPTC1,PTA2,PTB2,PTA3,PTB3,PTC5,PTD5,PTB6,PTC6,PTD6,PTB8,PTC8,PEA1,  PNRC0390
CPEB1,PEC1,PEA2,PEB2,PEC2,PEB4,PEC4,PED4,PEB5,PEC5,PED5,PEE5,PEC6,  PNRC0400
DPED6,PEB7,PEC7,PED7,PEC11,PED11,PSA1,PSB1,PSC1,PSA2,PSB2,PSC2,PSB4 PNRC0410
E,PSC4,PSD4,PSB5,PSC5,PSD5,PSE5,PSB6,PSC6,PSD6,PSE6,PSB7,PSC7,PSD7, PNRC0420
FPSE7,PSC11,PSD11,PRND22,PLD21,PLE21,PTD10,PTE10,PRID26             PNRC0430
 COMMON /COSTIN/   PROFIT,QD,R,AFA1,AFB1,AFC1,AFD1,AFI1,AFA2,AFB2,  PNRC0440
1AFG2,AFA3,AFB3,AFG3,AFA4,AFB4,AFC4,AFD4,AFJ4,AFA5,AFB5,AFC5,AFH5,  PNRC0450
2AFA6,AFB6,AFG6,AFA7,AFC7,AFD7,AFA8,AFB8,AFC8,AFD8,AFI8,AFA9,AFB9,  PNRC0460
3AFC9,AFD9,AFJ9,AFA10,AFB10,AFC10,AFH10,AFA11,AFB11,AFG11,AFA12,    PNRC0470
4AFC12,AFD12,AFA13,AFB13,AFC13,AFA14,AFB14,AFC14,KFUZE,WA1,WB1,WF1, PNRC0480
5WA2,WD2,WE2,KGAIN,CA1,CF1,CF1,CA2,CE2,CF2,CA3,CE3,CF3,GA1,GB1,GF1, PNRC0490
6KLF6,KGT6,KSTAB,KAGATE,NCHAN,KSGATE,GA2,GB2,GK2,GA3,GB3,GQ3,GA4,  PNRC0500
7CB4,CM4,GA5,GB5,GH5,KG,KC,KW,KA,KP,IGTYPE,ICTYPE,IPRCST            PNRC0510
 COMMON /COSTIN/   AFE1,AFF1,AFG1,AFH1,AFC2,AFD2,AFE2,AFF2,AFC3,    PNRC0520
1AFD3,AFE3,AFF3,AFE4,AFF4,AFG4,AFH4,AFI4,AFD5,AFE5,AFF5,AFG5,AFC6,  PNRC0530
2AFD6,AFE6,AFF6,AFB7,AFE8,AFF8,AFG8,AFH8,AFE9,AFF9,AFG9,AFH9,AFI9,  PNRC0540
3AFD10,AFE10,AFF10,AFG10,AFC11,AFD11,AFE11,AFF11,AFB12,WB1,WC1,WD1, PNRC0550
4WB2,WC2,CB1,CC1,CD1,CB2,CC2,CD2,CB3,CC3,CD3,GC1,GD1,GE1,GC2,GD2,   PNRC0560
5CE2,GF2,GG2,GH2,GI2,GJ2,GC3,GD3,GE3,GF3,GG3,GH3,GI3,GJ3,GK3,GL3,   PNRC0570
6CM3,GN3,GP3,GC4,GD4,GE4,GF4,GG4,GH4,GI4,GJ4,GK4,GL4,GC5,GD5,GE5,   PNRC0580
7GF5,GG5,CFTTAB(11),PFTTAB(11)                                      PNRC0590
 COMMON /CSTPRV/ CBLC,CBMC,CCASE,CCFU,CCL,CCM,CCOMI,CCOML,CCOMM,    PNRC0600
1 CCONT,CCRD,CEBFU,CEBRD,CETJ,CEXIN,CGFU,CGRD,                      PNRC0610
2 CGT,CGTOT,CIGN,CIRJFU,      CIRJRD,       CLF,CLFL,CLGG,CLI,CLM,  PNRC0620
3              CLRFU,CLRRD,CLRT,CLTC,CLTP,CM,CMGG,CMP,CMTC,CMTP,    PNRC0630
4 CMV,CNO7,CNRJFU,       CNRJRD,       CP,CPAFI,CPENG,CPL,CPLC,     PNRC0640
5 CPMFGL,CPMFGM,CPOA,CPR,CPRC,CPS,CPSMGG,CPSN2,CPSRAM,CPSSGG,       PNRC0650
6 CPTOOL,CRAFI,CRDEV,CREG,CRENG,CRETO,CRJC,CRMFGL,CRMFGM,CRQA,      PNRC0660
7 CRTOOL,CSA,CSRFU,CSRRD,CSRT,CT,CTAFI,CTC,CTEB,CTIRJ,CTJFU,        PNRC0670
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     8 CTJLF,CTJLFL,CTJPD,CTJT,        CTL,CTM,CTNRJ,CTP,CWH,CWHFU,CWHR,  PNRC0680
     9 CBOOC,CRPS,CPFU,PROFPR,PRFUAF,PRPAF,CCLB,CCMB,CTCB,CLIB,CNOZB,    PNRC0690
     A CPKB,CPLB,CIGNB,CSAB,PROFEX                                        PNRC0700
      NAMELIST /ERRPRT/ CTL,CTM,CT,CEXIN,CGT,CREG,CMV,CPSN2,CPSSGG,       PNRC0710
     1 CPSMGG,CPSRAM,CLF,CLFL,CCOML,CCOMM,CCOMI,CNOZ,CRJC,CNRJFU,         PNRC0720
     2              CNRJRD,CTNRJ,CPS                                      PNRC0730
      CFTU=CFTTAB(MATTK)                                                  PNRC0740
