NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

Technical Memorandum 33-431

Volume II

FEDGE—A General-Purpose Computer Program for Finite Element Data Generation

Program Manual

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Preface

The work described in this report was performed by the Engineering Mechanics Division of the Jet Propulsion Laboratory.

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Program Manual

I. Introduction

The program language of the General-Purpose Finite Element Data Generation (FEDGE) computer program is FORTRAN II, with three additional subroutines in FAP program language. The program has been developed for the IBM 7094/7044 direct-coupled system with 36-bit, 32K fixed-word memory. In addition to the standard system, chain, and input/output (I/O) FORTRAN units, the program uses units No. 3, 4, 8, 9, and 10 as additional storage during the execution of the program.

In the present volume, detailed information concerning the structure of the program, the flow charts, the functions of the program, and the listings are presented. Although this information is completely descriptive for documentation purposes, a brief summary of the composition of the arrays, dimensions, and equivalence statements and tapes used is presented in Section II. The function of each link is summarized with additional information on the contents of the tape units in Table 1, and the meanings of prominent symbols used in the program are defined in Table 2.

Table 1. Summary of the function of each link

Link number	Function
1	Integration is performed along the lines and natural coordinate systems along the line faces and on the surface faces, or two-dimensional subdomains are generated. The list of coordinates for the natural coordinate systems on the surface faces of two-dimensional subdomains is stored in tape 10
2	The natural coordinate systems of surface units are read from tape 10. Natural coordinate systems for volume subdomains are generated. The coordinates of the final mesh are generated, printed, and punched out. Pertinent connectivity information is stored in tape 4
3	The connectivity information in tape 4 is duplicated in tape 3. The labels of nodes in each subdomain are determined. The boundary conditions (if any) are transferred to the proper nodal points, and stored in tape 8. The element properties, with associated nodal points, are determined, and stored in tape 9. The boundary condition information and element properties are printed and punched out. If $NE \leq -3$, the labels of each element are printed out for plotting purposes. Tape 9 is used for this purpose

The sections that follow present—for each link—one table containing the list of programs and their functions with their decimal word length, a figure for the summarized flow chart of the link, and the complete listing of the FORTRAN and FAP programs.

Although Vol. I can be used independently of Vol. II, Vol. I is an indispensable part of the documentation; therefore, references to Vol. I are cited herein.

II. General Information on Storage Organization

Basically, the programs use one array, A_i, which is common to the three links and contains all of the information needed for execution of the program. The dimensions of array A_i are 16684 in link 1, 22140 in link 2, and 23850 in link 3. The maximum number of storage locations in each link is carefully balanced with the program lengths for the 32K machine; there are practically no additional storage locations.

In all three links, A_i (i = 1–29) is equivalent to the constants, which in general do not change their value throughout a considerable portion of the program; A_i (i = 30–1000) is preserved for computed temporary constants in various links. The arrays that are read from the input data cards and contain special coordinates, intrinsic properties associated with the elements, and boundary conditions are stored in Ai (i = 1001–4600 and i = 6601–7201). Location A_i (i = 4601–6600) contains temporary specific information for each link. Arrays NX_i, NY_i, NZ_i, defining the number of mesh divisions in the I, J, K directions of the natural coordinate system, are stored in A_i (i = 7701–7850) in links 1 and 3, but are stored in A_i (i = 301–450) in link 2.

Table 2. Meanings of symbols

Location in array A_i	Symbol	Link number	Description
1	NE	1–3	Input type defined in Table 2 of Vol. I
2	NVOL	1–3	Number of volume subdomains
3	NSUR	1–3	Number of surface units
4	NLIN	1–3	Number of line units
5	LNG	1	Indicator for integration or generation of natural coordinates along the line faces
6	ISDE	1	Number of line faces
7	NC	1–3	Indicator and counter for various specific purposes
8	IO	1–3	Label of the subdomain where specific information is prescribed; in this program, $IO = 1$ at the beginning
9	CF	1–3	Refinement constant for final mesh; i.e., the ratio of two consecutive divisions that is measured in terms of natural-coordinate-system unit interval
10	XMI	1–3	Minimum x_1 coordinate in the overall coordinate system
11	YMI	1–3	Minimum x_2 coordinate in the overall coordinate system
12	ZMI	1–3	Minimum x_3 coordinate in the overall coordinate system
13	XMX	1–3	Maximum x_1 coordinate in the overall coordinate system
14	YMX	1–3	Maximum x_2 coordinate in the overall coordinate system
15	ZMX	1–3	Maximum x_3 coordinate in the overall coordinate system
16	IBOT	1	Constant for the maximum number of types of boundary conditions
17	SCX	1	Scale factor of x_1 direction
18	SCY	1	Scale factor of x_2 direction
19	SCZ	1	Scale factor of x_3 direction
20	DER	1–3	Incremental arc length along lines
21	ER	1–3	Error tolerance for distances

Table 2 (contd)

Location in array A_i	Symbol	Link number	Description
22	TER	1–3	Error tolerance for quadratics
23	NN	1–3	Number of divisions along one direction for natural coordinate systems; for this program, $NN = 16$
24	XNN	1–3	Floating point equivalent to NN
25	NNP	1–3	Number of nodal points along one direction for natural coordinate systems; for this program, $NNP = 17$
26	—	—	Not used
27	DT	1	Factor of refinement at the intersection of lines
1001–1050	XO_i	1–3	The x_1 coordinate of the special point in the ith[a] subdomain
1051–1100	YO_i	1–3	The x_2 coordinate of the special point in the ith[a] subdomain
1101–1150	ZO_i	1–3	The x_3 coordinate of the special point in the ith[a] subdomain
1151–1200	NMATE	1–3	Type of material and temperature
1201–1500	NFL	1–3	Sequential labels of the faces of the volume subdomains
1501–1600	MDM	1–3	Sequential labels of the surface units
1601–1700	MELMA	1–3	Element and material numbers for the surfaces
1701–1800	MPRTI	1–3	Pressure and thickness numbers for the surfaces
1801–1900	MTETG	1–3	Temperature-change and -gradient numbers for the surfaces
1901–2000	MBOVR	1–3	Boundary-condition and convexity index types for surfaces (see Table 5, Vol. I)
2001–2400	ML	1–3	Labels of the line faces of the surface faces or surface subdomains
2401–2600	IDM	1–3	Sequential labels of the line units
2601–2800	IELMA	1–3	Element and material numbers of the lines
2801–3000	IPRTE	1–3	Pressure- and temperature-change numbers for the lines
3001–3201	IGYGZ	1–3	Temperature-gradient number of the lines
3201–3400	IARMX	1–3	Area and torsional moment-of-inertia types for lines
3401–3600	IMYMZ	1–3	Moment-of-interia numbers for lines
3601–3800	IMFBO	1–3	Boundary condition numbers for lines
3801–4000	IDTNR	1–3	Number of coefficients of equations for lines and the intersection indicator (see Table 6, Vol. I)
4001–4600	IFL	1–3	Label of faces for faces
4601–6600	AN	1	Temporary storage for coefficients of equations or coordinates of prescribed boundary points
4601–6600	AN	2	Temporary location for coordinates of final-mesh nodal points and topological information for nodal points (NCN_i)
4601–6600	AN	3	List of labels in two adjacent subdomains (NCC_i, MCC_i)
6601–6800	IBON	1–3	Boundary condition information—direction labels
6801–7200	BORC	1–3	Boundary condition information—constants of linear relations

[a] $i = 1$ at the beginning of computations.

Table 2 (contd)

Location in array A_i	Symbol	Link number	Description
7201–7400	NCL	2	Indicator for common points of adjacent subdomains
7701–7850	NX,NY,NZ	1,3	Number of divisions in *I, J, K* directions of volume or surface subdomains (see Section I)
7951–13950	XB,YB,ZB	1	Coordinates of the boundary points for surface faces in three dimensions or of surface subdomains in two dimensions
13951–15684	CC	1	Temporary storage for the coordinates of the nodal points on surface faces in the overall and transformed coordinate systems
15685–16684	EL	1	Lengths of each line unit
7401–22140	XX,YY,ZZ	2	Temporary storage for the coordinates of the nodal points of natural coordinate systems in a subdomain
7851–23850	NCN,MCM	3	Labels of the nodal points in the final mesh

III. Listing of the Programs in Link 1

This section contains a list of programs, their functions, and their decimal word length (Table 3), a flow chart (Fig. 1), and a complete listing of the FORTRAN and FAP programs of link 1.

Table 3. Programs in link 1 of FEDGE

Program name	Length in 36-bit words	Label	Function
MAIN	555	FAMN1	Governs loops on line units, computes preliminary constants, and prints time message
ADJL	136	FAAJL	Adjusts and computes constants related to computations of line-unit lengths
BACO	818	FABCO	Computes pointers for locations of the coordinates of the origins of the faces
BOLI	125	FABLI	Determines line labels of the surface face in the proper order
COBA	83	FACBA	Places coordinates of the origin of line faces in the proper location
CONT	95	FACNT	Prepares constants to distinguish the inside from the outside of the nearly convex, closed surface domain
COPY	680	FACPY	Copies proper information for each line integration and starts integration procedure
CORD	152	FACRD	Determines coordinates of a nodal point by interpolation from the boundary points
DATA	431	FADTA	Reads and prints data for coefficients of the equations and boundary conditions
DIRC	245	FADRC	Computes components of incremental line segments for integration
DORB	1311	FADRB	Reads and prints topological information
DSAN	111	FADAN	Determines equations of segments defined by the coordinates of the end points
INTR	462	FAITR	Integrates along the lines

Table 3 (contd)

Program name	Length in 36-bit words	Label	Function
LEBIN[a]	12	FALSN	Checks whether a binary bit is 0 or 1
SEBIN[a]	52	FALSN	Stores 1 or 0 to the prescribed binary bit
LEBN	428	FALBN	Determines inside of the nearly convex surface domain
LENG	300	FALNG	Computes length of incremental line segments
NOCO	283	FANCO	Computes components of the normal vector on the boundary of a surface face in three-dimensional problems
NOGE	140	FANGE	Determines average normal vector of a surface in three-dimensional problems
NPUT	465	FANUT	Prepares constants for boundary points that are used for interpolation
ORKA	256	FAOKA	Makes corrections for the natural coordinate system
ORTA	135	FAOTA	Prepares correction procedure for the natural coordinate system
PREP	130	FAPEP	Computes coordinates of one of the points on the boundary for interpolation
REFD	273	FARFD	Distinguishes inside from outside of the closed surface, nearly convex domain
ROOT	250	FAROT	Finds exact values of the coordinates during the integration along the lines in two-dimensional problems
ROTZ	265	FARTZ	Finds exact values of the coordinates on the surface
SCAN	834	FASAN	Governs loops and computes constants for interpolation procedure
SLCO	81	FASCO	Checks incremental vector along the line
STEP	60	FASEP	Increments coordinates during the integration
SUTR	728	FASTR	Transforms surface equations and boundary coordinates in the local coordinate system of the surface face
SUDI	199	FASDI	Generates natural coordinate systems in the surface faces
SUZC	525	FASZC	Computes coordinates on the surface and transforms in overall coordinate system
TEST	191	FATST	Checks coordinates of the origin of a line face
TICK[a]	15	FATCK	Measures time

[a]In FAP language.