      PFTU=PFTTAB(MATTK)                                                  PNRC0750
      I=CASEM                                                             PNRC0760
      CFCU=CFTTAB(I)                                                      PNRC0770
      PFCU=PFTTAB(I)                                                      PNRC0780
      IF (CFT .NE. 0.) CFTU=CFT                                           PNRC0790
      IF (PFT .NE. 0.) PFTU=PFT                                           PNRC0800
      IF (CFC .NE. 0.) CFCU=CFC                                           PNRC0810
      IF (PFC .NE. 0.) PFCU=PFC                                           PNRC0820
1     CTL=1.059*PRNA1*PRNB1*CFTU*WTANK**PRNC1                             PNRC0830
2     CTM=1.059*PRNA2*PRNB2*PFTU*WTANK**PRNC2                             PNRC0840
3     CT=PRNA3*(CTL+CTM)+PRNB3                                            PNRC0850
      CEXIN = 0.0                                                         PNRC0860
      IF ( VEXIN .EQ. 0.0 ) GO TO 9991                                    PNRC0870
4     CEXIN=1.1*PRNA4*PRNB4*(PRNC4/VEXIN)**PRND4*VEXIN+PRNE4              PNRC0880
9991  CONTINUE                                                            PNRC0890
      IF(KEM.NE.1) GO TO 1000                                             PNRC0900
5     CGT=1.059*PRNA5*PRNB5*VREQ**PRNC5/1000.                             PNRC0910
6     CREG=PRNA6                                                          PNRC0920
7     CMV=PRNA7                                                           PNRC0930
8     CPSN2=PRNA8*(CGT+CREG+CMV)+PRNB8                                    PNRC0940
1000  IF(KEM.NE.3) GO TO 2000                                             PNRC0950
9     CPSSGG=1.1*PRNA9*PRNB9*(PRNC9*(PRND9/GGW)**PRNE9*GGW+PRNF9)+PRNG9   PNRC0960
2000  IF(KEM.NE.2) GO TO 3000                                             PNRC0970
10    CPSMGG=PRNA10                                                       PNRC0980
3000  IF(KEM.NE.4) GO TO 4000                                             PNRC0990
11    CPSRAM=1.1*PRNA11*(PRNB11*(PRNC11+PRND11*HPPUMP)-PRNE11*HPPUMP      PNRC1000
     1 **PRNF11)+PRNG11                                                   PNRC1010
4000  CONTINUE                                                            PNRC1020
      CPS=0.                                                              PNRC1030
      IF (KEM .EQ. 1) CPS=CPSN2                                           PNRC1040
      IF (KEM .EQ. 2) CPS=CPSMGG                                          PNRC1050
      IF (KEM .EQ. 3) CPS=CPSSGG                                          PNRC1060
      IF (KEM .EQ. 4) CPS=CPSRAM                                          PNRC1070
12    CLF=PRNA12*PRNB12*(PRNC12/WTFUEL)**PRND12*WTFUEL/1000.+PRNE12       PNRC1080
13    CLFL=1.1*PRNA13*PRNB13*(PRNC13/WTFUEL)**PRND13*WTFUEL+PRNE13        PNRC1090