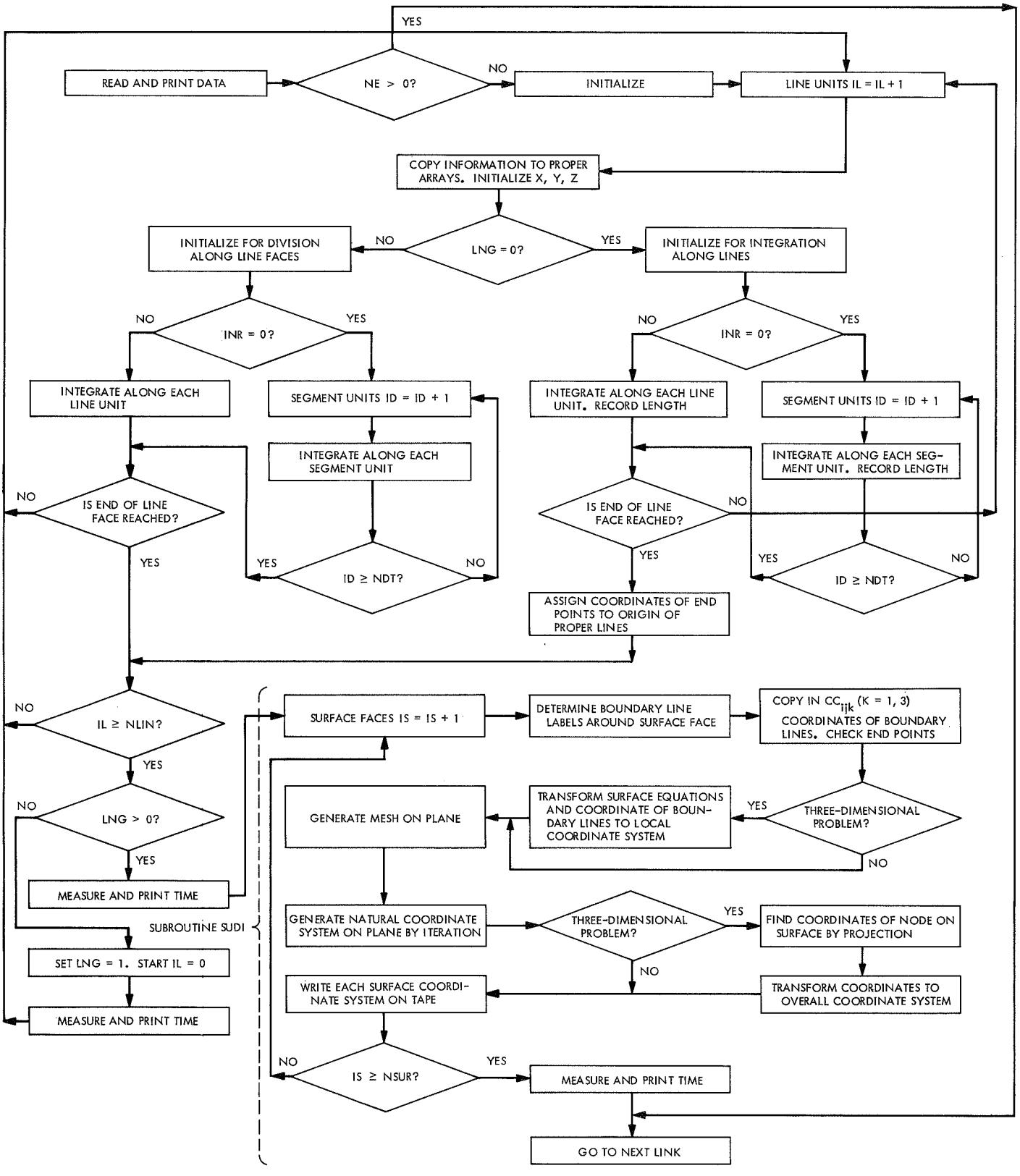

Fig. 1. Flow chart for link 1

FORTRAN and FAP Programs—Link 1

```
CFAMN1                                                                  FAMN1000
      DIMENSION A(16684),IA(16684),XO(50),YO(50),ZO(50),NMATE(50)       FAMN1001
     1,NFL(50,6),MDM(100),MELMA(100),MPRTI(100),MTETG(100),MBOVR(100)   FAMN1002
     2,ML(100,4),IDM(200),IELMA(200),IPRTE(200),IGYGZ(200),IARMX(200)   FAMN1003
     3,IMYMZ(200),IMFBO(200),IDTNR(200),IFL(200,3),AN(2000),IBON(50,4)  FAMN1004
     4,BORC(50,8),NCL(200),XIR(100),YIR(100),ZIR(100),NX(50),NY(50)     FAMN1005
     5,NZ(50)                                                           FAMN1006
      COMMON A                                                          FAMN1007
      EQUIVALENCE (A,IA),(A(1001),XO),(A(1051),YO),(A(1101),ZO)         FAMN1008
     1,(A(1151),NMATE),(A(1201),NFL),(A(1501),MDM),(A(1601),MELMA)      FAMN1009
     2,(A(1701),MPRTI),(A(1801),MTETG),(A(1901),MBOVR),(A(2001),ML)     FAMN1010
     3,(A(2401),IDM),(A(2601),IELMA),(A(2801),IPRTE),(A(3001),IGYGZ)    FAMN1011
     4,(A(3201),IARMX),(A(3401),IMYMZ),(A(3601),IMFBO),(A(3801),IDTNR)  FAMN1012
     5,(A(4001),IFL),(A(4601),AN),(A(6601),IBON),(A(6801),BORC)         FAMN1013
     6,(A(7201),NCL),(A(7401),XIR),(A(7501),YIR),(A(7601),ZIR)          FAMN1014
     7,(A(7701),NX),(A(7751),NY),(A(7801),NZ)                           FAMN1015
      EQUIVALENCE (A(1),NE),(A(2),NVOL),(A(3),NSUR),(A(4),NLIN)         FAMN1016
     1,(A(5),LNG),(A(6),ISDE),(A(7),NC),(A(8),IO),(A(9),CF),(A(10),XMI) FAMN1017
     2,(A(11),YMI),(A(12),ZMI),(A(13),XMX),(A(14),YMX),(A(15),ZMX)      FAMN1018
     3,(A(16),IBOT),(A(17),SCX),(A(18),SCY),(A(19),SCZ),(A(20),DER)     FAMN1019
     4,(A(21),ER),(A(22),TER),(A(23),NN),(A(24),XNN),(A(25),NNP)        FAMN1020
     5,(A(26),KR),(A(27),DT)                                            FAMN1021
      DIMENSION XB(2000),YB(2000),ZB(2000),CC(17,17,6),EL(200,5)        FAMN1022
      EQUIVALENCE (A(7951),XB),(A(9951),YB),(A(11951),ZB),(A(13951),CC) FAMN1023
     1,(A(15685),EL)                                                    FAMN1024
      DIMENSION IBTE(16),AL(10),AR(10),AE(10),CO(3),CP(3)               FAMN1025
      EQUIVALENCE (A(30),IMAT),(A(31),ITEM),(A(32),IELT),(A(33),IPRS)   FAMN1026
     1,(A(34),ITIC),(A(35),ITGY),(A(36),MBON),(A(37),MCV),(A(38),MNR)   FAMN1027
     2,(A(39),ITGZ),(A(40),IARE),(A(41),IMMX),(A(42),IMMY),(A(43),IMMZ) FAMN1028
     3,(A(44),IMFI),(A(45),JBON),(A(46),NDT),(A(47),INR),(A(48),NTOT)   FAMN1029
     4,(A(49),IBTE),(A(65),ETT),(A(66),IL),(A(67),NBE1),(A(68),NBE2)    FAMN1030
     5,(A(69),NBE3),(A(70),ISD),(A(71),AL),(A(81),AR),(A(91),AE)        FAMN1031
     6,(A(103),INRP),(A(104),LEN),(A(105),CO),(A(102),IBN),(A(101),ELL) FAMN1032
     7,(A(108),CP),(A(111),DX),(A(112),DY),(A(113),DZ),(A(114),LE)      FAMN1033
     8,(A(115),DISD),(A(116),DXNL),(A(117),DISL),(A(118),ACL)           FAMN1034
     9,(A(119),NDTM),(A(120),ID)                                        FAMN1035
      DIMENSION RE(13)                                                  FAMN1036
      EQUIVALENCE (A(122),X),(A(123),Y),(A(124),Z),(A(125),XE)          FAMN1037
     1,(A(126),YE),(A(127),ZE),(A(128),XA),(A(129),YA),(A(130),ZA)      FAMN1038
     2,(A(131),LB),(A(132),NBEP),(A(133),NBET),(A(134),NDXS)            FAMN1039
     3,(A(135),IBI)                                                     FAMN1040
      REWIND 10                                                         FAMN1041
      CALL TICK (ITM)                                                   FAMN1042
      READ INPUT TAPE 5,1,NE,(RE(I),I=1,13)                             FAMN1043
    1 FORMAT (I2,13A6)                                                  FAMN1044
      WRITE OUTPUT TAPE 6,6,(RE(I),I=1,13),NE                           FAMN1045
    6 FORMAT (1H1,13A6,4X,14HINPUT TYPE NO.,I3///)                      FAMN1046
      IF (NE-1) 10,30,30                                                FAMN1047
   10 DO 20 I=2,16684                                                   FAMN1048
   20 A(I)=0.                                                           FAMN1049
   30 CALL DATA                                                         FAMN1050
      IF (NE-1) 40,6000,6000                                            FAMN1051
   40 SCX=108./ABSF(XMX-XMI)                                            FAMN1052
      SCY=108./ABSF(YMX-YMI)                                            FAMN1053
      SCZ=108./ABSF(ZMX-ZMI)                                            FAMN1054
      DER=1./(3.*SCX)+1./(3.*SCY)+1./(3.*SCZ)                           FAMN1055
      ER=.01*DER                                                        FAMN1056
      TER=ER*DER                                                        FAMN1057
      DER=.1*DER                                                        FAMN1058
      NN=16                                                             FAMN1059
      XNN=NN                                                            FAMN1060
      NNP=NN+1                                                          FAMN1061
      LNG=0                                                             FAMN1062
   60 ISDE=0                                                            FAMN1063
      NC=-1                                                             FAMN1064
      IF (XB(1)) 90,80,90                                               FAMN1065
   80 XB(1)=TER*.1E-6                                                   FAMN1066
   90 CONTINUE                                                          FAMN1067
      DO 400 IL=1,NLIN                                                  FAMN1068
      IL=IL                                                             FAMN1069
      ETT=0.                                                            FAMN1070
      NBET=NBEP                                                         FAMN1071
      DO 100 J=71,100                                                   FAMN1072
  100 A(J)=0.                                                           FAMN1073
      CALL COPY                                                         FAMN1074
      IF (NDXS) 105,105,400                                             FAMN1075
  105 ISD=ISD                                                           FAMN1076
      IF (LNG) 110,110,150                                              FAMN1077
  110 IF (ISD-ISDE) 130,130,120                                         FAMN1078
  120 LE=1                                                              FAMN1079
      NCL(ISD)=1                                                        FAMN1080
      GO TO 190                                                         FAMN1081
  130 IF (LEN) 190,190,140                                              FAMN1082
  140 LE=LE+1                                                           FAMN1083
      EL(ISD,LE)=EL(ISD,LE-1)                                           FAMN1084
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      NCL(ISD)=LE                                                       FAMN1085
      KR=KR+1                                                           FAMN1086
      XIR(KR)=X                                                         FAMN1087
      YIR(KR)=Y                                                         FAMN1088
      ZIR(KR)=Z                                                         FAMN1089
      GO TO 190                                                         FAMN1090
  150 IF (ISD-ISDE) 170,170,160                                         FAMN1091
  160 NCLI=NCL(ISD)                                                     FAMN1092
      LE=1                                                              FAMN1093
      DISD=EL(ISD,NCLI)/XNN                                             FAMN1094
      DXNL=0.                                                           FAMN1095
      IBN=0                                                             FAMN1096
      IBI=1                                                             FAMN1097
      IF (IDM(IL)) 165,165,180                                          FAMN1098
  165 IBI=-1                                                            FAMN1099
      GO TO 180                                                         FAMN1100
  170 IF (LEN) 190,190,175                                              FAMN1101
  175 LE=LE+1                                                           FAMN1102
  180 CALL ADJL                                                         FAMN1103
  190 ISDE=ISD                                                          FAMN1104
      IF (INR) 210,210,310                                              FAMN1105
  210 NDTM=NDT-1                                                        FAMN1106
      DO 300 ID=1,NDTM                                                  FAMN1107
      IF (ID-1) 260,260,220                                             FAMN1108
  220 CALL SLCO                                                         FAMN1109
      IF (LEN) 260,260,230                                              FAMN1110
  230 LE=LE+1                                                           FAMN1111
      IF (LNG) 240,240,250                                              FAMN1112
  240 EL(ISD,LE)=EL(ISD,LE-1)                                           FAMN1113
      NCL(ISD)=LE                                                       FAMN1114
      KR=KR+1                                                           FAMN1115
      XIR(KR)=X                                                         FAMN1116
      YIR(KR)=Y                                                         FAMN1117
      ZIR(KR)=Z                                                         FAMN1118
      GO TO 260                                                         FAMN1119
  250 CALL ADJL                                                         FAMN1120
  260 DX=DER*CO(1)                                                      FAMN1121
      DY=DER*CO(2)                                                      FAMN1122
      DZ=0.                                                             FAMN1123
      XE=AL(2*ID+1)                                                     FAMN1124
      YE=AL(2*ID+2)                                                     FAMN1125
  270 CALL LENG (X,Y,Z,XE,YE,ZE)                                        FAMN1126
  300 CONTINUE                                                          FAMN1127
      GO TO 370                                                         FAMN1128
  310 CALL INTR                                                         FAMN1129
      IF (LNG) 370,370,390                                              FAMN1130
  370 IF (IDM(IL+1)-IDM(IL)) 380,390,380                                FAMN1131
  380 CALL BACO                                                         FAMN1132
  390 CONTINUE                                                          FAMN1133
      DO 395 I=1,3                                                      FAMN1134
  395 CP(I)=CO(I)                                                       FAMN1135
  400 CONTINUE                                                          FAMN1136
      IF (LNG) 500,500,600                                              FAMN1137
  500 LNG=I                                                             FAMN1138
      CALL TICK (ITM)                                                   FAMN1139
      XTM=ITM                                                           FAMN1140
      XTM=XTM/60.                                                       FAMN1141
      WRITE OUTPUT TAPE 6,3,XTM                                         FAMN1142
    3 FORMAT (41HOINTEGRATION ALONG THE LINE SEGMENTS TOOK,F9.2,9H SECONFAMN1143
     1DS.)                                                              FAMN1144
      GO TO 60                                                          FAMN1145
  600 ITMM=ITM                                                          FAMN1146
      CALL TICK (ITM)                                                   FAMN1147
      XTM=ITM-ITMM                                                      FAMN1148
      XTM=XTM/60.                                                       FAMN1149
      WRITE OUTPUT TAPE 6,2,XTM                                         FAMN1150
    2 FORMAT (38HODIVISION ALONG THE LINE SEGMENTS TOOK,4X,F8.2,9H SECONFAMN1151
     1DS.//)                                                            FAMN1152
      CALL SUDI                                                         FAMN1153
      ITMM=ITM                                                          FAMN1154
      CALL TICK (ITM)                                                   FAMN1155
      XTM=ITM-ITMM                                                      FAMN1156
      XTM=XTM/60.                                                       FAMN1157
      WRITE OUTPUT TAPE 6,5,XTM                                         FAMN1158
    5 FORMAT (39HOGENERATION OF NATURAL COORDINATES TOOK,F11.2,9H SECONDFAMN1159
     1S.//)                                                             FAMN1160
 6000 CALL CHAIN (2,2)                                                  FAMN1161
      END                                                               FAMN1162
CFAAJL                                                                  FAAJL000
      SUBROUTINE ADJL                                                   FAAJL001
      DIMENSION A(16684),IA(16684),XO(50),YO(50),ZO(50),NMATE(50)       FAAJL002
     1,NFL(50,6),MDM(100),MELMA(100),MPRTI(100),MTETG(100),MBOVR(100)   FAAJL003
     2,ML(100,4),IDM(200),IELMA(200),IPRTE(200),IGYGZ(200),IARMX(200)   FAAJL004
     3,IMYMZ(200),IMFBO(200),IDTNR(200),IFL(200,3),AN(2000),IBON(50,4)  FAAJL005
     4,BORC(50,8),NCL(200),XIR(100),YIR(100),ZIR(100),NX(50),NY(50)     FAAJL006
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     5,NZ(50)                                                                FAAJL007
      COMMON A                                                               FAAJL008
      EQUIVALENCE (A,IA),(A(1001),XO),(A(1051),YO),(A(1101),ZO)              FAAJL009
     1,(A(1151),NMATE),(A(1201),NFL),(A(1501),MDM),(A(1601),MELMA)           FAAJL010
     2,(A(1701),MPRTI),(A(1801),MTETG),(A(1901),MBOVR),(A(2001),ML)          FAAJL011
     3,(A(2401),IDM),(A(2601),IELMA),(A(2801),IPRTE),(A(3001),IGYGZ)         FAAJL012
     4,(A(3201),IARMX),(A(3401),IMYMZ),(A(3601),IMFBO),(A(3801),IDTNR)       FAAJL013
     5,(A(4001),IFL),(A(4601),AN),(A(6601),IBON),(A(6801),BORC)              FAAJL014
     6,(A(7201),NCL),(A(7401),XIR),(A(7501),YIR),(A(7601),ZIR)               FAAJL015
     7,(A(7701),NX),(A(7751),NY),(A(7801),NZ)                                FAAJL016
      EQUIVALENCE (A(1),NE),(A(2),NVOL),(A(3),NSUR),(A(4),NLIN)              FAAJL017
     1,(A(5),LNG),(A(6),ISDE),(A(7),NC),(A(8),IO),(A(9),CF),(A(10),XMI)      FAAJL018
     2,(A(11),YMI),(A(12),ZMI),(A(13),XMX),(A(14),YMX),(A(15),ZMX)           FAAJL019
     3,(A(16),IBOT),(A(17),SCX),(A(18),SCY),(A(19),SCZ),(A(20),DER)          FAAJL020
     4,(A(21),ER),(A(22),TER),(A(23),NN),(A(24),XNN),(A(25),NNP)             FAAJL021
     5,(A(26),KR)                                                           FAAJL022
      DIMENSION XB(2000),YB(2000),ZB(2000),CC(17,17,6),EL(200,5)             FAAJL023
      EQUIVALENCE (A(7951),XB),(A(9951),YB),(A(11951),ZB),(A(13951),CC)      FAAJL024
     1,(A(15685),EL)                                                         FAAJL025
      DIMENSION IBTE(16),AL(10),AR(10),AE(10),CO(3),CP(3)                    FAAJL026
      EQUIVALENCE (A(30),IMAT),(A(31),ITEM),(A(32),IELT),(A(33),IPRS)        FAAJL027
     1,(A(34),ITIC),(A(35),ITGY),(A(36),MBON),(A(37),MCV),(A(38),MNR)        FAAJL028
     2,(A(39),ITGZ),(A(40),IARE),(A(41),IMMX),(A(42),IMMY),(A(43),IMMZ)      FAAJL029
     3,(A(44),IMFI),(A(45),JBON),(A(46),NDT),(A(47),INR),(A(48),NTOT)        FAAJL030
     4,(A(49),IBTE),(A(65),ETT),(A(66),IL),(A(67),NBE1),(A(68),NBE2)         FAAJL031
     5,(A(69),NBE3),(A(70),ISD),(A(71),AL),(A(81),AR),(A(91),AE)             FAAJL032
     6,(A(103),INRP),(A(104),LEN),(A(105),CO),(A(102),IBN),(A(101),ELL)      FAAJL033
     7,(A(108),CP),(A(111),DX),(A(112),DY),(A(113),DZ),(A(114),LE)           FAAJL034
     8,(A(115),DISD),(A(116),DXNL),(A(117),DISL),(A(118),ACL)                FAAJL035
     9,(A(119),NDTM),(A(120),ID),(A(121),DT)                                 FAAJL036
      EQUIVALENCE (A(122),X),(A(123),Y),(A(124),Z),(A(125),XE)               FAAJL037
     1,(A(126),YE),(A(127),ZE),(A(128),XA),(A(129),YA),(A(130),ZA)           FAAJL038
     2,(A(131),LB),(A(132),NBEP),(A(133),NBET),(A(134),NDXS)                 FAAJL039
      IL=IL                                                                  FAAJL040
      IK=IDM(IL)                                                             FAAJL041
      IF (IK) 100,100,105                                                    FAAJL042
  100 IK=-IK                                                                 FAAJL043
  105 IF (LE-1) 110,110,120                                                  FAAJL044
  110 ETT=EL(IK,1)                                                           FAAJL045
      GO TO 130                                                              FAAJL046
  120 ETT=EL(IK,LE)-EL(IK,LE-1)                                              FAAJL047
  130 XNL=ETT/DISD                                                           FAAJL048
      NNL=XNL                                                                FAAJL049
      XNLM=NNL                                                               FAAJL050
      DXNL=DXNL+XNL-XNLM                                                     FAAJL051
      IF (DXNL-.5) 140,140,150                                               FAAJL052
  140 XNL=XNLM                                                               FAAJL053
      GO TO 160                                                              FAAJL054
  150 XNL=XNLM+1.                                                            FAAJL055
      DXNL=DXNL-1.                                                           FAAJL056
  160 ETTD=XNL*DISD                                                          FAAJL057
      IF (ABSF(ETTD-ETT)-ER) 180,180,170                                     FAAJL058
  170 DISL=ETT/XNL                                                           FAAJL059
      GO TO 200                                                              FAAJL060
  180 DISL=DISD                                                              FAAJL061
  200 ACL=DISL                                                               FAAJL062
      ELL=0.                                                                 FAAJL063
      RETURN                                                                 FAAJL064
      END                                                                    FAAJL065
CFABCO                                                                       FABC0000
      SUBROUTINE BACO                                                        FABC0001
      DIMENSION A(16684),IA(16684),XO(50),YO(50),ZO(50),NMATE(50)            FABC0002
     1,NFL(50,6),MDM(100),MELMA(100),MPRTI(100),MTETG(100),MBOVR(100)        FABC0003
     2,ML(100,4),IDM(200),IELMA(200),IPRTE(200),IGYGZ(200),IARMX(200)        FABC0004
     3,IMYMZ(200),IMFBO(200),IDTNR(200),IFL(200,3),AN(2000),IBON(50,4)       FABC0005
     4,BORC(50,8),NCL(200),XIR(100),YIR(100),ZIR(100),NX(50),NY(50)          FABC0006
     5,NZ(50)                                                                FABC0007
      COMMON A                                                               FABC0008
      EQUIVALENCE (A,IA),(A(1001),XO),(A(1051),YO),(A(1101),ZO)              FABC0009
     1,(A(1151),NMATE),(A(1201),NFL),(A(1501),MDM),(A(1601),MELMA)           FABC0010
     2,(A(1701),MPRTI),(A(1801),MTETG),(A(1901),MBOVR),(A(2001),ML)          FABC0011
     3,(A(2401),IDM),(A(2601),IELMA),(A(2801),IPRTE),(A(3001),IGYGZ)         FABC0012
     4,(A(3201),IARMX),(A(3401),IMYMZ),(A(3601),IMFBO),(A(3801),IDTNR)       FABC0013
     5,(A(4001),IFL),(A(4601),AN),(A(6601),IBON),(A(6801),BORC)              FABC0014
     6,(A(7201),NCL),(A(7401),XIR),(A(7501),YIR),(A(7601),ZIR)               FABC0015
     7,(A(7701),NX),(A(7751),NY),(A(7801),NZ)                                FABC0016
      EQUIVALENCE (A(1),NE),(A(2),NVOL),(A(3),NSUR),(A(4),NLIN)              FABC0017
     1,(A(5),LNG),(A(6),ISDE),(A(7),NC),(A(8),IO),(A(9),CF),(A(10),XMI)      FABC0018
     2,(A(11),YMI),(A(12),ZMI),(A(13),XMX),(A(14),YMX),(A(15),ZMX)           FABC0019
     3,(A(16),IBOT),(A(17),SCX),(A(18),SCY),(A(19),SCZ),(A(20),DER)          FABC0020
     4,(A(21),ER),(A(22),TER),(A(23),NN),(A(24),XNN),(A(25),NNP)             FABC0021
     5,(A(26),KR)                                                           FABC0022
      DIMENSION XB(2000),YB(2000),ZB(2000),CC(17,17,6),EL(200,5)             FABC0023
      EQUIVALENCE (A(7951),XB),(A(9951),YB),(A(11951),ZB),(A(13951),CC)      FABC0024
     1,(A(15685),EL)                                                         FABC0025
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      DIMENSION IBTE(16),AL(10),AR(10),AE(10),CO(3),CP(3)                FABC0026
      EQUIVALENCE (A(30),IMAT),(A(31),ITEM),(A(32),IELT),(A(33),IPRS)    FABC0027
     1,(A(34),ITIC),(A(35),ITGY),(A(36),MBON),(A(37),MCV),(A(38),MNR)    FABC0028
     2,(A(39),ITGZ),(A(40),IARE),(A(41),IMMX),(A(42),IMMY),(A(43),IMMZ)  FABC0029
     3,(A(44),IMFI),(A(45),JBON),(A(46),NDT),(A(47),INR),(A(48),NTOT)    FABC0030
     4,(A(49),IBTE),(A(65),ETT),(A(66),IL),(A(67),NBE1),(A(68),NBE2)     FABC0031
     5,(A(69),NBE3),(A(70),ISD),(A(71),AL),(A(81),AR),(A(91),AE)         FABC0032
     6,(A(103),INRP),(A(104),LEN),(A(105),CO),(A(102),IBN),(A(101),ELL)  FABC0033
     7,(A(108),CP),(A(111),DX),(A(112),DY),(A(113),DZ),(A(114),LE)       FABC0034
     8,(A(115),DISD),(A(116),DXNL),(A(117),DISL),(A(118),ACL)            FABC0035
     9,(A(119),NDTM),(A(120),ID),(A(121),DT)                             FABC0036
      EQUIVALENCE (A(122),X),(A(123),Y),(A(124),Z),(A(125),XE)           FABC0037
     1,(A(126),YE),(A(127),ZE),(A(128),XA),(A(129),YA),(A(130),ZA)       FABC0038
     2,(A(131),LB),(A(132),NBEP),(A(133),NBET),(A(134),NDXS)             FABC0039
      DIMENSION MA(3),MOU(3)                                             FABC0040
      IL=IL                                                              FABC0041
      MOI=0                                                              FABC0042
      DO 100 I=1,3                                                       FABC0043
  100 MOU(I)=0                                                           FABC0044
      IF (IFL(IL,3)) 810,810,110                                         FABC0045
  110 IF (NVOL) 120,120,190                                              FABC0046
  120 DO 150 I=2,3                                                       FABC0047
      IF (IFL(IL,I)) 130,150,130                                         FABC0048
  130 DO 140 J=1,NLIN                                                    FABC0049
      IDMJ=IDM(J)                                                        FABC0050
      IF (IDM(J)) 135,9000,136                                           FABC0051
  135 IDMJ=-IDM(J)                                                       FABC0052
  136 IF (IFL(IL,I)-IDMJ) 140,145,140                                    FABC0053
  140 CONTINUE                                                           FABC0054
      GO TO 9000                                                         FABC0055
  145 IF (IDM(J)) 146,9000,147                                           FABC0056
  146 IB=-NNP*IDM(J)                                                     FABC0057
      GO TO 148                                                          FABC0058
  147 IB=NNP*(IDM(J)-1)+1                                                FABC0059
  148 MOI=MOI+1                                                          FABC0060
      IF (MOI-3) 149,149,9000                                            FABC0061
  149 MOU(MOI)=IDM(J)                                                    FABC0062
      CALL COBA (IB,NG,XB,YB,ZB,X,Y,Z)                                   FABC0063
  150 CONTINUE                                                           FABC0064
      GO TO 810                                                          FABC0065
  190 DO 200 I=1,3                                                       FABC0066
  200 MA(I)=0                                                            FABC0067
      IDMM=IDM(IL)                                                       FABC0068
      IF (IDMM) 203,9000,205                                             FABC0069
  203 IDMM=-IDMM                                                         FABC0070
  205 DO 250 I=1,3                                                       FABC0071
      DO 210 J=1,NSUR                                                    FABC0072
      J=J                                                                FABC0073
      IF (IFL(IL,I)-MDM(J)) 210,220,210                                  FABC0074
  210 CONTINUE                                                           FABC0075
  220 IF (ML(J,1)+ML(J,2)+ML(J,3)+ML(J,4)) 250,250,230                   FABC0076
  230 MA(I)=J                                                            FABC0077
  250 CONTINUE                                                           FABC0078
      NG=0                                                               FABC0079
  255 NG=NG+1                                                            FABC0080
      IF (NG-2) 260,260,305                                              FABC0081
  260 IF (MA(NG)) 9000,270,255                                           FABC0082
  270 DO 300 I=1,NSUR                                                    FABC0083
      DO 290 J=1,4                                                       FABC0084
      IF (IDMM-ML(I,J)) 290,275,290                                      FABC0085
  275 DO 277 K=1,3                                                       FABC0086
      IF (I-MA(K)) 277,300,277                                           FABC0087
  277 CONTINUE                                                           FABC0088
  280 MA(NG)=I                                                           FABC0089
      GO TO 255                                                          FABC0090
  290 CONTINUE                                                           FABC0091
  300 CONTINUE                                                           FABC0092
      GO TO 9000                                                         FABC0093
  305 IF (MA(NG)) 9000,310,405                                           FABC0094
  310 DO 350 I=1,NVOL                                                    FABC0095
      NG=0                                                               FABC0096
      II=I                                                               FABC0097
      DO 340 J=1,3                                                       FABC0098
      IF ((MA(1)-NFL(I,2*J))*(MA(1)-NFL(I,2*J-1))*(MA(2)-NFL(I,2*J))*(MAFABC0099
     1(2)-NFL(I,2*J-1))) 330,325,330                                     FABC0100
  325 NG=NG+1                                                            FABC0101
      GO TO 340                                                          FABC0102
  330 JJ=J                                                               FABC0103
  340 CONTINUE                                                           FABC0104
      IF (NG-2) 350,360,9000                                             FABC0105
  350 CONTINUE                                                           FABC0106
  360 IF (IDM(IL)) 370,9000,380                                          FABC0107
  370 JJ=2*JJ-1                                                          FABC0108
      GO TO 390                                                          FABC0109
  380 JJ=2*JJ                                                            FABC0110
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  390 MA(3)=NFL(II,JJ)                                                  FABCO111
  405 CONTINUE                                                          FABCO112
      MLP=0                                                             FABCO113
      NG=0                                                              FABCO114
      NI=0                                                              FABCO115
      NIP=0                                                             FABCO116
      DO 800 I=1,2                                                      FABCO117
      IP=I+1                                                            FABCO118
  410 MAI=MA(I)+NI                                                      FABCO119
      IF (NI-NIP) 413,415,413                                           FABCO120
  413 NIP=NI                                                            FABCO121
      IP=1                                                              FABCO122
  415 NJ=0                                                              FABCO123
      DO 700 J=IP,3                                                     FABCO124
      IF (I-J) 420,700,420                                              FABCO125
  420 MAJ=MA(J)+NJ                                                      FABCO126
      DO 600 K=1,4                                                      FABCO127
      DO 500 L=1,4                                                      FABCO128
      IF (ML(MAI,K)-ML(MAJ,L)) 500,510,500                              FABCO129
  500 CONTINUE                                                          FABCO130
      GO TO 600                                                         FABCO131
  510 MLS=ML(MAI,K)                                                     FABCO132
      IF (MLS-MLP) 511,600,511                                          FABCO133
  511 IF (MLS) 515,600,515                                              FABCO134
  515 MLP=MLS                                                           FABCO135
      DO 550 M=1,NLIN                                                   FABCO136
      IDMM=IDM(M)                                                       FABCO137
      IF (IDM(M)) 520,9000,530                                          FABCO138
  520 IDMM=-IDM(M)                                                      FABCO139
  530 IF (MLS-IDMM) 550,560,550                                         FABCO140
  550 CONTINUE                                                          FABCO141
      GO TO 9000                                                        FABCO142
  560 IF (IDM(M)) 570,9000,580                                          FABCO143
  570 IB=NNP*MLS                                                        FABCO144
      GO TO 590                                                         FABCO145
  580 IB=NNP*(MLS-1)+1                                                  FABCO146
  590 MOI=MOI+1                                                         FABCO147
      IF (MOI-3) 595,595,9000                                           FABCO148
  595 MOU(MOI)=MLS                                                      FABCO149
      CALL COBA (IB,NG,XB,YB,ZB,X,Y,Z)                                  FABCO150
  600 CONTINUE                                                          FABCO151
      IF (NG-2) 610,810,9000                                            FABCO152
  610 IF (MAJ-NSUR) 620,700,700                                         FABCO153
  620 IF (MDM(MAJ)-MDM(MAJ+1)) 640,630,640                              FABCO154
  630 NJ=1                                                              FABCO155
      GO TO 420                                                         FABCO156
  640 NJ=0                                                              FABCO157
  700 CONTINUE                                                          FABCO158
      IF (NG-2) 710,810,9000                                            FABCO159
  710 IF (MAI-NSUR) 720,800,800                                         FABCO160
  720 IF (MDM(MAI)-MDM(MAI+1)) 740,730,740                              FABCO161
  730 NI=1                                                              FABCO162
      GO TO 410                                                         FABCO163
  740 NI=0                                                              FABCO164
  800 CONTINUE                                                          FABCO165
  810 CONTINUE                                                          FABCO166
      WRITE OUTPUT TAPE 6,2,IL,(MA(I),I=1,3),(MOU(I),I=1,3)             FABCO167
    2 FORMAT (45H LABELS OF SURFACES AND LINES INVOLVED IN THE,I6,24H THFABCO168
     1 LINE INTEGRATION ARE,3I6,6X,3I6)                                 FABCO169
      RETURN                                                            FABCO170
 9000 WRITE OUTPUT TAPE 6,1,IL,(IFL(IL,J),J=1,3),(MA(I),I=1,3),(MOU(I),IFABCO171
     1=1,3)                                                             FABCO172
    1 FORMAT (47H1INPUT ERROR DEDECTED DURING THE INTEGRATION OF,I6,36H FABCO173
     1TH LINE,RELATED INFORMATIONS FOLLOW/1X,3(6X,3I6))                 FABCO174
      CALL EXIT                                                         FABCO175
      END                                                               FABCO176
CFABLI                                                                  FABLI000
      SUBROUTINE BOLI                                                   FABLI001
      DIMENSION A(16684),IA(16684),XO(50),YO(50),ZO(50),NMATE(50)       FABLI002
     1,NFL(50,6),MDM(100),MELMA(100),MPRTI(100),MTETG(100),MBOVR(100)   FABLI003
     2,ML(100,4),IDM(200),IELMA(200),IPRTE(200),IGYGZ(200),IARMX(200)   FABLI004
     3,IMYMZ(200),IMFBO(200),IDTNR(200),IFL(200,3),AN(2000),IBON(50,4)  FABLI005
     4,BORC(50,8),NCL(200),XIR(100),YIR(100),ZIR(100),NX(50),NY(50)     FABLI006
     5,NZ(50)                                                           FABLI007
      COMMON A                                                          FABLI008
      EQUIVALENCE (A,IA),(A(1001),XO),(A(1051),YO),(A(1101),ZO)         FABLI009
     1,(A(1151),NMATE),(A(1201),NFL),(A(1501),MDM),(A(1601),MELMA)      FABLI010
     2,(A(1701),MPRTI),(A(1801),MTETG),(A(1901),MBOVR),(A(2001),ML)     FABLI011
     3,(A(2401),IDM),(A(2601),IELMA),(A(2801),IPRTE),(A(3001),IGYGZ)    FABLI012
     4,(A(3201),IARMX),(A(3401),IMYMZ),(A(3601),IMFBO),(A(3801),IDTNR)  FABLI013
     5,(A(4001),IFL),(A(4601),AN),(A(6601),IBON),(A(6801),BORC)         FABLI014
     6,(A(7201),NCL),(A(7401),XIR),(A(7501),YIR),(A(7601),ZIR)          FABLI015
     7,(A(7701),NX),(A(7751),NY),(A(7801),NZ)                           FABLI016
      EQUIVALENCE (A(1),NE),(A(2),NVOL),(A(3),NSUR),(A(4),NLIN)         FABLI017
     1,(A(5),LNG),(A(6),ISDE),(A(7),NC),(A(8),IO),(A(9),CF),(A(10),XMI) FABLI018
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     2,(A(11),YMI),(A(12),ZMI),(A(13),XMX),(A(14),YMX),(A(15),ZMX)      FABLI019
     3,(A(16),IBOT),(A(17),SCX),(A(18),SCY),(A(19),SCZ),(A(20),DER)     FABLI020
     4,(A(21),ER),(A(22),TER),(A(23),NN),(A(24),XNN),(A(25),NNP)        FABLI021
     5,(A(26),KR)                                                       FABLI022
      DIMENSION XB(2000),YB(2000),ZB(2000),CC(17,17,6),EL(200,5)        FABLI023
      EQUIVALENCE (A(7951),XB),(A(9951),YB),(A(11951),ZB),(A(13951),CC) FABLI024
     1,(A(15685),EL)                                                    FABLI025
      EQUIVALENCE (A(30),IMAT),(A(31),ITEM),(A(32),IELT),(A(33),IPRS)   FABLI026
     1,(A(34),ITIC),(A(35),ITGY),(A(36),MBON),(A(37),MCV),(A(38),MNR)   FABLI027
     2,(A(39),ITGZ),(A(40),IARE),(A(41),IMMX),(A(42),IMMY),(A(43),IMMZ) FABLI028
     3,(A(44),IMFI),(A(45),JBON),(A(46),NDT),(A(47),INR),(A(48),NTOT)   FABLI029
     4,(A(49),ISKE)                                                     FABLI030
      DIMENSION IST(4),AD(200),DC(3,3),CO(3),CP(3),CMI(3),CMX(3),DUB(3) FABLI031
     1,DUA(3,3),DMB(3),DMA(3,3)                                         FABLI032
      EQUIVALENCE (A(101),IS),(A(102),ISP),(A(103),IB),(A(104),IBB)     FABLI033
     1,(A(105),IQ),(A(106),I),(A(107),IL),(A(108),IBC),(A(109),IC)      FABLI034
     2,(A(110),JBC),(A(111),JC),(A(112),ISPD),(A(113),IK),(A(114),IKD)  FABLI035
     3,(A(131),IST),(A(135),AD),(A(335),DC),(A(344),CO),(A(347),CP)     FABLI036
     4,(A(350),CMI),(A(353),CMX),(A(356),DUB),(A(359),DUA),(A(368),DMB) FABLI037
     5,(A(371),DMA)                                                     FABLI038
      IS=IS                                                             FABLI039
      ISP=ISP                                                           FABLI040
      ISKE=0                                                            FABLI041
      IF (IS-ISP) 120,110,120                                           FABLI042
  110 IST(1)=ML(IS,3)                                                   FABLI043
      IST(2)=ML(IS,2)                                                   FABLI044
      IST(3)=ML(IS,4)                                                   FABLI045
      IST(4)=ML(IS,1)                                                   FABLI046
      GO TO 200                                                         FABLI047
  120 IF (ML(IS,1)*ML(IS,2)) 140,130,140                                FABLI048
  130 IST(1)=ML(IS,3)                                                   FABLI049
      IST(2)=ML(ISP,2)                                                  FABLI050
      IST(3)=ML(IS,4)                                                   FABLI051
      IST(4)=ML(IS,1)                                                   FABLI052
      GO TO 200                                                         FABLI053
  140 IF (ML(IS,3)*ML(IS,4)) 9000,150,9000                              FABLI054
  150 IST(1)=ML(IS,3)                                                   FABLI055
      IST(2)=ML(IS,2)                                                   FABLI056
      IST(3)=ML(ISP,4)                                                  FABLI057
      IST(4)=ML(IS,1)                                                   FABLI058
      ISKE=1                                                            FABLI059
  200 CONTINUE                                                          FABLI060
      RETURN                                                            FABLI061
 9000 WRITE OUTPUT TAPE 6,1,IS,(ML(IS,J),J=1,4),ISP,(ML(ISP,J),J=1,4)   FABLI062
    1 FORMAT (87H INPUT ERROR IN THE SURFACE-LINE LABEL INFORMATION, CHEFABLI063
     1CK WITH THE FORMAT SPECIFICATION/(2(1X,I6,4X,4I6)))               FABLI064
      GO TO 200                                                         FABLI065
      END                                                               FABLI066
CFACBA                                                                  FACBA000
      SUBROUTINE COBA (IB,NG,XB,YB,ZB,X,Y,Z)                            FACBA001
      DIMENSION XB(2000),YB(2000),ZB(2000)                              FACBA002
      IB=IB                                                             FACBA003
      IF (XB(IB)) 600,520,600                                           FACBA004
  520 IF (YB(IB)) 600,530,600                                           FACBA005
  530 IF (ZB(IB)) 600,540,600                                           FACBA006
  540 XB(IB)=X                                                          FACBA007
      YB(IB)=Y                                                          FACBA008
      ZB(IB)=Z                                                          FACBA009
      NG=NG+1                                                           FACBA010
      IF (XB(IB)) 600,590,600                                           FACBA011
  590 XB(IB)=.1E-20                                                     FACBA012
  600 RETURN                                                            FACBA013
      END                                                               FACBA014
CFACNT                                                                  FACNT000
      SUBROUTINE CONT (II,IBA,ICR,JBA,JCR)                              FACNT001
      COMMON A                                                          FACNT002
      EQUIVALENCE (A(25),NNP)                                           FACNT003
      II=II                                                             FACNT004
      GO TO (210,220,230,240),II                                        FACNT005
  210 IBA=0                                                             FACNT006
      ICR=1                                                             FACNT007
      JBA=1                                                             FACNT008
      JCR=0                                                             FACNT009
      GO TO 250                                                         FACNT010
  220 IBA=NNP                                                           FACNT011
      ICR=0                                                             FACNT012
      JBA=0                                                             FACNT013
      JCR=1                                                             FACNT014
      GO TO 250                                                         FACNT015
  230 IBA=NNP+1                                                         FACNT016
      ICR=-1                                                            FACNT017
      JBA=NNP                                                           FACNT018
      JCR=0                                                             FACNT019
      GO TO 250                                                         FACNT020
  240 IBA=1                                                             FACNT021
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      ICR=0                                                              FACNT022
      JBA=NNP+1                                                          FACNT023
      JCR=-1                                                             FACNT024
  250 RETURN                                                             FACNT025
      END                                                                FACNT026
CFACPY                                                                   FACPY000
      SUBROUTINE COPY                                                    FACPY001
      DIMENSION A(16684),IA(16684),XO(50),YO(50),ZO(50),NMATE(50)        FACPY002
     1,NFL(50,6),MDM(100),MELMA(100),MPRTI(100),MTETG(100),MBOVR(100)    FACPY003
     2,ML(100,4),IDM(200),IELMA(200),IPRTE(200),IGYGZ(200),IARMX(200)    FACPY004
     3,IMYMZ(200),IMFBO(200),IDTNR(200),IFL(200,3),AN(2000),IBON(50,4)   FACPY005
     4,BORC(50,8),NCL(200),XIR(100),YIR(100),ZIR(100),NX(50),NY(50)      FACPY006
     5,NZ(50)                                                            FACPY007
      COMMON A                                                           FACPY008
      EQUIVALENCE (A,IA),(A(1001),XO),(A(1051),YO),(A(1101),ZO)          FACPY009
     1,(A(1151),NMATE),(A(1201),NFL),(A(1501),MDM),(A(1601),MELMA)       FACPY010
     2,(A(1701),MPRTI),(A(1801),MTETG),(A(1901),MBOVR),(A(2001),ML)      FACPY011
     3,(A(2401),IDM),(A(2601),IELMA),(A(2801),IPRTE),(A(3001),IGYGZ)     FACPY012
     4,(A(3201),IARMX),(A(3401),IMYMZ),(A(3601),IMFBO),(A(3801),IDTNR)   FACPY013
     5,(A(4001),IFL),(A(4601),AN),(A(6601),IBON),(A(6801),BORC)          FACPY014
     6,(A(7201),NCL),(A(7401),XIR),(A(7501),YIR),(A(7601),ZIR)           FACPY015
     7,(A(7701),NX),(A(7751),NY),(A(7801),NZ)                            FACPY016
      EQUIVALENCE (A(1),NE),(A(2),NVOL),(A(3),NSUR),(A(4),NLIN)          FACPY017
     1,(A(5),LNG),(A(6),ISDE),(A(7),NC),(A(8),IO),(A(9),CF),(A(10),XMI)  FACPY018
     2,(A(11),YMI),(A(12),ZMI),(A(13),XMX),(A(14),YMX),(A(15),ZMX)       FACPY019
     3,(A(16),IBOT),(A(17),SCX),(A(18),SCY),(A(19),SCZ),(A(20),DER)      FACPY020
     4,(A(21),ER),(A(22),TER),(A(23),NN),(A(24),XNN),(A(25),NNP)         FACPY021
     5,(A(26),KR)                                                        FACPY022
      DIMENSION XB(2000),YB(2000),ZB(2000),CC(17,17,6),EL(200,5)         FACPY023
      EQUIVALENCE (A(7951),XB),(A(9951),YB),(A(11951),ZB),(A(13951),CC)  FACPY024
     1,(A(15685),EL)                                                     FACPY025
      DIMENSION IBTE(16),AL(10),AR(10),AE(10),CO(3),CP(3)                FACPY026
      EQUIVALENCE (A(30),IMAT),(A(31),ITEM),(A(32),IELT),(A(33),IPRS)    FACPY027
     1,(A(34),ITIC),(A(35),ITGY),(A(36),MBON),(A(37),MCV),(A(38),MNR)    FACPY028
     2,(A(39),ITGZ),(A(40),IARE),(A(41),IMMX),(A(42),IMMY),(A(43),IMMZ)  FACPY029
     3,(A(44),IMFI),(A(45),JBON),(A(46),NDT),(A(47),INR),(A(48),NTOT)    FACPY030
     4,(A(49),IBTE),(A(65),ETT),(A(66),IL),(A(67),NBE1),(A(68),NBE2)     FACPY031
     5,(A(69),NBE3),(A(70),ISD),(A(71),AL),(A(81),AR),(A(91),AE)         FACPY032
     6,(A(103),INRP),(A(104),LEN),(A(105),CO),(A(102),IBN),(A(101),ELL)  FACPY033
     7,(A(108),CP),(A(111),DX),(A(112),DY),(A(113),DZ),(A(114),LE)       FACPY034
     8,(A(115),DISD),(A(116),DXNL),(A(117),DISL),(A(118),ACL)            FACPY035
     9,(A(119),NDTM),(A(120),ID),(A(121),DT)                             FACPY036
      EQUIVALENCE (A(122),X),(A(123),Y),(A(124),Z),(A(125),XE)           FACPY037
     1,(A(126),YE),(A(127),ZE),(A(128),XA),(A(129),YA),(A(130),ZA)       FACPY038
     2,(A(131),LB),(A(132),NBEP),(A(133),NBET),(A(134),NDXS)             FACPY039
      NCO=0                                                              FACPY040
      ITT=1                                                              FACPY041
      NLINM=NLIN-1                                                       FACPY042
      IL=IL                                                              FACPY043
      NSUR=NSUR                                                          FACPY044
      NDXS=0                                                             FACPY045
      NBE1=0                                                             FACPY046
      NBE2=0                                                             FACPY047
      NBE3=0                                                             FACPY048
      DO 95 ID=IL,NLINM                                                  FACPY049
      IF (IDM(ID+1)-IDM(ID)) 96,91,96                                    FACPY050
   91 NCO=NCO+1                                                          FACPY051
   95 CONTINUE                                                           FACPY052
   96 NCB=NCO                                                            FACPY053
      ISD=IDM(IL)                                                        FACPY054
      IF (ISD) 97,9000,105                                               FACPY055
   97 ISD=-ISD                                                           FACPY056
      NCB=0                                                              FACPY057
      ITT=-1                                                             FACPY058
      ILM=IL-1                                                           FACPY059
      DO 100 ID=1,ILM                                                    FACPY060
      IM=IL-ID+1                                                         FACPY061
      IF (IDM(IM)-IDM(IM-1)) 105,99,105                                  FACPY062
   99 NCB=NCB+1                                                          FACPY063
  100 CONTINUE                                                           FACPY064
  105 IF (NVOL) 410,410,110                                              FACPY065
  110 IF (IL-NLIN) 115,130,130                                           FACPY066
  115 IF (NCO) 120,130,120                                               FACPY067
  120 NC=NC+1                                                            FACPY068
      NT=NC                                                              FACPY069
      NG=1                                                               FACPY070
      GO TO 140                                                          FACPY071
  130 NT=NC+1                                                            FACPY072
      NC=-1                                                              FACPY073
      NG=2                                                               FACPY074
  140 DO 150 I=1,NSUR                                                    FACPY075
      IF (MDM(I)-IFL(IL,1)) 150,160,150                                  FACPY076
  150 CONTINUE                                                           FACPY077
      GO TO 9000                                                         FACPY078
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160 IF (I-NSUR) 165,170,170                                                    FACPY079