14    CCOML=PRNA14*PRNB14*1.1*CFCU*(PRNC14/WCOMM)**PRND14*WCOMM           PNRC1100
15    CCOMM=1.1*PRNA15*PRNB15*PFCU*(PRNC15/WCOMM)**PRND15*WCOMM           PNRC1110
16    CCOMI=1.1*PRNA16*PRNB16*(PRNC16/VCOMI)**PRND16*VCOMI                PNRC1120
17    CNOZ=1.1*PRNA17*PRNB17*(PRNC17+PRND17*R5+PRNE17*Y1)*WNOZ            PNRC1130
18    CRJC=PRNA18*(CCOML+CCOMM+CCOMI+CNOZ)+PRNB18                         PNRC1140
19    CNRJFU=PRNA19*(1.+PRJC)*(1.15*PRNB19*(CT+CEXIN+CPS+CLF+CLFL+CRJC)   PNRC1150
     1 +PRNC19)                                                           PNRC1160
      CPFU=CNRJFU                                                         PNRC1170
      PROFPR=CNRJFU*PRJC/(1.+PRJC)                                        PNRC1180
22    CNRJRD=(1.+PRJC)*PRNA22*(PRNB22*1.184*PRND22*DCOM+PRNC22)           PNRC1190
      CRPS=CNRJRD                                                         PNRC1200
23    CTNRJ=CNRJFU+CNRJRD                                                 PNRC1210
      CTL=CTL*PRNA19                                                      PNRC1220
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      CT=CT*PRNA19                                                      PNRC1230
      CEXIN=CEXIN*PRNA19                                                PNRC1240
      CGT=CGT*PRNA19                                                    PNRC1250
      CREG=CREG*PRNA19                                                  PNRC1260
      CMV=CMV*PRNA19                                                    PNRC1270
      CPSN2=CPSN2*PRNA19                                                PNRC1280
      CPSSGG=CPSSGG*PRNA19                                              PNRC1290
      CPSMGG=CPSMGG*PRNA19                                              PNRC1300
      CPSRAM=CPSRAM*PRNA19                                              PNRC1310
      CPS=CPS*PRNA19                                                    PNRC1320
      CLF=CLF*PRNA19                                                    PNRC1330
      CLFL=CLFL*PRNA19                                                  PNRC1340
      CCOML=CCOML*PRNA19                                                PNRC1350
      CCOMM=CCOMM*PRNA19                                                PNRC1360
      CCOMI=CCOMI*PRNA19                                                PNRC1370
      CNOZ=CNOZ*PRNA19                                                  PNRC1380
      CPJC=CPJC*PRNA19                                                  PNRC1390
      IF (IPRCST .NE. 0) WRITE (6,ERRPRT)                               PNRC1400
      RETURN                                                            PNRC1410
      END                                                               PNRC1420


      SUBROUTINE PTJCST                                                 PTJC0010
C                                                                       PTJC0020