165 IF (MDM(I)-MDM(I+1)) 170,180,170                                           FACPY080
170 NBE1=I                                                                     FACPY081
    GO TO 190                                                                  FACPY082
180 NGT=1                                                                      FACPY083
    IF (IDM(IL)) 185,9000,186                                                  FACPY084
185 NBE1=I+NCO                                                                 FACPY085
    ITT=-1                                                                     FACPY086
    GO TO 190                                                                  FACPY087
186 NGT=1                                                                      FACPY088
    NBE1=I+NT                                                                  FACPY089
190 DO 200 I=1,NSUR                                                            FACPY090
    IF (MDM(I)-IFL(IL,2)) 200,210,200                                          FACPY091
200 CONTINUE                                                                   FACPY092
    GO TO 9000                                                                 FACPY093
210 IF (I-NSUR) 215,220,220                                                    FACPY094
215 IF (MDM(I)-MDM(I+1)) 220,230,220                                           FACPY095
220 NBE2=I                                                                     FACPY096
    GO TO 240                                                                  FACPY097
230 NGT=2                                                                      FACPY098
    IF (IDM(IL)) 235,9000,236                                                  FACPY099
235 NBE2=I+NCO                                                                 FACPY100
    ITT=-1                                                                     FACPY101
    GO TO 240                                                                  FACPY102
236 NBE2=I+NT                                                                  FACPY103
240 GO TO (245,290),NG                                                         FACPY104
245 GO TO (250,260),NGT                                                        FACPY105
250 IF (IFL(IL,3)) 290,255,290                                                 FACPY106
255 NBE3=NBE1+ITT                                                              FACPY107
    GO TO 306                                                                  FACPY108
260 NBE3=NBE2+ITT                                                              FACPY109
    GO TO 306                                                                  FACPY110
290 DO 300 I=1,NSUR                                                            FACPY111
    IF (MDM(I)-IFL(IL,3)) 300,303,300                                          FACPY112
300 CONTINUE                                                                   FACPY113
    GO TO 9000                                                                 FACPY114
303 NBE3=I                                                                     FACPY115
306 IF (NBE1*NBE2*NBE3) 310,9000,310                                           FACPY116
310 IF ((NBE1-NBE2)*(NBE2-NBE3)*(NBE3-NBE1)) 320,9000,320                      FACPY117
320 NBE1=10*(NBE1-1)                                                           FACPY118
    NBE2=10*(NBE2-1)                                                           FACPY119
    IF (ML(NBE3,1)+ML(NBE3,2)+ML(NBE3,3)+ML(NBE3,4)) 340,330,340               FACPY120
330 NBEP=1                                                                     FACPY121
    GO TO 345                                                                  FACPY122
340 NBEP=0                                                                     FACPY123
345 CONTINUE                                                                   FACPY124
    NBE3=10*(NBE3-1)                                                           FACPY125
350 DO 400 I=1,10                                                              FACPY126
    NBI1=NBE1+I                                                                FACPY127
    NBI2=NBE2+I                                                                FACPY128
    NBI3=NBE3+I                                                                FACPY129
    AL(I)=AN(NBI1)                                                             FACPY130
    AR(I)=AN(NBI2)                                                             FACPY131
400 AE(I)=AN(NBI3)                                                             FACPY132
    GO TO 610                                                                  FACPY133
410 NDT=IDTNR(IL)/10                                                           FACPY134
    INR=IDTNR(IL)-10*NDT                                                       FACPY135
    NBE1=IL                                                                    FACPY136
415 IF (IFL(IL,1)+IFL(IL,2)+IFL(IL,3)) 750,750,417                             FACPY137
417 IF (IL-NLIN) 418,430,430                                                   FACPY138
418 IF (IDM(IL)-IDM(IL+1)) 430,420,430                                         FACPY139
420 NBE3=IL+1                                                                  FACPY140
    GO TO 520                                                                  FACPY141
430 DO 500 I=1,NLIN                                                            FACPY142
    IDMIL=IDM(I)                                                               FACPY143
    IF (IDMIL) 440,9000,450                                                    FACPY144
440 IDMIL=-IDM(I)                                                              FACPY145
450 IF (IDMIL-IFL(IL,3)) 500,510,500                                           FACPY146
500 CONTINUE                                                                   FACPY147
    GO TO 9000                                                                 FACPY148
510 NBE3=I+IFL(IL,1)                                                           FACPY149
520 INRP=IDTNR(NBE3)-10*(IDTNR(NBE3)/10)                                       FACPY150
    IF (INRP) 540,540,530                                                      FACPY151
530 NBE1=10*(NBE1-1)                                                           FACPY152
    NBE2=0                                                                     FACPY153
    IF (IFL(NBE3,1)+IFL(NBE3,2)+IFL(NBE3,3)) 534,533,534                       FACPY154
533 NBEP=1                                                                     FACPY155
    GO TO 535                                                                  FACPY156
534 NBEP=0                                                                     FACPY157
535 CONTINUE                                                                   FACPY158
    NBE3=10*(NBE3-1)                                                           FACPY159
    GO TO 350                                                                  FACPY160
540 CALL DSAN                                                                  FACPY161
    NBE1=10*(NBE1-1)                                                           FACPY162
    NBE2=0                                                                     FACPY163
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      DO 600 I=1,10                                                     FACPY164
      NBI1=NBE1+I                                                       FACPY165
      NBI2=NBE2+I                                                       FACPY166
      AL(I)=AN(NBI1)                                                    FACPY167
  600 AR(I)=AN(NBI2)                                                    FACPY168
  610 IF (IL-1) 640,640,630                                             FACPY169
  630 IF (IDM(IL-1)-IDM(IL)) 640,650,640                                FACPY170
  640 LEN=1                                                             FACPY171
      IF (IDM(IL)) 642,9000,645                                         FACPY172
  642 LB=-NNP*IDM(IL)                                                   FACPY173
      GO TO 646                                                         FACPY174
  645 LB=NNP*(IDM(IL)-1)+1                                              FACPY175
  646 CONTINUE                                                          FACPY176
      X=XB(LB)                                                          FACPY177
      Y=YB(LB)                                                          FACPY178
      Z=ZB(LB)                                                          FACPY179
      ID=1                                                              FACPY180
      CALL DIRC                                                         FACPY181
      GO TO 700                                                         FACPY182
  650 CALL SLCO                                                         FACPY183
  700 CONTINUE                                                          FACPY184
      RETURN                                                            FACPY185
  750 NDXS=1                                                            FACPY186
      GO TO 700                                                         FACPY187
 9000 WRITE OUTPUT TAPE 6,1,IL                                          FACPY188
    1 FORMAT (51H1INPUT ERROR PROBABLY IN CONNECTION WITH INPUT UNIT,I6)FACPY189
      GO TO 700                                                         FACPY190
      END                                                               FACPY191
CFACRD                                                                  FACRD000
      SUBROUTINE CORD                                                   FACRD001
      DIMENSION A(16684),IA(16684),XO(50),YO(50),ZO(50),NMATE(50)       FACRD002
     1,NFL(50,6),MDM(100),MELMA(100),MPRTI(100),MTETG(100),MBOVR(100)   FACRD003
     2,ML(100,4),IDM(200),IELMA(200),IPRTE(200),IGYGZ(200),IARMX(200)   FACRD004
     3,IMYMZ(200),IMFBO(200),IDTNR(200),IFL(200,3),AN(2000),IBON(50,4)  FACRD005
     4,BORC(50,8),NCL(200),XIR(100),YIR(100),ZIR(100),NX(50),NY(50)     FACRD006
     5,NZ(50)                                                           FACRD007
      COMMON A                                                          FACRD008
      EQUIVALENCE (A,IA),(A(1001),XO),(A(1051),YO),(A(1101),ZO)         FACRD009
     1,(A(1151),NMATE),(A(1201),NFL),(A(1501),MDM),(A(1601),MELMA)      FACRD010
     2,(A(1701),MPRTI),(A(1801),MTETG),(A(1901),MBOVR),(A(2001),ML)     FACRD011
     3,(A(2401),IDM),(A(2601),IELMA),(A(2801),IPRTE),(A(3001),IGYGZ)    FACRD012
     4,(A(3201),IARMX),(A(3401),IMYMZ),(A(3601),IMFBO),(A(3801),IDTNR)  FACRD013
     5,(A(4001),IFL),(A(4601),AN),(A(6601),IBON),(A(6801),BORC)         FACRD014
     6,(A(7201),NCL),(A(7401),XIR),(A(7501),YIR),(A(7601),ZIR)          FACRD015
     7,(A(7701),NX),(A(7751),NY),(A(7801),NZ)                           FACRD016
      EQUIVALENCE (A(1),NE),(A(2),NVOL),(A(3),NSUR),(A(4),NLIN)         FACRD017
     1,(A(5),LNG),(A(6),ISDE),(A(7),NC),(A(8),IO),(A(9),CF),(A(10),XMI) FACRD018
     2,(A(11),YMI),(A(12),ZMI),(A(13),XMX),(A(14),YMX),(A(15),ZMX)      FACRD019
     3,(A(16),IBOT),(A(17),SCX),(A(18),SCY),(A(19),SCZ),(A(20),DER)     FACRD020
     4,(A(21),ER),(A(22),TER),(A(23),NN),(A(24),XNN),(A(25),NNP)        FACRD021
     5,(A(26),KR)                                                       FACRD022
      DIMENSION XB(2000),YB(2000),ZB(2000),CC(17,17,6),EL(200,5)        FACRD023
      EQUIVALENCE (A(7951),XB),(A(9951),YB),(A(11951),ZB),(A(13951),CC) FACRD024
     1,(A(15685),EL)                                                    FACRD025
      EQUIVALENCE (A(30),IMAT),(A(31),ITEM),(A(32),IELT),(A(33),IPRS)   FACRD026
     1,(A(34),ITIC),(A(35),ITGY),(A(36),MBON),(A(37),MCV),(A(38),MNR)   FACRD027
     2,(A(39),ITGZ),(A(40),IARE),(A(41),IMMX),(A(42),IMMY),(A(43),IMMZ) FACRD028
     3,(A(44),IMFI),(A(45),JBON),(A(46),NDT),(A(47),INR),(A(48),NTOT)   FACRD029
      DIMENSION IST(4),AD(200),DC(3,3),CO(3),CP(3),CMI(3),CMX(3),DUB(3) FACRD030
     1,DUA(3,3),DMB(3),DMA(3,3),LL(4,2),XX(17,17),YY(17,17)             FACRD031
      EQUIVALENCE (A(101),IS),(A(102),ISP),(A(103),IB),(A(104),IBB)     FACRD032
     1,(A(105),IQ),(A(106),I),(A(107),IL),(A(108),IBC),(A(109),IC)      FACRD033
     2,(A(110),JBC),(A(111),JC),(A(112),ISPD),(A(113),IK),(A(114),IKD)  FACRD034
     3,(A(131),IST),(A(135),AD),(A(335),DC),(A(344),CO),(A(347),CP)     FACRD035
     4,(A(350),CMI),(A(353),CMX),(A(356),DUB),(A(359),DUA),(A(368),DMB) FACRD036
     5,(A(371),DMA),(A(380),LL),(A(388),J),(A(389),IM),(A(390),JM)      FACRD037
     6,(A(391),IIM),(A(392),JJM),(A(393),I2),(A(394),J2),(A(395),DN)    FACRD038
     7,(A(396),DD),(A(397),X2),(A(398),Y2),(A(399),NDX),(A(400),I1)     FACRD039
     8,(A(401),J1),(A(402),PRIJ)                                        FACRD040
      EQUIVALENCE (A(403),XTP),(A(404),YTP),(A(405),XX),(A(694),YY)     FACRD041
      I1=I1                                                             FACRD042
      J1=J1                                                             FACRD043
      I=I                                                               FACRD044
      J=J                                                               FACRD045
      X1=XX(I1,J1)+PRIJ*(X2-XX(I1,J1))                                  FACRD046
      Y1=YY(I1,J1)+PRIJ*(Y2-YY(I1,J1))                                  FACRD047
      IF (MCV) 120,120,110                                              FACRD048
  110 NBX=(X1-CMI(1))*SCX                                               FACRD049
      NBY=(Y1-CMI(2))*SCY                                               FACRD050
      JB=(NBX-1)/36+1                                                   FACRD051
      ACH=EL(NBY,JB)                                                    FACRD052
      JBT=NBX-36*(JB-1)                                                 FACRD053
      IF (LEBIN(ACH,JBT)) 300,300,120                                   FACRD054
  120 NC=NC+1                                                           FACRD055
      XTP=XTP+X1                                                        FACRD056
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      YTP=YTP+Y1                                                        FACRD057
  300 RETURN                                                            FACRD058
      END                                                               FACRD059
CFADTA                                                                  FADTA000
      SUBROUTINE DATA                                                   FADTA001
      DIMENSION A(16684),IA(16684),XO(50),YO(50),ZO(50),NMATE(50)       FADTA002
     1,NFL(50,6),MDM(100),MELMA(100),MPRTI(100),MTETG(100),MBOVR(100)   FADTA003
     2,ML(100,4),IDM(200),IELMA(200),IPRTE(200),IGYGZ(200),IARMX(200)   FADTA004
     3,IMYMZ(200),IMFBO(200),IDTNR(200),IFL(200,3),AN(2000),IBON(50,4)  FADTA005
     4,BORC(50,8),NCL(200),XIR(100),YIR(100),ZIR(100),NX(50),NY(50)     FADTA006
     5,NZ(50)                                                           FADTA007
      COMMON A                                                          FADTA008
      EQUIVALENCE (A,IA),(A(1001),XO),(A(1051),YO),(A(1101),ZO)         FADTA009
     1,(A(1151),NMATE),(A(1201),NFL),(A(1501),MDM),(A(1601),MELMA)      FADTA010
     2,(A(1701),MPRTI),(A(1801),MTETG),(A(1901),MBOVR),(A(2001),ML)     FADTA011
     3,(A(2401),IDM),(A(2601),IELMA),(A(2801),IPRTE),(A(3001),IGYGZ)    FADTA012
     4,(A(3201),IARMX),(A(3401),IMYMZ),(A(3601),IMFBO),(A(3801),IDTNR)  FADTA013
     5,(A(4001),IFL),(A(4601),AN),(A(6601),IBON),(A(6801),BORC)         FADTA014
     6,(A(7201),NCL),(A(7401),XIR),(A(7501),YIR),(A(7601),ZIR)          FADTA015
     7,(A(7701),NX),(A(7751),NY),(A(7801),NZ)                           FADTA016
      EQUIVALENCE (A(1),NE),(A(2),NVOL),(A(3),NSUR),(A(4),NLIN)         FADTA017
     1,(A(5),LNG),(A(6),ISDE),(A(7),NC),(A(8),IO),(A(9),CF),(A(10),XMI) FADTA018
     2,(A(11),YMI),(A(12),ZMI),(A(13),XMX),(A(14),YMX),(A(15),ZMX)      FADTA019
     3,(A(16),IBOT),(A(17),SCX),(A(18),SCY),(A(19),SCZ),(A(20),DER)     FADTA020
     4,(A(21),ER),(A(22),TER),(A(23),NN),(A(24),XNN),(A(25),NNP)        FADTA021
     5,(A(26),KR)                                                      FADTA022
      DIMENSION XB(2000),YB(2000),ZB(2000),CC(17,17,6),EL(200,5)        FADTA023
      EQUIVALENCE (A(7951),XB),(A(9951),YB),(A(11951),ZB),(A(13951),CC) FADTA024
     1,(A(15685),EL)                                                    FADTA025
      DIMENSION IBTE(16),AL(10),AR(10),AE(10),CO(3),CP(3)               FADTA026
      EQUIVALENCE (A(30),IMAT),(A(31),ITEM),(A(32),IELT),(A(33),IPRS)   FADTA027
     1,(A(34),ITIC),(A(35),ITGY),(A(36),MBON),(A(37),MCV),(A(38),MNR)   FADTA028
     2,(A(39),ITGZ),(A(40),IARE),(A(41),IMMX),(A(42),IMMY),(A(43),IMMZ) FADTA029
     3,(A(44),IMFI),(A(45),JBON),(A(46),NDT),(A(47),INR),(A(48),NTOT)   FADTA030
     4,(A(49),IBTE),(A(65),ETT),(A(66),IL),(A(67),NBE1),(A(68),NBE2)    FADTA031
     5,(A(69),NBE3),(A(70),ISD),(A(71),AL),(A(81),AR),(A(91),AE)        FADTA032
     6,(A(103),INRP),(A(104),LEN),(A(105),CO),(A(102),IBN),(A(101),ELL) FADTA033
     7,(A(108),CP),(A(111),DX),(A(112),DY),(A(113),DZ),(A(114),LE)      FADTA034
     8,(A(115),DISD),(A(116),DXNL),(A(117),DISL),(A(118),ACL)           FADTA035
     9,(A(119),NDTM),(A(120),ID),(A(121),DT)                            FADTA036
      EQUIVALENCE (A(122),X),(A(123),Y),(A(124),Z),(A(125),XE)          FADTA037
     1,(A(126),YE),(A(127),ZE),(A(128),XA),(A(129),YA),(A(130),ZA)      FADTA038
     2,(A(131),LB),(A(132),NBEP),(A(133),NBET),(A(134),NDXS)            FADTA039
      CALL DORB                                                         FADTA040
      IF (NE-1) 100,700,100                                             FADTA041
  100 IF (NVOL) 210,210,110                                             FADTA042
  110 WRITE OUTPUT TAPE 6,1                                             FADTA043
    1 FORMAT (// 8H S UN NO,   5X,33HCOEFFICIENTS OF SURFACE EQUATIONS//FADTA044
     1)                                                                 FADTA045
      NTOT=10*NSUR                                                      FADTA046
      READ INPUT TAPE 5,4,(AN(J),J=1,NTOT)                              FADTA047
    4 FORMAT (10E8.0)                                                   FADTA048
      DO 200 I=1,NSUR                                                   FADTA049
      NBE=10*(I-1)+1                                                    FADTA050
      NEA=NBE+9                                                         FADTA051
      WRITE OUTPUT TAPE 6,2,I,MDM(I),(AN(J),J=NBE,NEA)                  FADTA052
    2 FORMAT (2I4,2X,10F11.4)                                           FADTA053
      MBON=MBOVR(I)/100                                                 FADTA054
      IF (I-1) 120,120,130                                              FADTA055
  120 IBOT=MBON                                                         FADTA056
  130 IF (IBOT-MBON) 140,200,200                                        FADTA057
  140 IBOT=MBON                                                         FADTA058
  200 CONTINUE                                                          FADTA059
      GO TO 310                                                         FADTA060
  210 WRITE OUTPUT TAPE 6,3                                             FADTA061
    3 FORMAT (// 8H L UN NO,   5X,45HCOEFFICIENTS OF LINE EQUATIONS OR CFADTA062
     1OORDINATES//)                                                     FADTA063
      NTOT=10*NLIN                                                      FADTA064
      READ INPUT TAPE 5,4,(AN(J),J=1,NTOT)                              FADTA065
      DO 300 I=1,NLIN                                                   FADTA066
      NDT=IDTNR(I)/10                                                   FADTA067
      INR=IDTNR(I)-10*NDT                                               FADTA068
      NBE=10*(I-1)+1                                                    FADTA069
      NEA=NBE+NDT-1                                                     FADTA070
      IF (INR) 270,270,280                                              FADTA071
  270 NEA=NEA+NDT                                                       FADTA072
      WRITE OUTPUT TAPE 6,2,I,IDM(I),(AN(J),J=NBE,NEA,2)                FADTA073
      WRITE OUTPUT TAPE 6,5,(AN(J+1),J=NBE,NEA,2)                       FADTA074
    5 FORMAT (13X,10F10.5)                                              FADTA075
      GO TO 300                                                         FADTA076
  280 WRITE OUTPUT TAPE 6,2,I,IDM(I),(AN(J),J=NBE,NEA)                  FADTA077
  300 CONTINUE                                                          FADTA078
  310 DO 400 I=1,NLIN                                                   FADTA079
      MBON=IMFBO(I)-100*(IMFBO(I)/100)                                  FADTA080
      IF (IBOT-MBON) 320,400,400                                        FADTA081
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  320 IBOT=MBON                                                          FADTA082
  400 CONTINUE                                                           FADTA083
      IF (IBOT) 700,700,410                                              FADTA084
  410 WRITE OUTPUT TAPE 6,6                                              FADTA085
    6 FORMAT (// 8H B UN NO,   2X,65HNO OF DIRECTIONS RELATED TO EACH OTFADTA086
     1HER AND THE RELATION CONSTANTS//)                                  FADTA087
      READ INPUT TAPE 5,7,((IBON(I,J),J=1,4),(BORC(I,J),J=1,8),I=1,IBOT)FADTA088
    7 FORMAT (4I4,8E8.0)                                                 FADTA089
      DO 600 I=1,IBOT                                                    FADTA090
      DO 500 J=1,4                                                       FADTA091
      J4=4*J                                                             FADTA092
      IBTE(J4-3)=IBON(I,J)/1000                                          FADTA093
      IBTE(J4-2)=IBON(I,J)/100-10*IBTE(J4-3)                             FADTA094
      IBTE(J4-1)=IBON(I,J)/10-10*IBTE(J4-2)-100*IBTE(J4-3)               FADTA095
      IBTE(J4)=IBON(I,J)-10*IBTE(J4-1)-100*IBTE(J4-2)-1000*IBTE(J4-3)    FADTA096
  500 CONTINUE                                                           FADTA097
      WRITE OUTPUT TAPE 6,8,I,(IBTE(2*J-1),IBTE(2*J),BORC(I,J),J=1,8)    FADTA098
    8 FORMAT (I8,8(I4,I2,F8.4))                                          FADTA099
  600 CONTINUE                                                           FADTA100
  700 RETURN                                                             FADTA101
      END                                                                FADTA102
CFADRC                                                                   FADRC000
      SUBROUTINE DIRC                                                    FADRC001
      DIMENSION A(16684),IA(16684),XO(50),YO(50),ZO(50),NMATE(50)        FADRC002
     1,NFL(50,6),MDM(100),MELMA(100),MPRTI(100),MTETG(100),MBOVR(100)    FADRC003
     2,ML(100,4),IDM(200),IELMA(200),IPRTE(200),IGYGZ(200),IARMX(200)    FADRC004
     3,IMYMZ(200),IMFBO(200),IDTNR(200),IFL(200,3),AN(2000),IBON(50,4)   FADRC005
     4,BORC(50,8),NCL(200),XIR(100),YIR(100),ZIR(100),NX(50),NY(50)      FADRC006
     5,NZ(50)                                                            FADRC007
      COMMON A                                                           FADRC008
      EQUIVALENCE (A,IA),(A(1001),XO),(A(1051),YO),(A(1101),ZO)          FADRC009
     1,(A(1151),NMATE),(A(1201),NFL),(A(1501),MDM),(A(1601),MELMA)       FADRC010
     2,(A(1701),MPRTI),(A(1801),MTETG),(A(1901),MBOVR),(A(2001),ML)      FADRC011
     3,(A(2401),IDM),(A(2601),IELMA),(A(2801),IPRTE),(A(3001),IGYGZ)     FADRC012
     4,(A(3201),IARMX),(A(3401),IMYMZ),(A(3601),IMFBO),(A(3801),IDTNR)   FADRC013
     5,(A(4001),IFL),(A(4601),AN),(A(6601),IBON),(A(6801),BORC)          FADRC014
     6,(A(7201),NCL),(A(7401),XIR),(A(7501),YIR),(A(7601),ZIR)           FADRC015
     7,(A(7701),NX),(A(7751),NY),(A(7801),NZ)                            FADRC016
      EQUIVALENCE (A(1),NE),(A(2),NVOL),(A(3),NSUR),(A(4),NLIN)          FADRC017
     1,(A(5),LNG),(A(6),ISDE),(A(7),NC),(A(8),IO),(A(9),CF),(A(10),XMI)  FADRC018