C          TURBOJET PROPULSION COST                                     PTJC0030
C                                                                       PTJC0040
      REAL NOZWT,MP                                                     PTJC0050
      COMMON /COMVLS/ WTANK,VEXIN,VREQ,GGW,NPPUMP,WTFUEL,WCOMM,WCOMI,   PTJC0060
     1 R5,Y1,WNOZ,KFM,MATTK,A,DCOM,WMC,VBI,DTHRT,RNOZI,NOZWT,MP,CASEM,  PTJC0070
     2 ENET,WT,WF,FMAX,S,T4,METTJ,ZXNB,D,WM,FC,PPEAK,BSP,NDET,QA,WCS,   PTJC0080
     3 WWH,WTC,WTP,WGG,WSC,WLV,VGT,WO,WP,DP,WN,METAL,NCONFG             PTJC0090
      COMMON /COSTIN/   PRIA1,PRIA2,PRJC,PRIA3,PRIB3,PRIA4,PRIE4,PRIA5, PTJC0100
     1PRIA6,PRIA7,PRIA8,PRIB8,PRIA9,PRIG9,PRIA10,PRIA11,PRIG11,PRIA12,  PTJC0110
     2PRIB12,PRIE12,PRIA13,PRIE13,PRIA14,PRIE14,PRIA15,PRIE15,PRIA16,   PTJC0120
     3PRIF16,PRIA17,PRIF17,PRIA18,PRIB18,PRIE18,PRIA19,PRIE19,PRIA20,   PTJC0130
     4PRIA21,PRIA22,PRIB22,PRIA23,PRIB23,PRIC23,PRIA24,PRIC24,PRIA25,   PTJC0140
     5PRIB25,PRIA26,PRIB26,PRIC26,PRNA1,PRNA2,PRNA3,PRNB3,PRNA4,PRNE4,  PTJC0150
     6PRNA5,PRNA6,PRNA7,PRNA8,PRNB8,PRNA9,PRNG9,PRNA10,PRNA11,PRNG11,   PTJC0160
     7PRNA12,PRNB12,PRNE12,PRNA13,PRNE13,PRNA14,PRNE14,PRNA15,PRNA16,   PTJC0170
     8PRNA17,PRNA18,PRNB18,PRNA19,PRNB19,PRNC19,PRNA20,PRNC20,PRNA21,   PTJC0180
     9PRNB21,PRNA22,PRNB22,PRNC22,PLPC,PLA1,PLA3,PLB3,PLA4,PLA6,PLA8,   PTJC0190
     APLB8,PLA9,PLA11,PLB11,PLA13,PLB13,PLC13,PLD13,PLA14,PLD14,PLA15,  PTJC0200
     BPLB15,PLF15,PLF15,PLA16,PLE16,PLA17,PLA18,PLB18,PLC18,PLA19,PLA20,PTJC0210
     CPLB20,PLA21,PLB21,PLC21,PTA1,PTD1,PTA4,PTB4,PTA5,PTB5,PTE5,PTA6,  PTJC0220
     DPTE6,PTA7,PTB7,PTC7,PTJC,PTA8,PTD8,PTA9,PTB9,PTA10,PTB10,PTC10,   PTJC0230
     EPEA3,PEB3,PEA4,PEE4,PEA5,PEF5,PEA6,PEB6,PEE6,PEA7,PEF7,PEA8,PEA9, PTJC0240
     FPEA10,PEB10,PEC10,PEA11,PEB11,PEE11,PEBC,PSPC,PSA3,PSB3,PSA4,PSE4,PTJC0250
     GPSA5,PSF5,PSA6,PSF6,PSG6,PSA7,PSF7,PSA8,PSA9,PSA10,PSB10,PSC10,   PTJC0260
     HPSA11,PSB11,PSF11,CFT,PFT,CFCASE,PFCASE,CFC,PFC,CFM,PFM,IYEAR     PTJC0270
      COMMON /COSTIN/   PRIB1,PRIC1,PRIB2,PRIC2,PRIB4,PRIC4,PRID4,PRIE5,PTJC0280
     1PRIC5,PRIB9,PRIC9,PRID9,PRIE9,PRIF9,PRIB11,PRIC11,PRID11,PRIE11,  PTJC0290
     2PRIF11,PRIC12,PRID12,PRIB13,PRIC13,PRID13,PRIB14,PRIC14,PRID14,   PTJC0300
     3PRIB15,PRIC15,PRID15,PRIB16,PRIC16,PRID16,PRIB17,PRIC17,PRID17,   PTJC0310
     4PRIF17,PRIC18,PRID18,PRIB19,PRIC19,PRID19,PRIB24,PRNB1,PRNC1,PRNB2PTJC0320
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     5,PRNC2,PRNB4,PRNC4,PRND4,PRNB5,PRNC5,PRNB9,PRNC9,PRND9,PRNE9,PRNF9PTJC0330
     6,PRNB11,PRNC11,PRND11,PRNE11,PRNF11,PRNC12,PRND12,PRNB13,PRNC13,  PTJC0340
     7PRND13,PRNB14,PRNC14,PRND14,PRNB15,PRNC15,PRND15,PRNB16,PRNC16,    PTJC0350
     8PRND16,PRNB17,PRNC17,PRND17,PRNF17,PRNB20,PLB1,PLC1,PLA2,PLB2,PLB4PTJC0360
     9,PLC4,PLA5,PLB5,PLB6,PLC6,PLA7,PLB7,PLB9,PLC9,PLA10,PLB10,PLA12,  PTJC0370
     APLB12,PLB14,PLC14,PLC15,PLD15,PLB16,PLC16,PLD16,PLB19,PLC19,PTB1,  PTJC0380
     BPTC1,PTA2,PTB2,PTA3,PTB3,PTC5,PTD5,PTB6,PTC6,PTD6,PTB8,PTC8,PEA1,  PTJC0390
     CPEB1,PEC1,PEA2,PEB2,PEC2,PEB4,PEC4,PED4,PEB5,PEC5,PED5,PEE5,PEC6,  PTJC0400
     DPED6,PEB7,PEC7,PED7,PEC11,PED11,PSA1,PSB1,PSC1,PSA2,PSB2,PSC2,PSB4PTJC0410
     E,PSC4,PSD4,PSB5,PSC5,PSD5,PSE5,PSB6,PSC6,PSD6,PSE6,PSB7,PSC7,PSD7,PTJC0420
     EPSE7,PSC11,PSD11,PRND22,PLD21,PLE21,PTD10,PTE10,PRID26              PTJC0430
      COMMON /COSTIN/   PROFIT,QD,R,AFA1,AFB1,AFC1,AFD1,AFI1,AFA2,AFB2,  PTJC0440
     1AFG2,AFA3,AFB3,AFG3,AFA4,AFB4,AFC4,AFD4,AFJ4,AFA5,AFB5,AFC5,AFH5,  PTJC0450
     2AFA6,AFB6,AFG6,AFA7,AFC7,AFD7,AFA8,AFB8,AFC8,AFD8,AFI8,AFA9,AFB9,  PTJC0460
     3AFC9,AFD9,AFJ9,AFA10,AFB10,AFC10,AFH10,AFA11,AFB11,AFG11,AFA12,    PTJC0470
     4AFC12,AFD12,AFA13,AFB13,AFC13,AFA14,AFB14,AFC14,KFUZE,WA1,WE1,WF1,PTJC0480
     5WA2,WD2,WE2,KGAIN,CA1,CE1,CF1,CA2,CE2,CF2,CA3,CE3,CF3,GA1,GB1,GF1,PTJC0490
     6KLF6,KGT6,KSTAB,KAGATE,NCHAN,KSGATE,GA2,GB2,GK2,GA3,GB3,GQ3,GA4,   PTJC0500
     7GB4,GM4,GA5,GB5,GH5,KG,KC,KW,KA,KP,IGTYPE,ICTYPE,IPRCST             PTJC0510
      COMMON /COSTIN/   AFE1,AFF1,AFG1,AFH1,AFC2,AFD2,AFE2,AFF2,AFC3,    PTJC0520
     1AFD3,AFE3,AFF3,AFE4,AFF4,AFG4,AFH4,AFI4,AFD5,AFE5,AFF5,AFG5,AFC6,  PTJC0530
     2AFD6,AFE6,AFF6,AFB7,AFE8,AFF8,AFG8,AFH8,AFE9,AFF9,AFG9,AFH9,AFI9,  PTJC0540
     3AFD10,AFE10,AFF10,AFG10,AFC11,AFD11,AFE11,AFF11,AFB12,WB1,WC1,WD1, PTJC0550
     4WP2,WC2,CB1,CC1,CD1,CB2,CC2,CD2,CB3,CC3,CD3,GC1,GD1,GE1,GC2,GD2,   PTJC0560
     5GE2,GF2,GG2,GH2,GI2,GJ2,GC3,GD3,GE3,GF3,GG3,GH3,GI3,GJ3,GK3,GL3,   PTJC0570
     6GM3,GN3,GP3,GC4,GD4,GE4,GF4,GG4,GH4,GI4,GJ4,GK4,GL4,GC5,GD5,GE5,   PTJC0580
     7GF5,GG5,CFTTAB(11),PFTTAB(11)                                       PTJC0590
      COMMON /CSTPRV/ CBLC,CBMC,CCASE,CCFU,CCL,CCM,CCDMI,CCDML,CCDMM,     PTJC0600
     1 CCONT,CCRD,CEBFU,CEBRD,CETJ,CEXIN,CGFU,CGRD,                       PTJC0610
     2 CGT,CGTOT,CIGN,CIRJFU,       CIRJRD,       CLF,CLFL,CLGG,CLI,CLM,  PTJC0620
     3              CLRFU,CLRRD,CLRT,CLTC,CLTP,CM,CMGG,CMM,CMTC,CMTP,     PTJC0630
     4 CMV,CNOZ,CNRJFU,       CNRJRD,       CP,CPAFI,CPENG,CPL,CPLC,     PTJC0640
     5 CPMFGL,CPMFGM,CPQA,CPR,CPRC,CPS,CPSMGG,CPSN2,CPSRAM,CPSSGG,        PTJC0650
     6 CPTOOL,CRAFI,CRDFV,CREG,CRENG,CRFTO,CRJC,CRMFGL,CRMFGM,CRQA,       PTJC0660
     7 CRTOOL,CSA,CSRFU,CSRRD,CSRT,CT,CTAFI,CTC,CTEB,CTIRJ,CTJFU,         PTJC0670
     8 CTJLF,CTJLFL,CTJRD,CTJT,       CTL,CTM,CTNRJ,CTP,CWH,CWHFU,CWHP,   PTJC0680
     9 CBODC,CRPS,CPFU,PROFPR,PRFUAF,PRRAF,CCLB,CCMB,CTCB,CLIB,CNCZB,     PTJC0690
     A CPRB,CPLB,CIGNB,CSAB,PROFFX                                        PTJC0700
      DIMENSION CFTARY(3),PFTARY(3)                                       PTJC0710
      NAMELIST /ERRPRT/ CETJ,CTL,CTM,CT,CTJLF,CTJLFL,CTJFU,               PTJC0720
     1         CTJRD,CTJT                                                 PTJC0730