     2,(A(11),YMI),(A(12),ZMI),(A(13),XMX),(A(14),YMX),(A(15),ZMX)       FADRC019
     3,(A(16),IBOT),(A(17),SCX),(A(18),SCY),(A(19),SCZ),(A(20),DER)      FADRC020
     4,(A(21),ER),(A(22),TER),(A(23),NN),(A(24),XNN),(A(25),NNP)         FADRC021
     5,(A(26),KR),(A(27),DT)                                             FADRC022
      DIMENSION XB(2000),YB(2000),ZB(2000),CC(17,17,6),EL(200,5)         FADRC023
      EQUIVALENCE (A(7951),XB),(A(9951),YB),(A(11951),ZB),(A(13951),CC)  FADRC024
     1,(A(15685),EL)                                                     FADRC025
      DIMENSION IBTE(16),AL(10),AR(10),AE(10),CO(3),CP(3)                FADRC026
      EQUIVALENCE (A(30),IMAT),(A(31),ITEM),(A(32),IELT),(A(33),IPRS)    FADRC027
     1,(A(34),ITIC),(A(35),ITGY),(A(36),MBON),(A(37),MCV),(A(38),MNR)    FADRC028
     2,(A(39),ITGZ),(A(40),IARE),(A(41),IMMX),(A(42),IMMY),(A(43),IMMZ)  FADRC029
     3,(A(44),IMFI),(A(45),JBON),(A(46),NDT),(A(47),INR),(A(48),NTOT)    FADRC030
     4,(A(49),IBTE),(A(65),ETT),(A(66),IL),(A(67),NBE1),(A(68),NBE2)     FADRC031
     5,(A(69),NBE3),(A(70),ISD),(A(71),AL),(A(81),AR),(A(91),AE)         FADRC032
     6,(A(103),INRP),(A(104),LEN),(A(105),CO),(A(102),IBN),(A(101),ELL)  FADRC033
     7,(A(108),CP),(A(111),DX),(A(112),DY),(A(113),DZ),(A(114),LE)       FADRC034
     8,(A(115),DISD),(A(116),DXNL),(A(117),DISL),(A(118),ACL)            FADRC035
     9,(A(119),NDTM),(A(120),ID)                                         FADRC036
      EQUIVALENCE (A(122),X),(A(123),Y),(A(124),Z),(A(125),XE)           FADRC037
     1,(A(126),YE),(A(127),ZE),(A(128),XA),(A(129),YA),(A(130),ZA)       FADRC038
     2,(A(131),LB),(A(132),NBEP),(A(133),NBET),(A(134),NDXS)             FADRC039
      DIMENSION CL(3),CR(3)                                              FADRC040
      ID=ID                                                              FADRC041
      IL=IL                                                              FADRC042
      SGN=1.                                                             FADRC043
      IF (IDM(IL)) 105,106,106                                           FADRC044
  105 SGN=-1.                                                            FADRC045
  106 IF (NVOL) 110,120,110                                              FADRC046
  110 CL(1)=AL(4)+AL(5)*Z+AL(7)*Y+2.*AL(10)*X                            FADRC047
      CL(2)=AL(3)+AL(6)*Z+AL(7)*X+2.*AL(9)*Y                             FADRC048
      CL(3)=AL(2)+AL(5)*X+AL(6)*Y+2.*AL(8)*Z                             FADRC049
      CR(1)=AR(4)+AR(5)*Z+AR(7)*Y+2.*AR(10)*X                            FADRC050
      CR(2)=AR(3)+AR(6)*Z+AR(7)*X+2.*AR(9)*Y                             FADRC051
      CR(3)=AR(2)+AR(5)*X+AR(6)*Y+2.*AR(8)*Z                             FADRC052
      GO TO 140                                                          FADRC053
  120 IF (INR) 130,150,130                                               FADRC054
  130 CL(1)=AL(3)+AL(4)*Y+2.*AL(6)*X                                     FADRC055
      CL(2)=AL(2)+AL(4)*X+2.*AL(5)*Y                                     FADRC056
      CL(3)=0.                                                           FADRC057
      CR(1)=0.                                                           FADRC058
      CR(2)=0.                                                           FADRC059
      CR(3)=1.                                                           FADRC060
  140 CO(1)=CL(2)*CR(3)-CL(3)*CR(2)                                      FADRC061
      CO(2)=-(CL(1)*CR(3)-CL(3)*CR(1))                                   FADRC062
      CO(3)=CL(1)*CR(2)-CL(2)*CR(1)                                      FADRC063
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      GO TO 200                                                          FADRC064
  150 CO(1)=AL(2*ID+1)-AL(2*ID-1)                                        FADRC065
      CO(2)=AL(2*ID+2)-AL(2*ID)                                          FADRC066
      CO(3)=0.                                                           FADRC067
  200 COL=SQRTF(CO(1)*CO(1)+CO(2)*CO(2)+CO(3)*CO(3))                     FADRC068
      DO 300 I=1,3                                                       FADRC069
  300 CO(I)=CO(I)/COL                                                    FADRC070
      DX=DER*CO(1)*SGN                                                   FADRC071
      DY=DER*CO(2)*SGN                                                   FADRC072
      DZ=DER*CO(3)*SGN                                                   FADRC073
      RETURN                                                             FADRC074
      END                                                                FADRC075
CFADRB                                                                   FADRB000
      SUBROUTINE DORB                                                    FADRB001
      DIMENSION A(16684),IA(16684),XO(50),YO(50),ZO(50),NMATE(50)        FADRB002
     1,NFL(50,6),MDM(100),MELMA(100),MPRTI(100),MTETG(100),MBOVR(100)    FADRB003
     2,ML(100,4),IDM(200),IELMA(200),IPRTE(200),IGYGZ(200),IARMX(200)    FADRB004
     3,IMYMZ(200),IMFBO(200),IDTNR(200),IFL(200,3),AN(2000),IBON(50,4)   FADRB005
     4,BORC(50,8),NCL(200),XIR(100),YIR(100),ZIR(100),NX(50),NY(50)      FADRB006
     5,NZ(50)                                                            FADRB007
      COMMON A                                                           FADRB008
      EQUIVALENCE (A,IA),(A(1001),XO),(A(1051),YO),(A(1101),ZO)          FADRB009
     1,(A(1151),NMATE),(A(1201),NFL),(A(1501),MDM),(A(1601),MELMA)       FADRB010
     2,(A(1701),MPRTI),(A(1801),MTETG),(A(1901),MBOVR),(A(2001),ML)      FADRB011
     3,(A(2401),IDM),(A(2601),IELMA),(A(2801),IPRTE),(A(3001),IGYGZ)     FADRB012
     4,(A(3201),IARMX),(A(3401),IMYMZ),(A(3601),IMFBO),(A(3801),IDTNR)   FADRB013
     5,(A(4001),IFL),(A(4601),AN),(A(6601),IBON),(A(6801),BORC)          FADRB014
     6,(A(7201),NCL),(A(7401),XIR),(A(7501),YIR),(A(7601),ZIR)           FADRB015
     7,(A(7701),NX),(A(7751),NY),(A(7801),NZ)                            FADRB016
      EQUIVALENCE (A(1),NE),(A(2),NVOL),(A(3),NSUR),(A(4),NLIN)          FADRB017
     1,(A(5),LNG),(A(6),ISDE),(A(7),NC),(A(8),IO),(A(9),CF),(A(10),XMI)  FADRB018
     2,(A(11),YMI),(A(12),ZMI),(A(13),XMX),(A(14),YMX),(A(15),ZMX)       FADRB019
     3,(A(16),IBOT),(A(17),SCX),(A(18),SCY),(A(19),SCZ),(A(20),DER)      FADRB020
     4,(A(21),ER),(A(22),TER),(A(23),NN),(A(24),XNN),(A(25),NNP)         FADRB021
     5,(A(26),KR)                                                        FADRB022
      DIMENSION XB(2000),YB(2000),ZB(2000),CC(17,17,6),EL(200,5)         FADRB023
      EQUIVALENCE (A(7951),XB),(A(9951),YB),(A(11951),ZB),(A(13951),CC)  FADRB024
     1,(A(15685),EL)                                                     FADRB025
      DIMENSION IBTE(16),AL(10),AR(10),AE(10),CO(3),CP(3)                FADRB026
      EQUIVALENCE (A(30),IMAT),(A(31),ITEM),(A(32),IELT),(A(33),IPRS)    FADRB027
     1,(A(34),ITIC),(A(35),ITGY),(A(36),MBON),(A(37),MCV),(A(38),MNR)    FADRB028
     2,(A(39),ITGZ),(A(40),IARE),(A(41),IMMX),(A(42),IMMY),(A(43),IMMZ)  FADRB029
     3,(A(44),IMFI),(A(45),JBON),(A(46),NDT),(A(47),INR),(A(48),NTOT)    FADRB030
     4,(A(49),IBTE),(A(65),ETT),(A(66),IL),(A(67),NBE1),(A(68),NBE2)     FADRB031
     5,(A(69),NBE3),(A(70),ISD),(A(71),AL),(A(81),AR),(A(91),AE)         FADRB032
     6,(A(103),INRP),(A(104),LEN),(A(105),CO),(A(102),IBN),(A(101),ELL)  FADRB033
     7,(A(108),CP),(A(111),DX),(A(112),DY),(A(113),DZ),(A(114),LE)       FADRB034
     8,(A(115),DISD),(A(116),DXNL),(A(117),DISL),(A(118),ACL)            FADRB035
     9,(A(119),NDTM),(A(120),ID),(A(121),DT)                             FADRB036
      EQUIVALENCE (A(122),X),(A(123),Y),(A(124),Z),(A(125),XE)           FADRB037
     1,(A(126),YE),(A(127),ZE),(A(128),XA),(A(129),YA),(A(130),ZA)       FADRB038
     2,(A(131),LB),(A(132),NBEP),(A(133),NBET),(A(134),NDXS)             FADRB039
     3,(A(135),IBI)                                                      FADRB040
      READ INPUT TAPE 5,2,NVOL,NSUR,NLIN,IO,NU,NV,NW,CF,XT,YT,ZT,XB(1)   FADRB041
     1,YB(1),ZB(1),XMI,XMX,YMI,YMX,ZMI,ZMX                               FADRB042
      IF (ABSF(CF-1.)-.01) 90,95,95                                      FADRB043
   90 CF=1.0001                                                          FADRB044
   95 XO(IO)=XT                                                          FADRB045
      YO(IO)=YT                                                          FADRB046
      ZO(IO)=ZT                                                          FADRB047
      NX(IO)=NU                                                          FADRB048
      NY(IO)=NV                                                          FADRB049
      NZ(IO)=NW                                                          FADRB050
    2 FORMAT (I2,2I3,4I2,E4.0,12E5.0)                                    FADRB051
      IF (NVOL) 100,100,110                                              FADRB052
  100 WRITE OUTPUT TAPE 6,3                                              FADRB053
    3 FORMAT (33HODATA FOR TWO DIMENSIONAL PROBLEM///)                   FADRB054
      GO TO 120                                                          FADRB055
  110 WRITE OUTPUT TAPE 6,4                                              FADRB056
    4 FORMAT (35HODATA FOR THREE DIMENSIONAL PROBLEM///)                 FADRB057
  120 CONTINUE                                                           FADRB058
      WRITE OUTPUT TAPE 6,6,NVOL,NSUR,NLIN,IO,NU,NV,NW,CF,XO(IO),YO(IO)  FADRB059
     1,ZO(IO),XB(1),YB(1),ZB(1)                                          FADRB060
    6 FORMAT (39H NUMBER OF THREE DIMENSIONAL SUBDOMAINS,11X,4HNVOL,I16  FADRB061
     1/39H NUMBER OF FACES OR TWO DIM. SUBDOMAINS,11X,4HNSUR,I16         FADRB062
     2/44H NUMBER OF LINEAR FACES OR ONE DIM. ELEMENTS, 6X,4HNLIN,I16    FADRB063
     3/47H NO. OF SUBDIVISION IN WHICH SPECIAL POINT LIES,5X,2HIO,I16/39FADRB064
     4H NUMBER OF DIVISION IN THREE DIRECTIONS,9X,6HNX(IO),I16/48X,6HNY(FADRB065
     5IO),I16/48X,6HNZ(IO),I16/21H FACTOR OF REFINEMENT,31X,2HCF,E16.6/ FADRB066
     629H COORDINATES OF SPECIAL POINT,19X,6HXO(IO),E16.6/48X,6HYO(IO), FADRB067
     7E16.6/48X,6HZO(IO),E16.6/26H COORDINATES OF THE ORIGIN,23X,        FADRB068
     85HXB(1),  E16.6/49X,5HYB(1),  E16.6/49X,5HZB(1),  E16.6)          FADRB069
      WRITE OUTPUT TAPE 6,7,XMI,XMX,YMI,YMX,ZMI,ZMX                      FADRB070
    7 FORMAT (41H MINIMUM AND MAXIMUM BOUNDARY COORDINATES, 9X,4HXMIN,   FADRB071
     1E16.6/50X,4HXMAX,E16.6/50X,4HYMIN,E16.6/50X,4HYMAX,E16.6/          FADRB072
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   250X,4HZMIN,E16.6/50X,4HZMAX,E16.6///)                                FADRB073
    IF (NE-1) 125,600,125                                                FADRB074
125 WRITE OUTPUT TAPE 6,18                                               FADRB075
 18 FORMAT (1H1)                                                         FADRB076
    IF (NVOL) 310,310,130                                                FADRB077
130 READ INPUT TAPE 5,8,(MDM(I),NMATE(I),(NFL(I,J),J=1,6),I=1,NVOL)      FADRB078
  8 FORMAT (2(8I4,8X))                                                   FADRB079
    DO 200 I=1,NVOL                                                      FADRB080
    IF (MDM(I)-I) 9000,200,9000                                          FADRB081
200 CONTINUE                                                             FADRB082
    WRITE OUTPUT TAPE 6,9                                                FADRB083
    DO 250 I=1,NVOL                                                      FADRB084
    IMAT=NMATE(I)/100                                                    FADRB085
    ITEM=NMATE(I)-100*IMAT                                               FADRB086
    WRITE OUTPUT TAPE 6,10,I,IMAT,ITEM,(NFL(I,J),J=1,6)                  FADRB087
  9 FORMAT (19H VOLUME INFORMATION// 8H SUBD NO,  5X ,8HMATERIAL,2X,     FADRB088
   111HTEMPERATURE, 2X,11H1ST FACE NO,2X,11H2ND FACE NO,2X,11H3RD FACE   FADRB089
   2 NO,2X,11H4TH FACE NO,2X,11H5TH FACE NO,2X,11H6TH FACE NO//)         FADRB090
 10 FORMAT (9(I8,5X))                                                    FADRB091
250 CONTINUE                                                             FADRB092
    NBAS=1                                                               FADRB093
    NSON=2                                                               FADRB094
    KII=6                                                                FADRB095
255 JP=NSON+1                                                            FADRB096
    DO 300 J=NBAS,NSON                                                   FADRB097
    DO 295 I=1,NVOL                                                      FADRB098
    IF ((NFL(I,5)-1)*(NFL(I,5)-NSUR)) 260,260,9100                       FADRB099
260 IF ((NFL(I,6)-1)*(NFL(I,6)-NSUR)) 265,265,9100                       FADRB100
265 IF ((NFL(I,J)-1)*(NFL(I,J)-NSUR)) 270,270,9100                       FADRB101
270 DO 290 II=1,NVOL                                                     FADRB102
    IF (I-II) 275,280,275                                                FADRB103
275 IF (NFL(I,J)-NFL(II,J)) 280,9100,280                                 FADRB104
280 DO 285 K=JP,6                                                        FADRB105
    IF (NFL(I,J)-NFL(II,K)) 285,9100,285                                 FADRB106
285 CONTINUE                                                             FADRB107
290 CONTINUE                                                             FADRB108
295 CONTINUE                                                             FADRB109
300 CONTINUE                                                             FADRB110
    IF (NSON-4) 305,310,310                                              FADRB111
305 NBAS=3                                                               FADRB112
    NSON=4                                                               FADRB113
    GO TO 255                                                            FADRB114
310 CONTINUE                                                             FADRB115
    IF (NSUR) 9200,9200,320                                              FADRB116
320 READ INPUT TAPE 5,11,(MDM(I),MELMA(I),MPRTI(I),MTETG(I),MBOVR(I)     FADRB117
   1,(ML(I,J),J=1,4),I=1,NSUR)                                           FADRB118
 11 FORMAT (2(9I4,4X))                                                   FADRB119
    WRITE OUTPUT TAPE 6,12                                               FADRB120
    DO 400 I=1,NSUR                                                      FADRB121
    IELT=MELMA(I)/100                                                    FADRB122
    IMAT=MELMA(I)-100*IELT                                               FADRB123
    IPRS=MPRTI(I)/100                                                    FADRB124
    ITIC=MPRTI(I)-100*IPRS                                               FADRB125
    ITEM=MTETG(I)/100                                                    FADRB126
    ITGY=MTETG(I)-100*ITEM                                               FADRB127
    MBON=MBOVR(I)/100                                                    FADRB128
    MCV=MBOVR(I)/10-10*MBON                                              FADRB129
    MNR=MBOVR(I)-10*MCV-100*MBON                                         FADRB130
 12 FORMAT(/21HOSURFACES INFORMATION// 8H SURF NO,2X,6HELEMNT,2X,6HMATFADRB131
   1ERL,2X,6HPRESSR,2X,6HTHICNS,2X,6HTEM CH,2X,6HTEM GR,2X,6HBND CN,2XFADRB132
   2,6HCV IDX,2X,6HINP TP,2X,6H1ST FC,2X,6H2ND FC,2X,6H3RD FC,2X,6H4THFADRB133
   3 FC//)                                                               FADRB134
    WRITE OUTPUT TAPE 6,13,I,MDM(I),IELT,IMAT,IPRS,ITIC,ITEM,ITGY,MBONFADRB135
   1,MCV,MNR ,(ML(I,J),J=1,4)                                            FADRB136
 13 FORMAT (2I4,13I8)                                                    FADRB137
400 CONTINUE                                                             FADRB138
    IF (NVOL) 401,401,485                                                FADRB139
401 DO 480 J=1,2                                                         FADRB140
    DO 480 I=1,NSUR                                                      FADRB141
    IF ((ML(I,J)-1)*(ML(I,J)-NLIN)) 405,405,9100                         FADRB142
405 IF ((ML(I,J+2)-1)*(ML(I,J+2)-NLIN)) 410,410,9100                     FADRB143
410 DO 470 II=1,NSUR                                                     FADRB144
    IF (I-II) 420,430,420                                                FADRB145
420 IF (ML(I,J)-ML(II,J)) 430,9100,430                                   FADRB146
430 DO 460 K=3,4                                                         FADRB147
    IF (ML(I,J)-ML(II,K)) 460,9100,460                                   FADRB148
460 CONTINUE                                                             FADRB149
470 CONTINUE                                                             FADRB150
480 CONTINUE                                                             FADRB151
485 READ INPUT TAPE 6,14,(IDM(I),IELMA(I),IPRTE(I),IGYGZ(I),IARMX(I)     FADRB152
   1,IMYMZ(I),IMFBO(I),IDTNR(I),(IFL(I,J),J=1,3),I=1,NLIN)               FADRB153
 14 FORMAT (2(7I4,4I3))                                                  FADRB154
    WRITE OUTPUT TAPE 6,15                                               FADRB155
 15 FORMAT (/18HOLINES INFORMATION// 8H LINE NO,2X,6HELEMNT,2X,6HMATERFADRB156
   1L,2X,6HPRESSR,2X,6HTEM CH,2X,6HTEM GY,2X,6HTEM GZ,2X,6HS AREA,2X   FADRB157
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     2,6HTOR CS,2X,6HMOIN Y,2X,6HMOIN Z,2X,6HANG FI,2X,6HBND CN,1X,      FADRB158
     36HNDTINR,9H  FACE NO//)                                            FADRB159
      DO 500 I=1,NLIN                                                    FADRB160
      IELT=IELMA(I)/100                                                  FADRB161
      IMAT=IELMA(I)-100*IELT                                             FADRB162
      IPRS=IPRTE(I)/100                                                  FADRB163
      ITEM=IPRTE(I)-100*IPRS                                             FADRB164
      ITGY=IGYGZ(I)/100                                                  FADRB165
      ITGZ=IGYGZ(I)-100*ITGY                                             FADRB166
      IARE=IARMX(I)/100                                                  FADRB167
      IMMX=IARMX(I)-100*IARE                                             FADRB168
      IMMY=IMYMZ(I)/100                                                  FADRB169
      IMMZ=IMYMZ(I)-100*IMMY                                             FADRB170
      IMFI=IMFBO(I)/100                                                  FADRB171
      JBON=IMFBO(I)-100*IMFI                                             FADRB172
      NDT=IDTNR(I)/10                                                    FADRB173
      INR=IDTNR(I)-10*NDT                                                FADRB174
      WRITE OUTPUT TAPE 6,16,I,IDM(I),IELT,IMAT,IPRS,ITEM,ITGY,ITGZ,IAREFADRB175
     1,IMMX,IMMY,IMMZ,IMFI,JBON,NDT,INR,(IFL(I,J),J=1,3)                 FADRB176
   16 FORMAT (2I4,12I8,I4,4I3)                                           FADRB177
  500 CONTINUE                                                           FADRB178
  600 RETURN                                                             FADRB179
 9000 WRITE OUTPUT TAPE 6,17,I,MDM(I)                                    FADRB180
      GO TO 9300                                                         FADRB181
   17 FORMAT (45H1VOLUME SUBDOMAIN NUMBERS ARE NOT IN SEQUENCE,2I6)      FADRB182
 9100 WRITE OUTPUT TAPE 6,20,I,II                                        FADRB183
      GO TO 9300                                                         FADRB184
   20 FORMAT (40H ERROR IN THE FACE LABELING OF SUBDOMAIN,I6,3H OR,I6)   FADRB185
 9200 WRITE OUTPUT TAPE 6,19                                             FADRB186
   19 FORMAT (38H TOTAL NUMBER OF FACES MAY NOT BE ZERO)                 FADRB187
 9300 CALL EXIT                                                          FADRB188
      END                                                                FADRB189
CFADAN                                                                   FADAN000
      SUBROUTINE DSAN                                                    FADAN001
      DIMENSION A(16684),IA(16684),XO(50),YO(50),ZO(50),NMATE(50)        FADAN002
     1,NFL(50,6),MDM(100),MELMA(100),MPRTI(100),MTETG(100),MBOVR(100)    FADAN003
     2,ML(100,4, IDM(200),IELMA(200),IPRTE(200),IGYGZ(200),IARMX(200)    FADAN004
     3,IMYMZ(200),IMFBO(200),IDTNR(200),IFL(200,3),AN(2000),IBON(50,4)   FADAN005
     4,BORC(50,8),NCL(200),XIR(100),YIR(100),ZIR(100),NX(50),NY(50)      FADAN006
     5,NZ(50)                                                            FADAN007
      COMMON A                                                           FADAN008
      EQUIVALENCE (A,IA),(A(1001),XO),(A(1051),YO),(A(1101),ZO)          FADAN009
     1,(A(1151),NMATE),(A(1201),NFL),(A(1501),MDM),(A(1601),MELMA)       FADAN010
     2,(A(1701),MPRTI),(A(1801),MTETG),(A(1901),MBOVR),(A(2001),ML)      FADAN011
     3,(A(2401),IDM),(A(2601),IELMA),(A(2801),IPRTE),(A(3001),IGYGZ)     FADAN012
     4,(A(3201),IARMX),(A(3401),IMYMZ),(A(3601),IMFBO),(A(3801),IDTNR)   FADAN013
     5,(A(4001),IFL),(A(4601),AN),(A(6601),IBON),(A(6801),BORC)          FADAN014
     6,(A(7201),NCL),(A(7401),XIR),(A(7501),YIR),(A(7601),ZIR)           FADAN015
     7,(A(7701),NX),(A(7751),NY),(A(7801),NZ)                            FADAN016
      EQUIVALENCE (A(1),NE),(A(2),NVOL),(A(3),NSUR),(A(4),NLIN)          FADAN017
     1,(A(5),LNG),(A(6),ISDE),(A(7),NC),(A(8),IO),(A(9),CF),(A(10),XMI)  FADAN018
     2,(A(11),YMI),(A(12),ZMI),(A(13),XMX),(A(14),YMX),(A(15),ZMX)       FADAN019
     3,(A(16),IBOT),(A(17),SCX),(A(18),SCY),(A(19),SCZ),(A(20),DER)      FADAN020
     4,(A(21),ER),(A(22),TER),(A(23),NN),(A(24),XNN),(A(25),NNP)         FADAN021
     5,(A(26),KR)                                                       FADAN022
      DIMENSION XB(2000),YB(2000),ZB(2000),CC(17,17,6),EL(200,5)         FADAN023
      EQUIVALENCE (A(7951),XB),(A(9951),YB),(A(11951),ZB),(A(13951),CC)  FADAN024
     1,(A(15685),EL)                                                     FADAN025
      DIMENSION IBTE(16),AL(10),AR(10),AE(10),CO(3),CP(3)                FADAN026
      EQUIVALENCE (A(30),IMAT),(A(31),ITEM),(A(32),IELT),(A(33),IPRS)    FADAN027
     1,(A(34),ITIC),(A(35),ITGY),(A(36),MBON),(A(37),MCV),(A(38),MNR)    FADAN028
     2,(A(39),ITGZ),(A(40),IARE),(A(41),IMMX),(A(42),IMMY),(A(43),IMMZ)  FADAN029
     3,(A(44),IMFI),(A(45),JBON),(A(46),NDT),(A(47),INR),(A(48),NTOT)    FADAN030
     4,(A(49),IBTE),(A(65),ETT),(A(66),IL),(A(67),NBE1),(A(68),NBE2)     FADAN031
     5,(A(69),NBE3),(A(70),ISD),(A(71),AL),(A(81),AR),(A(91),AE)         FADAN032
     6,(A(103),INRP),(A(104),LEN),(A(105),CO),(A(102),IBN),(A(101),ELL)  FADAN033
     7,(A(108),CP),(A(111),DX),(A(112),DY),(A(113),DZ),(A(114),LE)       FADAN034
     8,(A(115),DISD),(A(116),DXNL),(A(117),DISL),(A(118),ACL)            FADAN035
     9,(A(119),NDTM),(A(120),ID),(A(121),DT)                             FADAN036
      EQUIVALENCE (A(122),X),(A(123),Y),(A(124),Z),(A(125),XE)           FADAN037
     1,(A(126),YE),(A(127),ZE),(A(128),XA),(A(129),YA),(A(130),ZA)       FADAN038
     2,(A(131),LB),(A(132),NBEP),(A(133),NBET),(A(134),NDXS)             FADAN039
      NBE3=10*(NBE3-1)                                                   FADAN040
      XA=AN(NBE3+1)                                                      FADAN041
      YA=AN(NBE3+2)                                                      FADAN042
      XE=AN(NBE3+3)                                                      FADAN043
      YE=AN(NBE3+4)                                                      FADAN044
      XD=XE-XA                                                           FADAN045
      YD=YE-YA                                                           FADAN046
      IF (XD) 110,200,110                                                FADAN047
  110 AE(1)=-YA+YD*XA/XD                                                 FADAN048
      AE(2)=1.                                                           FADAN049
      AE(3)=-YD/XD                                                       FADAN050
      GO TO 300                                                          FADAN051