      DATA CFTARY/.2,1.,1./                                               PTJC0740
      DATA PFTARY/.257,2.571,1./                                          PTJC0750
      CFTU=CFTARY(METTJ)                                                  PTJC0760
      PFTU=PFTARY(METTJ)                                                  PTJC0770
      PTB1U=1.52                                                          PTJC0780
      PTC1U=.6                                                            PTJC0790
      IF (T4 .GE. 2060.) PTB1U=3.08                                       PTJC0800
      IF (T4 .GT. 2360.) PTB1U=5.64                                       PTJC0810
      IF (CFT .NE. 0.) CFTU=CFT                                           PTJC0820
      IF (PFT .NE. 0.) PFTU=PFT                                           PTJC0830
      IF (PTB1 .NE. 0.) PTB1U=PTB1                                        PTJC0840
      IF (PTC1 .NE. 0.) PTC1U=PTC1                                        PTJC0850
1     CETJ=PTA1*PTB1U*FNET**PTC1U*1.222+PTD1                              PTJC0860
2     CTL=1.059*PTA2*CFTU*WT**PTB2                                        PTJC0870
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3     CTM=1.059*PTA3*PFTU*WT**PTB3                                          PTJC0880
4     CT=PTA4*(CTL+CTM)+PTB4                                                PTJC0890
5     CTJLF=PTA5*PTB5*(PTC5/WF)**PTD5*WF/1000.+PTE5                         PTJC0900
6     CTJLFL=1.1*PTA6*PTB6*(PTC6/WF)**PTD6*WF+PTE6                          PTJC0910
7     CTJFU=PTA7*(1.+PTJC)*(1.15*PTB7*(CETJ+CT+CTJLF+CTJLFL)+PTC7)          PTJC0920
      CPFU=CTJFU                                                            PTJC0930
      PROFPR=CTJFU*PTJC/(1.+PTJC)                                           PTJC0940
10    CTJRD=PTA10*(PTB10*1.462*PTD10*FMAX**PTE10+PTC10)*(1.+PTJC)           PTJC0950
      CRPS=CTJRD                                                            PTJC0960
11    CTJT=CTJFU+CTJRD                                                      PTJC0970
      CETJ=CETJ*PTA7                                                        PTJC0980
      CTL=CTL*PTA7                                                          PTJC0990
      CTM=CTM*PTA7                                                          PTJC1000
      CT=CT*PTA7                                                            PTJC1010
      CTJLF=CTJLF*PTA7                                                      PTJC1020
      CTJLFL=CTJLFL*PTA7                                                    PTJC1030
      IF (IPRCST .NE. 0) WRITE (6,ERRPRT)                                   PTJC1040
      RETURN                                                                PTJC1050
      END                                                                   PTJC1060
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