  200 IF (YD) 210,9000,210                                               FADAN052
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  210 AE(1)=-XA+XD*YA/YD                                                    FADAN053
      AE(2)=-XD/YD                                                          FADAN054
      AE(3)=1.                                                              FADAN055
  300 RETURN                                                                FADAN056
 9000 WRITE OUTPUT TAPE 6,1,NBET,XA,YA,XE,YE                                FADAN057
    1 FORMAT (24HOERROR IN THE INPUT UNIT,I6,2X,31HTHE FIRST FOUR CONSTA    FADAN058
     1NTS FOLLOW//1X,4E12.5)                                                FADAN059
      GO TO 300                                                             FADAN060
      END                                                                   FADAN061
CFAITR                                                                      FAITR000
      SUBROUTINE INTR                                                       FAITR001
      DIMENSION A(16684),IA(16684),XO(50),YO(50),ZO(50),NMATE(50)           FAITR002
     1,NFL(50,6),MDM(100),MELMA(100),MPRTI(100),MTETG(100),MBOVR(100)       FAITR003
     2,ML(100,4),IDM(200),IELMA(200),IPRTE(200),IGYGZ(200),IARMX(200)       FAITR004
     3,IMYMZ(200),IMFBO(200),IDTNR(200),IFL(200,3),AN(2000),IBON(50,4)      FAITR005
     4,BORC(50,8),NCL(200),XIR(100),YIR(100),ZIR(100),NX(50),NY(50)         FAITR006
     5,NZ(50)                                                               FAITR007
      COMMON A                                                              FAITR008
      EQUIVALENCE (A,IA),(A(1001),XO),(A(1051),YO),(A(1101),ZO)             FAITR009
     1,(A(1151),NMATE),(A(1201),NFL),(A(1501),MDM),(A(1601),MELMA)          FAITR010
     2,(A(1701),MPRTI),(A(1801),MTETG),(A(1901),MBOVR),(A(2001),ML)         FAITR011
     3,(A(2401),IDM),(A(2601),IELMA),(A(2801),IPRTE),(A(3001),IGYGZ)        FAITR012
     4,(A(3201),IARMX),(A(3401),IMYMZ),(A(3601),IMFBO),(A(3801),IDTNR)      FAITR013
     5,(A(4001),IFL),(A(4601),AN),(A(6601),IBON),(A(6801),BORC)             FAITR014
     6,(A(7201),NCL),(A(7401),XIR),(A(7501),YIR),(A(7601),ZIR)              FAITR015
     7,(A(7701),NX),(A(7751),NY),(A(7801),NZ)                               FAITR016
      EQUIVALENCE (A(1),NE),(A(2),NVOL),(A(3),NSUR),(A(4),NLIN)             FAITR017
     1,(A(5),LNG),(A(6),ISDE),(A(7),NC),(A(8),IO),(A(9),CF),(A(10),XMI)     FAITR018
     2,(A(11),YMI),(A(12),ZMI),(A(13),XMX),(A(14),YMX),(A(15),ZMX)          FAITR019
     3,(A(16),IBOT),(A(17),SCX),(A(18),SCY),(A(19),SCZ),(A(20),DER)         FAITR020
     4,(A(21),ER),(A(22),TER),(A(23),NN),(A(24),XNN),(A(25),NNP)            FAITR021
     5,(A(26),KR),(A(27),DT)                                                FAITR022
      DIMENSION XB(2000),YB(2000),ZB(2000),CC(17,17,6),EL(200,5)            FAITR023
      EQUIVALENCE (A(7951),XB),(A(9951),YB),(A(11951),ZB),(A(13951),CC)     FAITR024
     1,(A(15685),EL)                                                        FAITR025
      DIMENSION IBTE(16),AL(10),AR(10),AE(10),CO(3),CP(3)                   FAITR026
      EQUIVALENCE (A(30),IMAT),(A(31),ITEM),(A(32),IELT),(A(33),IPRS)       FAITR027
     1,(A(34),ITIC),(A(35),ITGY),(A(36),MBON),(A(37),MCV),(A(38),MNR)       FAITR028
     2,(A(39),ITGZ),(A(40),IARE),(A(41),IMMX),(A(42),IMMY),(A(43),IMMZ)     FAITR029
     3,(A(44),IMFI),(A(45),JBON),(A(46),NDT),(A(47),INR),(A(48),NTOT)       FAITR030
     4,(A(49),IBTE),(A(65),ETT),(A(66),IL),(A(67),NBE1),(A(68),NBE2)        FAITR031
     5,(A(69),NBE3),(A(70),ISD),(A(71),AL),(A(81),AR),(A(91),AE)            FAITR032
     6,(A(103),INRP),(A(104),LEN),(A(105),CO),(A(102),IBN),(A(101),ELL)     FAITR033
     7,(A(108),CP),(A(111),DX),(A(112),DY),(A(113),DZ),(A(114),LE)          FAITR034
     8,(A(115),DISD),(A(116),DXNL),(A(117),DISL),(A(118),ACL)               FAITR035
     9,(A(119),NDTM),(A(120),ID)                                            FAITR036
      EQUIVALENCE (A(122),X),(A(123),Y),(A(124),Z),(A(125),XE)              FAITR037
     1,(A(126),YE),(A(127),ZE),(A(128),XA),(A(129),YA),(A(130),ZA)          FAITR038
     2,(A(131),LB),(A(132),NBEP),(A(133),NBET),(A(134),NDXS)                FAITR039
      LE=LE                                                                 FAITR040
      ISD=ISD                                                               FAITR041
      FI=0.                                                                 FAITR042
      DT=1.                                                                 FAITR043
      NCO=0                                                                 FAITR044
      IF (INR-1) 9000,120,110                                               FAITR045
  110 NDX=2                                                                 FAITR046
      GO TO 130                                                             FAITR047
  120 NDX=1                                                                 FAITR048
  130 FT=FI                                                                 FAITR049
      IF (NVOL) 140,140,150                                                 FAITR050
  140 FI=AE(6)*X*X+AE(5)*Y*Y+AE(4)*X*Y+AE(3)*X+AE(2)*Y+AE(1)                FAITR051
      GO TO 155                                                             FAITR052
  150 FI=AE(10)*X*X+AE(9)*Y*Y+AE(8)*Z*Z+AE(7)*X*Y+AE(6)*Y*Z+AE(5)*Z*X+AEFAITR053
     1(4)*X+AE(3)*Y+AE(2)*Z+AE(1)                                           FAITR054
  155 IF (NCO-3) 220,160,170                                                FAITR055
  160 XXB=X                                                                 FAITR056
      YYB=Y                                                                 FAITR057
      ZZB=Z                                                                 FAITR058
      GO TO 220                                                             FAITR059
  170 IF (NCO-99) 220,220,180                                               FAITR060
  180 IF (ABSF(XXB-X)-DER) 190,210,210                                      FAITR061
  190 IF (ABSF(YYB-Y)-DER) 200,210,210                                      FAITR062
  200 IF (ABSF(ZZB-Z)-DER) 9000,210,210                                     FAITR063
  210 IF (NCO-9000) 220,220,9100                                            FAITR064
  220 NCO=NCO+1                                                             FAITR065
      IF (ABSF(FI)-TER) 370,230,230                                         FAITR066
  230 IF (FT*FI) 240,280,280                                                FAITR067
  240 GO TO (250,270,260),NDX                                               FAITR068
  250 NDX=3                                                                 FAITR069
      XAB=X-DX                                                              FAITR070
      YAB=Y-DY                                                              FAITR071
      ZAB=Z-DZ                                                              FAITR072
      IF (LNG) 255,255,257                                                  FAITR073
  255 EL(ISD,LE)=EL(ISD,LE)-DER                                             FAITR074
      GO TO 260                                                             FAITR075
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  257 ELL=ELL-DER                                                          FAITR076
  260 DT=-.5*DT                                                            FAITR077
      GO TO 280                                                            FAITR078
  270 NDX=1                                                                FAITR079
  280 XA=X                                                                 FAITR080
      YA=Y                                                                 FAITR081
      ZA=Z                                                                 FAITR082
      IF (NVOL) 290,290,310                                                FAITR083
  290 IF (NDT-3) 300,300,310                                               FAITR084
  300 X=X+DX*DT                                                            FAITR085
      Y=Y+DY*DT                                                            FAITR086
      Z=Z+DZ*DT                                                            FAITR087
      GO TO (360,360,130),NDX                                              FAITR088
  310 IF (NCO-1) 330,330,320                                               FAITR089
  320 CALL DIRC                                                            FAITR090
  330 IF (NVOL) 340,340,350                                                FAITR091
  340 CALL ROOT                                                            FAITR092
      GO TO 360                                                            FAITR093
  350 CALL STEP                                                            FAITR094
  360 GO TO (365,365,130),NDX                                              FAITR095
  365 CALL LENG (XA,YA,ZA,X,Y,Z)                                           FAITR096
      GO TO 130                                                            FAITR097
  370 IF (NCO-2) 380,390,390                                               FAITR098
  380 FI=0.                                                                FAITR099
      X=X+DX                                                               FAITR100
      Y=Y+DY                                                               FAITR101
      Z=Z+DZ                                                               FAITR102
      GO TO 130                                                            FAITR103
  390 GO TO (400,270,410),NDX                                              FAITR104
  400 XAB=X                                                                FAITR105
      YAB=Y                                                                FAITR106
      ZAB=Z                                                                FAITR107
  410 CALL LENG (XAB,YAB,ZAB,X,Y,Z)                                        FAITR108
  420 RETURN                                                               FAITR109
 9000 WRITE OUTPUT TAPE 6,1,NCO,X,Y,Z,(A(I),I=71,100)                     FAITR110
    1 FORMAT ( 6H1AFTER,I6,2X,96HSTEPS OF INTEGRATION  STARTING POINT ISFAITR111
     1 REACHED, COORDINATES AND COEFFICIENTS OF SURFACES FOLLOW//3F9.4/1FAITR112
     20(1X,F10.5)/10(1X,F10.5)/10(1X,F10.5))                             FAITR113
      GO TO 9010                                                         FAITR114
 9100 WRITE OUTPUT TAPE 6,2,NCO,X,Y,Z,(A(I),I=71,100)                    FAITR115
    2 FORMAT ( 6H1AFTER,I6,2X,96HSTEPS OF INTEGRATION END SURFACE IS NOTFAITR116
     1 REACHED, COORDINATES AND COEFFICIENTS OF SURFACES FOLLOW//3F9.4/1FAITR117
     20(1X,F10.5)/10(1X,F10.5)/10(1X,F10.5))                             FAITR118
 9010 CALL EXIT                                                          FAITR119
      END                                                                FAITR120
*       FAP                                                             FALSN000
        COUNT   100                                                     FALSN001
        LBL     E1LEDE                                                  FALSN002
        REM                                                             FALSN003
*       THIS SUBPROGRAM IS CALLED USING FORTRAN 'SUBROUTINE' CONVENTIONS.FALSN004
*       CALLING SEQUENCE IS...                                          FALSN005
*            CALL SEBIN(A,I,N)                                          FALSN006
*       WHERE  'A' IS THE NAME OF A WORD (VARIABLE).                    FALSN007
*              'I' IS FTN INTEGER SPECIFYING DESIRED BIT (1-36) IN 'A'. FALSN008
*              'N' IS A FORTRAN INTEGER ONE OR ZERO INDICATING THE NEW  FALSN009
*                  VALUE OF THE I'TH BIT OF 'A'.                        FALSN010
        REM                                                             FALSN011
        ENTRY   SEBIN                                                   FALSN012
        ENTRY   LEBIN                                                   FALSN013
        REM                                                             FALSN014
        EVEN                                                            FALSN015
        NAC                                                             FALSN016
SEBIN   EQU     *                                                       FALSN017
        STI     INDKTR          SAVE INDICATORS                         FALSN018
        SXA     SAVX1,1         AND XR1                                 FALSN019
        LDI*    1,4             RESET                                   FALSN020
        CLA*    2,4                                                     FALSN021
        PDC     ,1                                                      FALSN022
        ZET*    3,4             DO WE SET OR RESET                      FALSN023
        TRA     SET             SET                                     FALSN024
        RIS     TABLE,1         RESET                                   FALSN025
        TRA     EXIT                                                    FALSN026
        EVEN                                                            FALSN027
SET     OSI     TABLE,1                                                 FALSN028
EXIT    STI*    1,4                                                     FALSN029
SAVX1   AXT     **,1                                                    FALSN030
        LDI     INDKTR                                                  FALSN031
        TRA     4,4                                                     FALSN032
        REM                                                             FALSN033
INDKTR  PZE     **                                                      FALSN034
TABLE   PZE     0                                                       FALSN035
        MZE                                                             FALSN036
        DEC     1B1,1B2,1B3,1B4,1B5,1B6,1B7,1B8,1B9,1B10,1B11,1B12      FALSN037
        DEC     1B13,1B14,1B15,1B16,1B17,1B18,1B19,1B20,1B21,1B22       FALSN038
        DEC     1B23,1B24,1B25,1B26,1B27,1B28,1B29,1B30,1B31,1B32       FALSN039
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        DEC     1B33,1B34,1B35                                                  FALSN040
        SPACE   4                                                               FALSN041
*       A FUNCTION SUBPROGRAM...                                                FALSN042
*       CALLING SEQUENCE 'X=LEBIN(A,I)'                                         FALSN043
*       WHERE  'A' IS THE NAME OF A VARIABLE                                    FALSN044
*              'I' IS A FTN INTEGER SPECIFYING THE DESIRED BIT IN 'A'.          FALSN045
*                  ON RETURN TO CALLER THE AC CONTAINS A FORTRAN INTEGER        FALSN046
*                  ONE OR ZERO DEPENDING ON WHETHER I'TH BIT OF 'A' IS          FALSN047
*                  ONE OR ZERO.                                                 FALSN048
        REM                                                                     FALSN049
LEBIN   EQU     *                                                               FALSN050
        SXA     LEBX1,1                                                         FALSN051
        CAL*    2,4             THIS BIT                                        FALSN052
        PDC     ,1                                                              FALSN053
        CAL*    1,4                                                             FALSN054
        ANA     TABLE,1                                                         FALSN055
        TZE     LEBX1                                                           FALSN056
        CAL     ONE                                                             FALSN057
LEBX1   AXT     **,1                                                            FALSN058
        TRA     3,4                                                             FALSN059
        REM                                                                     FALSN060
ONE     PZE     ,,1             A FORTRAN II 1                                  FALSN061
        END                                                                     FALSN062
CFALBN                                                                          FALBN000
      SUBROUTINE LEBN (IBA,IE,JBA,JE,I)                                         FALBN001
      DIMENSION A(16684),IA(16684),XO(50),YO(50),ZO(50),NMATE(50)               FALBN002
     1,NFL(50,6),MDM(100),MELMA(100),MPRTI(100),MTETG(100),MBOVR(100)           FALBN003
     2,ML(100,4),IDM(200),IELMA(200),IPRTE(200),IGYGZ(200),IARMX(200)           FALBN004
     3,IMYMZ(200),IMFBO(200),IDTNR(200),IFL(200,3),AN(2000),IBON(50,4)          FALBN005
     4,BORC(50,8),NCL(200),XIR(100),YIR(100),ZIR(100),NX(50),NY(50)             FALBN006
     5,NZ(50)                                                                   FALBN007
      COMMON A                                                                  FALBN008
      EQUIVALENCE (A,IA),(A(1001),XO),(A(1051),YO),(A(1101),ZO)                 FALBN009
     1,(A(1151),NMATE),(A(1201),NFL),(A(1501),MDM),(A(1601),MELMA)              FALBN010
     2,(A(1701),MPRTI),(A(1801),MTETG),(A(1901),MBOVR),(A(2001),ML)             FALBN011
     3,(A(2401),IDM),(A(2601),IELMA),(A(2801),IPRTE),(A(3001),IGYGZ)            FALBN012
     4,(A(3201),IARMX),(A(3401),IMYMZ),(A(3601),IMFBO),(A(3801),IDTNR)          FALBN013
     5,(A(4001),IFL),(A(4601),AN),(A(6601),IBON),(A(6801),BORC)                 FALBN014
     6,(A(7201),NCL),(A(7401),XIR),(A(7501),YIR),(A(7601),ZIR)                  FALBN015
     7,(A(7701),NX),(A(7751),NY),(A(7801),NZ)                                   FALBN016
      EQUIVALENCE (A(1),NE),(A(2),NVOL),(A(3),NSUR),(A(4),NLIN)                 FALBN017
     1,(A(5),LNG),(A(6),ISDE),(A(7),NC),(A(8),IO),(A(9),CF),(A(10),XMI)         FALBN018
     2,(A(11),YMI),(A(12),ZMI),(A(13),XMX),(A(14),YMX),(A(15),ZMX)              FALBN019
     3,(A(16),IBOT),(A(17),SCX),(A(18),SCY),(A(19),SCZ),(A(20),DER)             FALBN020
     4,(A(21),ER),(A(22),TER),(A(23),NN),(A(24),XNN),(A(25),NNP)                FALBN021
     5,(A(26),KR)                                                              FALBN022
      DIMENSION XB(2000),YB(2000),ZB(2000),CC(17,17,6),EL(200,5)                FALBN023
      EQUIVALENCE (A(7951),XB),(A(9951),YB),(A(11951),ZB),(A(13951),CC)         FALBN024
     1,(A(15685),EL)                                                            FALBN025
      EQUIVALENCE (A(30),IMAT),(A(31),ITEM),(A(32),IELT),(A(33),IPRS)           FALBN026
     1,(A(34),ITIC),(A(35),ITGY),(A(36),MBON),(A(37),MCV),(A(38),MNR)           FALBN027
     2,(A(39),ITGZ),(A(40),IARE),(A(41),IMMX),(A(42),IMMY),(A(43),IMMZ)         FALBN028
     3,(A(44),IMFI),(A(45),JBON),(A(46),NDT),(A(47),INR),(A(48),NTOT)           FALBN029
      DIMENSION IST(4),AD(200),DC(3,3),CO(3),CP(3),CMI(3),CMX(3),DUB(3)         FALBN030
     1,DUA(3,3),DMB(3),DMA(3,3),XX(17,17),YY(17,17)                             FALBN031
      EQUIVALENCE (A(101),IS),(A(102),ISP),(A(103),IB),(A(104),IBB)             FALBN032
     1,(A(105),IQ)            ,(A(107),IL),(A(108),IBC),(A(109),IC)             FALBN033
     2,(A(110),JBC),(A(111),JC),(A(112),ISPD),(A(113),IK),(A(114),IKD)          FALBN034
     3,(A(131),IST),(A(135),AD),(A(335),DC),(A(344),CO),(A(347),CP)             FALBN035
     4,(A(350),CMI),(A(353),CMX),(A(356),DUB),(A(359),DUA),(A(368),DMB)         FALBN036
     5,(A(371),DMA)                                                             FALBN037
      EQUIVALENCE (A(403),XTP),(A(404),YTP),(A(405),XX),(A(694),YY)             FALBN038
      I=I                                                                       FALBN039
      IBA=IBA                                                                   FALBN040
      IE=IE                                                                     FALBN041
      JBA=JBA                                                                   FALBN042
      JE=JE                                                                     FALBN043
      DELD=DER                                                                  FALBN044
      X=XX(IBA,JBA)                                                             FALBN045
      Y=YY(IBA,JBA)                                                             FALBN046
  100 XEA=XX(IE,JE)-X                                                           FALBN047
      YEA=YY(IE,JE)-Y                                                           FALBN048
      DELT=SQRTF(XEA**2+YEA**2)                                                 FALBN049
      DX=DER*XEA/DELT                                                           FALBN050
      DY=DER*YEA/DELT                                                           FALBN051
      IF (DELD-DELT+ER) 120,110,110                                             FALBN052
  110 NDX=2                                                                     FALBN053
      DELD=DELT                                                                 FALBN054
      X=XX(IE,JE)                                                               FALBN055
      Y=YY(IE,JE)                                                               FALBN056
      GO TO 130                                                                 FALBN057
  120 NDX=1                                                                     FALBN058
      X=X+DX                                                                    FALBN059
      Y=Y+DY                                                                    FALBN060
  130 IF (LNG) 135,135,200                                                      FALBN061
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  135 NBX=(X-CMI(1))*SCX                                                FALBN062
      NBY=(Y-CMI(2))*SCY                                                FALBN063
      JB=(NBX-1)/36+1                                                   FALBN064
      ACH=EL(NBY,JB)                                                    FALBN065
      JBT=NBX-36*(JB-1)                                                 FALBN066
      CALL SEBIN (ACH,JBT,1)                                            FALBN067
      EL(NBY,JB)=ACH                                                    FALBN068
      GO TO (100,300),NDX                                               FALBN069
  200 NBX=(X-CMI(1))*SCX                                                FALBN070
      IF (NBX-NC) 210,295,210                                           FALBN071
  210 JB=(NBX-1)/36+1                                                   FALBN072
      JBT=NBX-36*(JB-1)                                                 FALBN073
      NCOE=ISDE                                                         FALBN074
      NCO=1                                                             FALBN075
      ISDE=0                                                            FALBN076
      NBY=(Y-CMI(2))*SCY                                                FALBN077
      IF (DX) 265,295,268                                               FALBN078
  265 NYD=-1                                                            FALBN079
      GO TO 270                                                         FALBN080
  268 NYD=1                                                             FALBN081
  270 NBY=NBY+NYD                                                       FALBN082
      IF (NBY-2) 281,272,272                                            FALBN083
  272 IF (NBY-107) 279,279,282                                          FALBN084
  279 NCO=NCO+1                                                         FALBN085
      ACH=EL(NBY,JB)                                                    FALBN086
      IF (LEBIN(ACH,JBT)) 290,280,290                                   FALBN087
  280 CALL SEBIN (ACH,JBT,1)                                            FALBN088
      EL(NBY,JB)=ACH                                                    FALBN089
      ISDE=ISDE+1                                                       FALBN090
      NCOE=0                                                            FALBN091
      GO TO 270                                                         FALBN092
  281 NYD=1                                                             FALBN093
      NBY=NBY-1                                                         FALBN094
      GO TO 283                                                         FALBN095
  282 NYD=-1                                                            FALBN096
      NBY=NBY+1                                                         FALBN097
  283 NCOE=0                                                            FALBN098
      ISDEP=ISDE+1                                                      FALBN099
      DO 285 K=1,ISDEP                                                  FALBN100
      NBY=NBY+NYD                                                       FALBN101
      ACH=EL(NBY,JB)                                                    FALBN102
      CALL SEBIN (ACH,JBT,0)                                            FALBN103
      EL(NBY,JB)=ACH                                                    FALBN104
  285 CONTINUE                                                          FALBN105
      ISDE=0                                                            FALBN106
  290 IF (NCO-NCOE) 270,293,293                                         FALBN107
  293 NC=NBX                                                            FALBN108
  295 GO TO (100,300),NDX                                               FALBN109
  300 RETURN                                                            FALBN110
      END                                                               FALBN111
CFALNG                                                                  FALNG000
      SUBROUTINE LENG (X,Y,Z,XE,YE,ZE)                                  FALNG001
      DIMENSION A(16684),IA(16684),XO(50),YO(50),ZO(50),NMATE(50)       FALNG002
     1,NFL(50,6),MDM(100),MELMA(100),MPRTI(100),MTETG(100),MBOVR(100)   FALNG003
     2,ML(100,4),IDM(200),IELMA(200),IPRTE(200),IGYGZ(200),IARMX(200)   FALNG004
     3,IMYMZ(200),IMFBO(200),IDTNR(200),IFL(200,3),AN(2000),IBON(50,4)  FALNG005
     4,BORC(50,8),NCL(200),XIR(100),YIR(100),ZIR(100),NX(50),NY(50)     FALNG006
     5,NZ(50)                                                           FALNG007
      COMMON A                                                          FALNG008
      EQUIVALENCE (A,IA),(A(1001),XO),(A(1051),YO),(A(1101),ZO)         FALNG009
     1,(A(1151),NMATE),(A(1201),NFL),(A(1501),MDM),(A(1601),MELMA)      FALNG010
     2,(A(1701),MPRTI),(A(1801),MTETG),(A(1901),MBOVR),(A(2001),ML)     FALNG011
     3,(A(2401),IDM),(A(2601),IELMA),(A(2801),IPRTE),(A(3001),IGYGZ)    FALNG012
     4,(A(3201),IARMX),(A(3401),IMYMZ),(A(3601),IMFBO),(A(3801),IDTNR)  FALNG013
     5,(A(4001),IFL),(A(4601),AN),(A(6601),IBON),(A(6801),BORC)         FALNG014
     6,(A(7201),NCL),(A(7401),XIR),(A(7501),YIR),(A(7601),ZIR)          FALNG015
     7,(A(7701),NX),(A(7751),NY),(A(7801),NZ)                           FALNG016
      EQUIVALENCE (A(1),NE),(A(2),NVOL),(A(3),NSUR),(A(4),NLIN)         FALNG017
     1,(A(5),LNG),(A(6),ISDE),(A(7),NC),(A(8),IO),(A(9),CF),(A(10),XMI) FALNG018
     2,(A(11),YMI),(A(12),ZMI),(A(13),XMX),(A(14),YMX),(A(15),ZMX)      FALNG019
     3,(A(16),IBOT),(A(17),SCX),(A(18),SCY),(A(19),SCZ),(A(20),DER)     FALNG020
     4,(A(21),ER),(A(22),TER),(A(23),NN),(A(24),XNN),(A(25),NNP)        FALNG021
     5,(A(26),KR),(A(27),DT)                                            FALNG022
      DIMENSION XB(2000),YB(2000),ZB(2000),CC(17,17,6),EL(200,5)        FALNG023
      EQUIVALENCE (A(7951),XB),(A(9951),YB),(A(11951),ZB),(A(13951),CC) FALNG024
     1,(A(15685),EL)                                                    FALNG025
      DIMENSION IBTE(16),AL(10),AR(10),AE(10),CO(3),CP(3)               FALNG026
      EQUIVALENCE (A(30),IMAT),(A(31),ITEM),(A(32),IELT),(A(33),IPRS)   FALNG027
     1,(A(34),ITIC),(A(35),ITGY),(A(36),MBON),(A(37),MCV),(A(38),MNR)   FALNG028
     2,(A(39),ITGZ),(A(40),IARE),(A(41),IMMX),(A(42),IMMY),(A(43),IMMZ) FALNG029
     3,(A(44),IMFI),(A(45),JBON),(A(46),NDT),(A(47),INR),(A(48),NTDT)   FALNG030
     4,(A(49),IBTE),(A(65),ETT),(A(66),IL),(A(67),NBE1),(A(68),NBE2)    FALNG031
     5,(A(69),NBE3),(A(70),ISD),(A(71),AL),(A(81),AR),(A(91),AE)        FALNG032
     6,(A(103),INRP),(A(104),LEN),(A(105),CO),(A(102),IBN),(A(101),ELL) FALNG033
     7,(A(108),CP),(A(111),DX),(A(112),DY),(A(113),DZ),(A(114),LE)      FALNG034
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     8,(A(115),DISD),(A(116),DXNL),(A(117),DISL),(A(118),ACL)          FALNG035
     9,(A(119),NDTM),(A(120),ID)                                       FALNG036
      EQUIVALENCE (A(131),LB),(A(135),IBI)                             FALNG037
      ISD=ISD                                                          FALNG038
      NSA=0                                                            FALNG039
      LE=LE                                                            FALNG040
      DELD=DER                                                         FALNG041
  100 XEA=XE-X                                                         FALNG042
      YEA=YE-Y                                                         FALNG043
      ZEA=ZE-Z                                                         FALNG044
      DELT=SQRTF(XEA*XEA+YEA*YEA+ZEA*ZEA)                              FALNG045
      IF (DELD-DELT+ER) 120,110,110                                    FALNG046
  110 NDX=2                                                            FALNG047
      DELD=DELT                                                        FALNG048
      X=XE                                                             FALNG049
      Y=YE                                                             FALNG050
      Z=ZE                                                             FALNG051
      GO TO 125                                                        FALNG052
  120 NDX=1                                                            FALNG053
      X=X+DX                                                           FALNG054
      Y=Y+DY                                                           FALNG055
      Z=Z+DZ                                                           FALNG056
      NSA=NSA+1                                                        FALNG057
      IF (NSA-1000) 125,125,9000                                       FALNG058
  125 IF (XMX-X) 9000,130,130                                          FALNG059
  130 IF (X-XMI) 9000,140,140                                          FALNG060
  140 IF (YMX-Y) 9000,150,150                                          FALNG061
  150 IF (Y-YMI) 9000,160,160                                          FALNG062
  160 IF (ZMX-Z) 9000,170,170                                          FALNG063
  170 IF (Z-ZMI) 9000,180,180                                          FALNG064
  180 IF (LNG) 190,190,400                                             FALNG065
  190 EL(ISD,LE)=EL(ISD,LE)+DELD                                       FALNG066
      GO TO 510                                                        FALNG067
  400 ELL=ELL+DELD                                                     FALNG068
      CONS=ELL-ACL                                                     FALNG069
      IF (CONS) 510,410,410                                            FALNG070
  410 CONS=CONS/DELD                                                   FALNG071
      ACL=ACL+DISL                                                     FALNG072
      IBN=IBN+IBI                                                      FALNG073
      NBI=LB+IBN                                                       FALNG074
      XB(NBI)=X-CONS*DX                                                FALNG075
      YB(NBI)=Y-CONS*DY                                                FALNG076
      ZB(NBI)=Z-CONS*DZ                                                FALNG077
      DO 500 I=1,3                                                     FALNG078
  500 CP(I)=CO(I)                                                      FALNG079
  510 GO TO (100,520),NDX                                              FALNG080
  520 RETURN                                                           FALNG081
 9000 WRITE OUTPUT TAPE 6,1,IL,X,Y,Z,(A(I),I=71,100)                   FALNG082
    1 FORMAT (24HOERROR IN THE INPUT UNIT,I6,2X,35HCOORDINATES AND COEFFFALNG083
     1ICIENTS FOLLOW//1X,3F9.4/10(1X,F10.5)/10(1X,F10.5)/10(1X,F10.5))  FALNG084
      CALL EXIT                                                        FALNG085
      END                                                              FALNG086
CFANCO                                                                 FANCO000
      SUBROUTINE NOCO                                                  FANCO001
      DIMENSION A(16684),IA(16684),XO(50),YO(50),ZO(50),NMATE(50)      FANCO002
     1,NFL(50,6),MDM(100),MELMA(100),MPRTI(100),MTETG(100),MBOVR(100)  FANCO003
     2,ML(100,4),IDM(200),IELMA(200),IPRTE(200),IGYGZ(200),IARMX(200)  FANCO004
     3,IMYMZ(200),IMFBO(200),IDTNR(200),IFL(200,3),AN(2000),IBON(50,4)  FANCO005
     4,BORC(50,8),NCL(200),XIR(100),YIR(100),ZIR(100),NX(50),NY(50)    FANCO006
     5,NZ(50)                                                          FANCO007
      COMMON A                                                         FANCO008
      EQUIVALENCE (A,IA),(A(1001),XO),(A(1051),YO),(A(1101),ZO)        FANCO009
     1,(A(1151),NMATE),(A(1201),NFL),(A(1501),MDM),(A(1601),MELMA)     FANCO010
     2,(A(1701),MPRTI),(A(1801),MTETG),(A(1901),MBOVR),(A(2001),ML)    FANCO011
     3,(A(2401),IDM),(A(2601),IELMA),(A(2801),IPRTE),(A(3001),IGYGZ)   FANCO012
     4,(A(3201),IARMX),(A(3401),IMYMZ),(A(3601),IMFBO),(A(3801),IDTNR) FANCO013
     5,(A(4001),IFL),(A(4601),AN),(A(6601),IBON),(A(6801),BORC)        FANCO014
     6,(A(7201),NCL),(A(7401),XIR),(A(7501),YIR),(A(7601),ZIR)         FANCO015
     7,(A(7701),NX),(A(7751),NY),(A(7801),NZ)                          FANCO016
      EQUIVALENCE (A(1),NE),(A(2),NVOL),(A(3),NSUR),(A(4),NLIN)        FANCO017
     1,(A(5),LNG),(A(6),ISDE),(A(7),NC),(A(8),IO),(A(9),CF),(A(10),XMI) FANCO018
     2,(A(11),YMI),(A(12),ZMI),(A(13),XMX),(A(14),YMX),(A(15),ZMX)     FANCO019
     3,(A(16),IBOT),(A(17),SCX),(A(18),SCY),(A(19),SCZ),(A(20),DER)    FANCO020
     4,(A(21),ER),(A(22),TER),(A(23),NN),(A(24),XNN),(A(25),NNP)       FANCO021
     5,(A(26),KR)                                                     FANCO022
      DIMENSION XB(2000),YB(2000),ZB(2000),CC(17,17,6),EL(200,5)       FANCO023
      EQUIVALENCE (A(7951),XB),(A(9951),YB),(A(11951),ZB),(A(13951),CC) FANCO024
     1,(A(15685),EL)                                                   FANCO025
      EQUIVALENCE (A(30),IMAT),(A(31),ITEM),(A(32),IELT),(A(33),IPRS)  FANCO026
     1,(A(34),ITIC),(A(35),ITGY),(A(36),MBON),(A(37),MCV),(A(38),MNR)  FANCO027
     2,(A(39),ITGZ),(A(40),IARE),(A(41),IMMX),(A(42),IMMY),(A(43),IMMZ) FANCO028
     3,(A(44),IMFI),(A(45),JBON),(A(46),NDT),(A(47),INR),(A(48),NTOT)  FANCO029
      DIMENSION IST(4),AD(200),DC(3,3),CO(3),CP(3),CMI(3),CMX(3),DUB(3) FANCO030
     1,DUA(3,3),DMB(3),DMA(3,3)                                        FANCO031
      EQUIVALENCE (A(101),IS),(A(102),ISP),(A(103),IB),(A(104),IBB)     FANCO032
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     1,(A(105),IQ),(A(106),I),(A(107),IL),(A(108),IBC),(A(109),IC)       FANCO033
     2,(A(110),JBC),(A(111),JC),(A(112),ISPD),(A(113),IK),(A(114),IKD)   FANCO034
     3,(A(131),IST),(A(135),AD),(A(335),DC),(A(344),CO),(A(347),CP)      FANCO035
     4,(A(350),CMI),(A(353),CMX),(A(356),DUB),(A(359),DUA),(A(368),DMB) FANCO036
     5,(A(371),DMA)                                                      FANCO037
      BER=100.*ER                                                        FANCO038
      IS=IS                                                              FANCO039
      DO 300 I=1,NNP                                                     FANCO040
      IBC=IBC+IC                                                         FANCO041
      JBC=JBC+JC                                                         FANCO042
      IBB=IBB+IQ                                                         FANCO043
      X=XB(IBB)                                                          FANCO044
      Y=YB(IBB)                                                          FANCO045
      Z=ZB(IBB)                                                          FANCO046
      CC(IBC,JBC,1)=XB(IBB)                                              FANCO047
      CC(IBC,JBC,2)=YB(IBB)                                              FANCO048
      CC(IBC,JBC,3)=ZB(IBB)                                              FANCO049
      IF (NVOL) 300,300,110                                              FANCO050
  110 RES=AD(IK+1)+AD(IK+2)*Z+AD(IK+3)*Y+AD(IK+4)*X+AD(IK+5)*X*Z+AD(IK+6FANCO051
     1)*Y*Z+AD(IK+7)*X*Y+AD(IK+8)*Z*Z+AD(IK+9)*Y*Y+AD(IK+10)*X*X         FANCO052
      IF (ABSF(RES)-BER) 120,120,210                                     FANCO053
  120 CP(1)=AD(IK+4)+AD(IK+5)*Z+AD(IK+7)*Y+2.*AD(IK+10)*X                FANCO054
      CP(2)=AD(IK+3)+AD(IK+6)*Z+AD(IK+7)*X+2.*AD(IK+9)*Y                 FANCO055
      CP(3)=AD(IK+2)+AD(IK+5)*X+AD(IK+6)*Y+2.*AD(IK+8)*Z                 FANCO056
      DO 200 I=1,3                                                       FANCO057
  200 CO(I)=CO(I)+CP(I)                                                  FANCO058
      GO TO 300                                                          FANCO059
  210 IF (ISPD) 9000,9000,220                                            FANCO060
  220 IK=IK+IKD                                                          FANCO061
      ISPD=ISPD-1                                                        FANCO062
      GO TO 110                                                          FANCO063
  300 CONTINUE                                                           FANCO064
  310 RETURN                                                             FANCO065
 9000 IKP=IK+1                                                           FANCO066
      IKN=IK+10                                                          FANCO067
      WRITE OUTPUT TAPE 6,1,RES,MDM(IS),TER,(AD(I),I=IKP,IKN)            FANCO068
    1 FORMAT (13H THE ERROR IS,E12.4,13H  ON THE FACE,I6,2X,15HERROR TOLFANCO069
     1ERANCE,E12.4,2X,31HIS EXCEEDED,COEFFICIENTS FOLLOW//10(1X,E11.4)) FANCO070
      GO TO 310                                                          FANCO071
      END                                                                FANCO072
CFANGE                                                                   FANGE000
      SUBROUTINE NOGE                                                    FANGE001
      DIMENSION A(16684),IA(16684),XO(50),YO(50),ZO(50),NMATE(50)        FANGE002
     1,NFL(50,6),MDM(100),MELMA(100),MPRTI(100),MTETG(100),MBOVR(100)    FANGE003
     2,ML(100,4),IDM(200),IELMA(200),IPRTE(200),IGYGZ(200),IARMX(200)    FANGE004
     3,IMYMZ(200),IMFBO(200),IDTNR(200),IFL(200,3),AN(2000),IBON(50,4)   FANGE005
     4,BORC(50,8),NCL(200),XIR(100),YIR(100),ZIR(100),NX(50),NY(50)      FANGE006
     5,NZ(50)                                                            FANGE007
      COMMON A                                                           FANGE008
      EQUIVALENCE (A,IA),(A(1001),XO),(A(1051),YO),(A(1101),ZO)          FANGE009
     1,(A(1151),NMATE),(A(1201),NFL),(A(1501),MDM),(A(1601),MELMA)       FANGE010
     2,(A(1701),MPRTI),(A(1801),MTETG),(A(1901),MBOVR),(A(2001),ML)      FANGE011
     3,(A(2401),IDM),(A(2601),IELMA),(A(2801),IPRTE),(A(3001),IGYGZ)     FANGE012
     4,(A(3201),IARMX),(A(3401),IMYMZ),(A(3601),IMFBO),(A(3801),IDTNR)   FANGE013
     5,(A(4001),IFL),(A(4601),AN),(A(6601),IBON),(A(6801),BORC)          FANGE014
     6,(A(7201),NCL),(A(7401),XIR),(A(7501),YIR),(A(7601),ZIR)           FANGE015
     7,(A(7701),NX),(A(7751),NY),(A(7801),NZ)                            FANGE016
      EQUIVALENCE (A(1),NE),(A(2),NVOL),(A(3),NSUR),(A(4),NLIN)          FANGE017
     1,(A(5),LNG),(A(6),ISDE),(A(7),NC),(A(8),IO),(A(9),CF),(A(10),XMI)  FANGE018
     2,(A(11),YMI),(A(12),ZMI),(A(13),XMX),(A(14),YMX),(A(15),ZMX)       FANGE019
     3,(A(16),IBOT),(A(17),SCX),(A(18),SCY),(A(19),SCZ),(A(20),DER)      FANGE020
     4,(A(21),ER),(A(22),TER),(A(23),NN),(A(24),XNN),(A(25),NNP)         FANGE021
     5,(A(26),KR)                                                        FANGE022
      DIMENSION XB(2000),YB(2000),ZB(2000),CC(17,17,6),EL(200,5)         FANGE023
      EQUIVALENCE (A(7951),XB),(A(9951),YB),(A(11951),ZB),(A(13951),CC)  FANGE024
     1,(A(15685),EL)                                                     FANGE025
      EQUIVALENCE (A(30),IMAT),(A(31),ITEM),(A(32),IELT),(A(33),IPRS)    FANGE026
     1,(A(34),ITIC),(A(35),ITGY),(A(36),MBON),(A(37),MCV),(A(38),MNR)    FANGE027
     2,(A(39),ITGZ),(A(40),IARE),(A(41),IMMX),(A(42),IMMY),(A(43),IMMZ)  FANGE028
     3,(A(44),IMFI),(A(45),JBON),(A(46),NDT),(A(47),INR),(A(48),NTOT)    FANGE029
      DIMENSION IST(4),AD(200),DC(3,3),CO(3),CP(3),CMI(3),CMX(3),DUB(3)  FANGE030
     1,DUA(3,3),DMB(3),DMA(3,3)                                          FANGE031
      EQUIVALENCE (A(101),IS),(A(102),ISP),(A(103),IB),(A(104),IBB)      FANGE032
     1,(A(105),IQ),(A(106),I),(A(107),IL),(A(108),IBC),(A(109),IC)       FANGE033
     2,(A(110),JBC),(A(111),JC),(A(112),ISPD),(A(113),IK),(A(114),IKD)   FANGE034
     3,(A(131),IST),(A(135),AD),(A(335),DC),(A(344),CO),(A(347),CP)      FANGE035
     4,(A(350),CMI),(A(353),CMX),(A(356),DUB),(A(359),DUA),(A(368),DMB)  FANGE036
     5,(A(371),DMA)                                                      FANGE037
      DO 200 I=1,4                                                       FANGE038
      IB=NNP*(IST(I)-1)                                                  FANGE039
      GO TO (110,120,130,140),I                                          FANGE040
  110 IBB=IB                                                             FANGE041
      IQ=1                                                               FANGE042
      IBC=0                                                              FANGE043
      IC=1                                                               FANGE044
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      JBC=1                                                                 FANGE045
      JC=0                                                                  FANGE046
      ISPD=0                                                                FANGE047
      IK=0                                                                  FANGE048
      GO TO 190                                                             FANGE049
  120 CALL TEST                                                             FANGE050
      IBC=NNP                                                               FANGE051
      IC=0                                                                  FANGE052
      JBC=0                                                                 FANGE053
      JC=1                                                                  FANGE054
      ISPD=ISP-IS                                                           FANGE055
      IK=0                                                                  FANGE056
      IKD=10                                                                FANGE057
      GO TO 190                                                             FANGE058
  130 CALL TEST                                                             FANGE059
      IBC=NNP+1                                                             FANGE060
      IC=-1                                                                 FANGE061
      JBC=NNP                                                               FANGE062
      JC=0                                                                  FANGE063
      ISPD=ISP-IS                                                           FANGE064
      IK=10*ISPD                                                            FANGE065
      GO TO 190                                                             FANGE066
  140 CALL TEST                                                             FANGE067
      IBC=1                                                                 FANGE068
      IC=0                                                                  FANGE069
      JBC=NNP+1                                                             FANGE070
      JC=-1                                                                 FANGE071
      ISPD=ISP-IS                                                           FANGE072
      IK=10*ISPD                                                            FANGE073
      IKD=-10                                                               FANGE074
  190 CONTINUE                                                              FANGE075
      CALL NOCO                                                             FANGE076
  200 CONTINUE                                                              FANGE077
      CNO=SQRTF(CO(1)*CO(1)+CO(2)*CO(2)+CO(3)*CO(3))                        FANGE078
      DO 300 I=1,3                                                          FANGE079
  300 DC(I,3)=CO(I)/CNO                                                     FANGE080
      ISPD=ISP-IS                                                           FANGE081
      RETURN                                                                FANGE082
      END                                                                   FANGE083
CFANUT                                                                      FANUT000
      SUBROUTINE NPUT                                                       FANUT001
      DIMENSION A(16684),IA(16684),XO(50),YO(50),ZO(50),NMATE(50)           FANUT002
     1,NFL(50,6),MDM(100),MELMA(100),MPRTI(100),MTETG(100),MBOVR(100)       FANUT003
     2,ML(100,4),IDM(200),IELMA(200),IPRTE(200),IGYGZ(200),IARMX(200)       FANUT004
     3,IMYMZ(200),IMFBO(200),IDTNR(200),IFL(200,3),AN(2000),IBON(50,4)      FANUT005
     4,BORC(50,8),NCL(200),XIR(100),YIR(100),ZIR(100),NX(50),NY(50)         FANUT006
     5,NZ(50)                                                               FANUT007
      COMMON A                                                              FANUT008
      EQUIVALENCE (A,IA),(A(1001),XO),(A(1051),YO),(A(1101),ZO)             FANUT009
     1,(A(1151),NMATE),(A(1201),NFL),(A(1501),MDM),(A(1601),MELMA)          FANUT010
     2,(A(1701),MPRTI),(A(1801),MTETG),(A(1901),MBOVR),(A(2001),ML)         FANUT011
     3,(A(2401),IDM),(A(2601),IELMA),(A(2801),IPRTE),(A(3001),IGYGZ)        FANUT012
     4,(A(3201),IARMX),(A(3401),IMYMZ),(A(3601),IMFBO),(A(3801),IDTNR)      FANUT013
     5,(A(4001),IFL),(A(4601),AN),(A(6601),IBON),(A(6801),BORC)             FANUT014
     6,(A(7201),NCL),(A(7401),XIR),(A(7501),YIR),(A(7601),ZIR)              FANUT015
     7,(A(7701),NX),(A(7751),NY),(A(7801),NZ)                               FANUT016
      EQUIVALENCE (A(1),NE),(A(2),NVOL),(A(3),NSUR),(A(4),NLIN)             FANUT017
     1,(A(5),LNG),(A(6),ISDE),(A(7),NC),(A(8),IO),(A(9),CF),(A(10),XMI)     FANUT018
     2,(A(11),YMI),(A(12),ZMI),(A(13),XMX),(A(14),YMX),(A(15),ZMX)          FANUT019
     3,(A(16),IBOT),(A(17),SCX),(A(18),SCY),(A(19),SCZ),(A(20),DER)         FANUT020
     4,(A(21),ER),(A(22),TER),(A(23),NN),(A(24),XNN),(A(25),NNP)            FANUT021
     5,(A(26),KR)                                                          FANUT022
      DIMENSION XB(2000),YB(2000),ZB(2000),CC(17,17,6),EL(200,5)            FANUT023
      EQUIVALENCE (A(7951),XB),(A(9951),YB),(A(11951),ZB),(A(13951),CC)     FANUT024
     1,(A(15685),EL)                                                        FANUT025
      EQUIVALENCE (A(30),IMAT),(A(31),ITEM),(A(32),IELT),(A(33),IPRS)       FANUT026
     1,(A(34),ITIC),(A(35),ITGY),(A(36),MBON),(A(37),MCV),(A(38),MNR)       FANUT027
     2,(A(39),ITGZ),(A(40),IARE),(A(41),IMMX),(A(42),IMMY),(A(43),IMMZ)     FANUT028
     3,(A(44),IMFI),(A(45),JBON),(A(46),NDT),(A(47),INR),(A(48),NTOT)       FANUT029
      DIMENSION IST(4),AD(200),DC(3,3),CO(3),CP(3),CMI(3),CMX(3),DUB(3)     FANUT030
     1,DUA(3,3),DMB(3),DMA(3,3),LL(4,2),XX(17,17),YY(17,17)                 FANUT031
      EQUIVALENCE (A(101),IS),(A(102),ISP),(A(103),IB),(A(104),IBB)         FANUT032
     1,(A(105),IQ),(A(106),I),(A(107),IL),(A(108),IBC),(A(109),IC)          FANUT033
     2,(A(110),JBC),(A(111),JC),(A(112),ISPD),(A(113),IK),(A(114),IKD)      FANUT034
     3,(A(131),IST),(A(135),AD),(A(335),DC),(A(344),CO),(A(347),CP)         FANUT035
     4,(A(350),CMI),(A(353),CMX),(A(356),DUB),(A(359),DUA),(A(368),DMB)     FANUT036
     5,(A(371),DMA),(A(380),LL),(A(388),J),(A(389),IM),(A(390),JM)          FANUT037
     6,(A(391),IIM),(A(392),JJM),(A(393),I2),(A(394),J2),(A(395),DN)        FANUT038
     7,(A(396),DD),(A(397),X2),(A(398),Y2),(A(399),NDX),(A(400),I1)         FANUT039
     8,(A(401),J1),(A(402),PRIJ)                                            FANUT040
      EQUIVALENCE (A(403),XTP),(A(404),YTP),(A(405),XX),(A(694),YY)         FANUT041
      IF (NVOL) 100,100,210                                                 FANUT042
  100 DO 200 I=1,NNP                                                        FANUT043
      DO 200 J=1,NNP                                                        FANUT044
      XX(I,J)=CC(I,J,1)                                                     FANUT045
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      YY(I,J)=CC(I,J,2)                                                 FANUT046
  200 CONTINUE                                                          FANUT047
  210 CONTINUE                                                          FANUT048
      NNN=NNP*NNP-1                                                     FANUT049
      NNI=NN/2                                                          FANUT050
      NNIP=NNI+1                                                        FANUT051
      NNIPP=NNIP+1                                                      FANUT052
      DO 4200 J=2,NNI                                                   FANUT053
      JJM=NNP-J                                                         FANUT054
      JM=J-1                                                            FANUT055
      DO 4100 I=J,JJM                                                   FANUT056
      IIM=NNP-I                                                         FANUT057
      IM=I-1                                                            FANUT058
      LL(1,1)=(NN*(I-J))/JJM+1                                          FANUT059
      LL(1,2)=(NN*IM)/JJM+1                                             FANUT060
      LL(2,1)=1                                                         FANUT061
      LL(2,2)=(NN*JM)/IM+1                                              FANUT062
      LL(3,1)=0                                                         FANUT063
      LL(3,2)=NNP                                                       FANUT064
      LL(4,1)=1                                                         FANUT065
      LL(4,2)=(NN*JM)/IIM+1                                             FANUT066
      CALL SCAN                                                         FANUT067
 4100 CONTINUE                                                          FANUT068
 4200 CONTINUE                                                          FANUT069
      DO 4400 I=NNIP,NN                                                 FANUT070
      IIM=NNP-I                                                         FANUT071
      IB=IIM+1                                                          FANUT072
      IM=I-1                                                            FANUT073
      DO 4300 J=IB,I                                                    FANUT074
      JJM=NNP-J                                                         FANUT075
      JM=J-1                                                            FANUT076
      LL(1,1)=(NN*(I-J))/JJM+1                                          FANUT077
      LL(1,2)=NNP                                                       FANUT078
      LL(2,1)=(NN*(I+J)-NNN)/IM+1                                       FANUT079
      LL(2,2)=(NN*JM)/IM+1                                              FANUT080
      LL(3,1)=(NN*(I+J)-NNN)/JM+1                                       FANUT081
      LL(3,2)=NNP                                                       FANUT082
      LL(4,1)=1                                                         FANUT083
      LL(4,2)=NN                                                        FANUT084
      CALL SCAN                                                         FANUT085
 4300 CONTINUE                                                          FANUT086
 4400 CONTINUE                                                          FANUT087
      DO 4600 J=NNIPP,NN                                                FANUT088
      JJM=NNP-J                                                         FANUT089
      JM=J-1                                                            FANUT090
      JB=JJM+1                                                          FANUT091
      DO 4500 I=JB,JM                                                   FANUT092
      IIM=NNP-I                                                         FANUT093
      IM=I-1                                                            FANUT094
      LL(1,1)=0                                                         FANUT095
      LL(1,2)=NNP                                                       FANUT096
      LL(2,1)=(NN*(I+J)-NNN)/IM+1                                       FANUT097
      LL(2,2)=NN                                                        FANUT098
      LL(3,1)=(NN*(I+J)-NNN)/JM+1                                       FANUT099
      LL(3,2)=(NN*(I-1))/JM+1                                           FANUT100
      LL(4,1)=(NN*(J-I))/IIM+1                                          FANUT101
      LL(4,2)=NN                                                        FANUT102
      CALL SCAN                                                         FANUT103
 4500 CONTINUE                                                          FANUT104
 4600 CONTINUE                                                          FANUT105
      DO 4800 I=2,NNI                                                   FANUT106
      IIM=NNP-I                                                         FANUT107
      IM=I-1                                                            FANUT108
      IB=IM+2                                                           FANUT109
      DO 4700 J=IB,IIM                                                  FANUT110
      JJM=NNP-J                                                         FANUT111
      JM=J-1                                                            FANUT112
      LL(1,1)=0                                                         FANUT113
      LL(1,2)=(NN*IM)/JJM+1                                             FANUT114
      LL(2,1)=1                                                         FANUT115
      LL(2,2)=NN                                                        FANUT116
      LL(3,1)=0                                                         FANUT117
      LL(3,2)=(NN*IM)/JM+1                                              FANUT118
      LL(4,1)=(NN*(J-I))/IIM+1                                          FANUT119
      LL(4,2)=(NN*JM)/IIM+1                                             FANUT120
      CALL SCAN                                                         FANUT121
 4700 CONTINUE                                                          FANUT122
 4800 CONTINUE                                                          FANUT123
      CALL ORTA                                                         FANUT124
      DO 4850 I=1,NNP                                                   FANUT125
      DO 4850 J=1,NNP                                                   FANUT126
      IF (NVOL) 4810,4810,4820                                          FANUT127
 4810 CC(I,J,1)=XX(I,J)                                                 FANUT128
      CC(I,J,2)=YY(I,J)                                                 FANUT129
      GO TO 4850                                                        FANUT130
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 4820 CC(I,J,4)=XX(I,J)                                                  FANUT131
      CC(I,J,5)=YY(I,J)                                                  FANUT132
 4850 CONTINUE                                                           FANUT133
      RETURN                                                             FANUT134
      END                                                                FANUT135
CFAOKA                                                                  FAOKA000
      SUBROUTINE ORKA (I,IM,IP,J,JM,JP,KO)                              FAOKA001
      DIMENSION A(16684),IA(16684),XO(50),YO(50),ZO(50),NMATE(50)       FAOKA002
     1,NFL(50,6),MDM(100),MELMA(100),MPRTI(100),MTETG(100),MBOVR(100)   FAOKA003
     2,ML(100,4),IDM(200),IELMA(200),IPRTE(200),IGYGZ(200),IARMX(200)   FAOKA004
     3,IMYMZ(200),IMFBO(200),IDTNR(200),IFL(200,3),AN(2000),IBON(50,4)  FAOKA005
     4,BORC(50,8),NCL(200),XIR(100),YIR(100),ZIR(100),NX(50),NY(50)     FAOKA006
     5,NZ(50)                                                           FAOKA007
      COMMON A                                                          FAOKA008
      EQUIVALENCE (A,IA),(A(1001),XO),(A(1051),YO),(A(1101),ZO)         FAOKA009
     1,(A(1151),NMATE),(A(1201),NFL),(A(1501),MDM),(A(1601),MELMA)      FAOKA010
     2,(A(1701),MPRTI),(A(1801),MTETG),(A(1901),MBOVR),(A(2001),ML)     FAOKA011
     3,(A(2401),IDM),(A(2601),IELMA),(A(2801),IPRTE),(A(3001),IGYGZ)    FAOKA012
     4,(A(3201),IARMX),(A(3401),IMYMZ),(A(3601),IMFBO),(A(3801),IDTNR)  FAOKA013
     5,(A(4001),IFL),(A(4601),AN),(A(6601),IBON),(A(6801),BORC)         FAOKA014
     6,(A(7201),NCL),(A(7401),XIR),(A(7501),YIR),(A(7601),ZIR)          FAOKA015
     7,(A(7701),NX),(A(7751),NY),(A(7801),NZ)                           FAOKA016
      EQUIVALENCE (A(1),NE),(A(2),NVOL),(A(3),NSUR),(A(4),NLIN)         FAOKA017
     1,(A(5),LNG),(A(6),ISDE),(A(7),NC),(A(8),IO),(A(9),CF),(A(10),XMI) FAOKA018
     2,(A(11),YMI),(A(12),ZMI),(A(13),XMX),(A(14),YMX),(A(15),ZMX)      FAOKA019
     3,(A(16),IBOT),(A(17),SCX),(A(18),SCY),(A(19),SCZ),(A(20),DER)     FAOKA020
     4,(A(21),ER),(A(22),TER),(A(23),NN),(A(24),XNN),(A(25),NNP)        FAOKA021
     5,(A(26),KR)                                                       FAOKA022
      DIMENSION XB(2000),YB(2000),ZB(2000),CC(17,17,6),EL(200,5)        FAOKA023
      EQUIVALENCE (A(7951),XB),(A(9951),YB),(A(11951),ZB),(A(13951),CC) FAOKA024
     1,(A(15685),EL)                                                    FAOKA025
      DIMENSION XX(17,17),YY(17,17),DAX(40)                             FAOKA026
      EQUIVALENCE (A(405),XX),(A(694),YY),(EL,DAX)                      FAOKA027
      I=I                                                               FAOKA028
      J=J                                                               FAOKA029
      IM=IM                                                             FAOKA030
      JM=JM                                                             FAOKA031
      IP=IP                                                             FAOKA032
      JP=JP                                                             FAOKA033
      DP=SQRTF((XX(IP,JP)-XX(I,J))**2+(YY(IP,JP)-YY(I,J))**2)           FAOKA034
      DM=SQRTF((XX(I,J)-XX(IM,JM))**2+(YY(I,J)-YY(IM,JM))**2)           FAOKA035
      DD=DP-DM                                                          FAOKA036
      DA=ABSF(DD)                                                       FAOKA037
      IF (DA-DER) 200,110,110                                           FAOKA038
  110 KO=KO+1                                                           FAOKA039
      IF (DD) 120,200,130                                               FAOKA040
  120 MI=IM                                                             FAOKA041
      MJ=JM                                                             FAOKA042
      GO TO 140                                                         FAOKA043
  130 MI=IP                                                             FAOKA044
      MJ=JP                                                             FAOKA045
  140 DD=DA/(DP+DM)                                                     FAOKA046
      XX(I,J)=XX(I,J)+DD*(XX(MI,MJ)-XX(I,J))                            FAOKA047
      YY(I,J)=YY(I,J)+DD*(YY(MI,MJ)-YY(I,J))                            FAOKA048
  200 RETURN                                                            FAOKA049
      END                                                               FAOKA050
CFAOTA                                                                  FAOTA000
      SUBROUTINE ORTA                                                   FAOTA001
      DIMENSION A(16684),IA(16684),XO(50),YO(50),ZO(50),NMATE(50)       FAOTA002
     1,NFL(50,6),MDM(100),MELMA(100),MPRTI(100),MTETG(100),MBOVR(100)   FAOTA003
     2,ML(100,4),IDM(200),IELMA(200),IPRTE(200),IGYGZ(200),IARMX(200)   FAOTA004
     3,IMYMZ(200),IMFBO(200),IDTNR(200),IFL(200,3),AN(2000),IBON(50,4)  FAOTA005
     4,BORC(50,8),NCL(200),XIR(100),YIR(100),ZIR(100),NX(50),NY(50)     FAOTA006
     5,NZ(50)                                                           FAOTA007
      COMMON A                                                          FAOTA008
      EQUIVALENCE (A,IA),(A(1001),XO),(A(1051),YO),(A(1101),ZO)         FAOTA009
     1,(A(1151),NMATE),(A(1201),NFL),(A(1501),MDM),(A(1601),MELMA)      FAOTA010
     2,(A(1701),MPRTI),(A(1801),MTETG),(A(1901),MBOVR),(A(2001),ML)     FAOTA011
     3,(A(2401),IDM),(A(2601),IELMA),(A(2801),IPRTE),(A(3001),IGYGZ)    FAOTA012
     4,(A(3201),IARMX),(A(3401),IMYMZ),(A(3601),IMFBO),(A(3801),IDTNR)  FAOTA013
     5,(A(4001),IFL),(A(4601),AN),(A(6601),IBON),(A(6801),BORC)         FAOTA014
     6,(A(7201),NCL),(A(7401),XIR),(A(7501),YIR),(A(7601),ZIR)          FAOTA015
     7,(A(7701),NX),(A(7751),NY),(A(7801),NZ)                           FAOTA016
      EQUIVALENCE (A(1),NE),(A(2),NVOL),(A(3),NSUR),(A(4),NLIN)         FAOTA017
     1,(A(5),LNG),(A(6),ISDE),(A(7),NC),(A(8),IO),(A(9),CF),(A(10),XMI) FAOTA018
     2,(A(11),YMI),(A(12),ZMI),(A(13),XMX),(A(14),YMX),(A(15),ZMX)      FAOTA019
     3,(A(16),IBOT),(A(17),SCX),(A(18),SCY),(A(19),SCZ),(A(20),DER)     FAOTA020
     4,(A(21),ER),(A(22),TER),(A(23),NN),(A(24),XNN),(A(25),NNP)        FAOTA021
     5,(A(26),KR)                                                       FAOTA022
      DIMENSION XB(2000),YB(2000),ZB(2000),CC(17,17,6),EL(200,5)        FAOTA023
      EQUIVALENCE (A(7951),XB),(A(9951),YB),(A(11951),ZB),(A(13951),CC) FAOTA024
     1,(A(15685),EL)                                                    FAOTA025
      EQUIVALENCE (A(30),IMAT),(A(31),ITEM),(A(32),IELT),(A(33),IPRS)   FAOTA026
     1,(A(34),ITIC),(A(35),ITGY),(A(36),MBON),(A(37),MCV),(A(38),MNR)   FAOTA027
     2,(A(39),ITGZ),(A(40),IARE),(A(41),IMMX),(A(42),IMMY),(A(43),IMMZ) FAOTA028
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     3,(A(44),IMFI),(A(45),JBON),(A(46),NDT),(A(47),INR),(A(48),NTOT)   FAOTA029
     4,(A(49),ISKE)                                                     FAOTA030
      DIMENSION IST(4),AD(200),DC(3,3),CO(3),CP(3),CMI(3),CMX(3)        FAOTA031
      EQUIVALENCE (A(101),IS),(A(102),ISP),(A(103),IB),(A(104),IBB)     FAOTA032
     1,(A(105),IQ),(A(106),I),(A(107),IL),(A(108),IBC),(A(109),IC)      FAOTA033
     2,(A(110),JBC),(A(111),JC),(A(112),ISPD),(A(113),IK),(A(114),IKD)  FAOTA034
     3,(A(131),IST),(A(135),AD),(A(335),DC),(A(344),NG),(A(345),AZ)     FAOTA035
     4,(A(346),BZ),(A(347),CZ),(A(348),R1),(A(349),ZG),(A(350),Z)       FAOTA036
     5,(A(351),ZN),(A(352),NCO),(A(353),M),(A(354),NNM),(A(355),J)      FAOTA037
     5,(A(356),X),(A(357),Y)                                            FAOTA038
      DIMENSION XX(17,17),YY(17,17),DAX(40)                             FAOTA039
      EQUIVALENCE (A(405),XX),(A(694),YY),(EL,DAX)                      FAOTA040
      DER=10.*ER                                                        FAOTA041
      DO 600 ICC=1,100                                                  FAOTA042
      KO=0                                                              FAOTA043
      DO 300 I=1,NNP                                                    FAOTA044
      IM=I                                                              FAOTA045
      IP=I                                                              FAOTA046
      DO 200 J=2,NN                                                     FAOTA047
      JM=J-1                                                            FAOTA048
      JP=J+1                                                            FAOTA049
      CALL ORKA (I,IM,IP,J,JM,JP,KO)                                    FAOTA050
  200 CONTINUE                                                          FAOTA051
  300 CONTINUE                                                          FAOTA052
      DO 500 J=1,NNP                                                    FAOTA053
      JM=J                                                              FAOTA054
      JP=J                                                              FAOTA055
      DO 400 I=2,NN                                                     FAOTA056
      IM=I-1                                                            FAOTA057
      IP=I+1                                                            FAOTA058
      CALL ORKA (I,IM,IP,J,JM,JP,KO)                                    FAOTA059
  400 CONTINUE                                                          FAOTA060
  500 CONTINUE                                                          FAOTA061
      IF (KO) 610,610,600                                               FAOTA062
  600 CONTINUE                                                          FAOTA063
  610 RETURN                                                            FAOTA064
      END                                                               FAOTA065
CFAPEP                                                                  FAPEP000
      SUBROUTINE PREP                                                   FAPEP001
      DIMENSION A(16684),IA(16684),XO(50),YO(50),ZO(50),NMATE(50)       FAPEP002
     1,NFL(50,6),MDM(100),MELMA(100),MPRTI(100),MTETG(100),MBOVR(100)   FAPEP003
     2,ML(100,4),IDM(200),IELMA(200),IPRTE(200),IGYGZ(200),IARMX(200)   FAPEP004
     3,IMYMZ(200),IMFBO(200),IDTNR(200),IFL(200,3),AN(2000),IBON(50,4)  FAPEP005
     4,BORC(50,8),NCL(200),XIR(100),YIR(100),ZIR(100),NX(50),NY(50)     FAPEP006
     5,NZ(50)                                                           FAPEP007
      COMMON A                                                          FAPEP008
      EQUIVALENCE (A,IA),(A(1001),XO),(A(1051),YO),(A(1101),ZO)         FAPEP009
     1,(A(1151),NMATE),(A(1201),NFL),(A(1501),MDM),(A(1601),MELMA)      FAPEP010
     2,(A(1701),MPRTI),(A(1801),MTETG),(A(1901),MBOVR),(A(2001),ML)     FAPEP011
     3,(A(2401),IDM),(A(2601),IELMA),(A(2801),IPRTE),(A(3001),IGYGZ)    FAPEP012
     4,(A(3201),IARMX),(A(3401),IMYMZ),(A(3601),IMFBO),(A(3801),IDTNR)  FAPEP013
     5,(A(4001),IFL),(A(4601),AN),(A(6601),IBON),(A(6801),BORC)         FAPEP014
     6,(A(7201),NCL),(A(7401),XIR),(A(7501),YIR),(A(7601),ZIR)          FAPEP015
     7,(A(7701),NX),(A(7751),NY),(A(7801),NZ)                           FAPEP016
      EQUIVALENCE (A(1),NE),(A(2),NVOL),(A(3),NSUR),(A(4),NLIN)         FAPEP017
     1,(A(5),LNG),(A(6),ISDE),(A(7),NC),(A(8),IO),(A(9),CF),(A(10),XMI) FAPEP018
     2,(A(11),YMI),(A(12),ZMI),(A(13),XMX),(A(14),YMX),(A(15),ZMX)      FAPEP019
     3,(A(16),IBOT),(A(17),SCX),(A(18),SCY),(A(19),SCZ),(A(20),DER)     FAPEP020
     4,(A(21),ER),(A(22),TER),(A(23),NN),(A(24),XNN),(A(25),NNP)        FAPEP021
     5,(A(26),KR)                                                       FAPEP022
      DIMENSION XB(2000),YB(2000),ZB(2000),CC(17,17,6),EL(200,5)        FAPEP023
      EQUIVALENCE (A(7951),XB),(A(9951),YB),(A(11951),ZB),(A(13951),CC) FAPEP024
     1,(A(15685),EL)                                                    FAPEP025
      EQUIVALENCE (A(30),IMAT),(A(31),ITEM),(A(32),IELT),(A(33),IPRS)   FAPEP026
     1,(A(34),ITIC),(A(35),ITGY),(A(36),MBON),(A(37),MCV),(A(38),MNR)   FAPEP027
     2,(A(39),ITGZ),(A(40),IARE),(A(41),IMMX),(A(42),IMMY),(A(43),IMMZ) FAPEP028
     3,(A(44),IMFI),(A(45),JBON),(A(46),NDT),(A(47),INR),(A(48),NTOT)   FAPEP029
      DIMENSION IST(4),AD(200),DC(3,3),CO(3),CP(3),CMI(3),CMX(3),DUB(3) FAPEP030
     1,DUA(3,3),DMB(3),DMA(3,3),LL(4,2),XX(17,17),YY(17,17)             FAPEP031
      EQUIVALENCE (A(101),IS),(A(102),ISP),(A(103),IB),(A(104),IBB)     FAPEP032
     1,(A(105),IQ),(A(106),I),(A(107),IL),(A(108),IBC),(A(109),IC)      FAPEP033
     2,(A(110),JBC),(A(111),JC),(A(112),ISPD),(A(113),IK),(A(114),IKD)  FAPEP034
     3,(A(131),IST),(A(135),AD),(A(335),DC),(A(344),CO),(A(347),CP)     FAPEP035
     4,(A(350),CMI),(A(353),CMX),(A(356),DUB),(A(359),DUA),(A(368),DMB) FAPEP036
     5,(A(371),DMA),(A(380),LL),(A(388),J),(A(389),IM),(A(390),JM)      FAPEP037
     6,(A(391),IIM),(A(392),JJM),(A(393),I2),(A(394),J2),(A(395),DN)    FAPEP038
     7,(A(396),DD),(A(397),X2),(A(398),Y2),(A(399),NDX),(A(400),I1)     FAPEP039
     8,(A(401),J1),(A(402),PRIJ)                                        FAPEP040
      EQUIVALENCE (A(403),XTP),(A(404),YTP),(A(405),XX),(A(694),YY)     FAPEP041
      I2P=I2                                                            FAPEP042
      J2P=J2                                                            FAPEP043
      NDX=NDX                                                           FAPEP044
      AON=ON/DD                                                         FAPEP045
      IND=ADN                                                           FAPEP046
      PR=IND                                                            FAPEP047
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      PR=ADN-PR                                                          FAPEP048
      GO TO (110,120),NDX                                                FAPEP049
  110 J2=IND+1                                                           FAPEP050
      J2P=J2+1                                                           FAPEP051
      GO TO 130                                                          FAPEP052
  120 I2=IND+1                                                           FAPEP053
      I2P=I2+1                                                           FAPEP054
  130 X2=XX(I2,J2)+PR*(XX(I2P,J2P)-XX(I2,J2))                            FAPEP055
      Y2=YY(I2,J2)+PR*(YY(I2P,J2P)-YY(I2,J2))                            FAPEP056
      RETURN                                                             FAPEP057
      END                                                                FAPEP058
CFARFD                                                                   FARFD000
      SUBROUTINE REFD                                                    FARFD001
      DIMENSION A(16684),IA(16684),XO(50),YO(50),ZO(50),NMATE(50)        FARFD002
     1,NFL(50,6),MDM(100),MELMA(100),MPRTI(100),MTETG(100),MBOVR(100)    FARFD003
     2,ML(100,4),IDM(200),IELMA(200),IPRTE(200),IGYGZ(200),IARMX(200)    FARFD004
     3,IMYMZ(200),IMFBO(200),IDTNR(200),IFL(200,3),AN(2000),IBON(50,4)   FARFD005
     4,BORC(50,8),NCL(200),XIR(100),YIR(100),ZIR(100),NX(50),NY(50)      FARFD006
     5,NZ(50)                                                            FARFD007
      COMMON A                                                           FARFD008
      EQUIVALENCE (A,IA),(A(1001),XO),(A(1051),YO),(A(1101),ZO)          FARFD009
     1,(A(1151),NMATE),(A(1201),NFL),(A(1501),MDM),(A(1601),MELMA)       FARFD010
     2,(A(1701),MPRTI),(A(1801),MTETG),(A(1901),MBOVR),(A(2001),ML)      FARFD011
     3,(A(2401),IDM),(A(2601),IELMA),(A(2801),IPRTE),(A(3001),IGYGZ)     FARFD012
     4,(A(3201),IARMX),(A(3401),IMYMZ),(A(3601),IMFBO),(A(3801),IDTNR)   FARFD013
     5,(A(4001),IFL),(A(4601),AN),(A(6601),IBON),(A(6801),BORC)          FARFD014
     6,(A(7201),NCL),(A(7401),XIR),(A(7501),YIR),(A(7601),ZIR)           FARFD015
     7,(A(7701),NX),(A(7751),NY),(A(7801),NZ)                            FARFD016
      EQUIVALENCE (A(1),NE),(A(2),NVOL),(A(3),NSUR),(A(4),NLIN)          FARFD017
     1,(A(5),LNG),(A(6),ISDE),(A(7),NC),(A(8),IO),(A(9),CF),(A(10),XMI)  FARFD018
     2,(A(11),YMI),(A(12),ZMI),(A(13),XMX),(A(14),YMX),(A(15),ZMX)       FARFD019
     3,(A(16),IBOT),(A(17),SCX),(A(18),SCY),(A(19),SCZ),(A(20),DER)      FARFD020
     4,(A(21),ER),(A(22),TER),(A(23),NN),(A(24),XNN),(A(25),NNP)         FARFD021
     5,(A(26),KR)                                                        FARFD022
      DIMENSION XB(2000),YB(2000),ZB(2000),CC(17,17,6),EL(200,5)         FARFD023
      EQUIVALENCE (A(7951),XB),(A(9951),YB),(A(11951),ZB),(A(13951),CC)  FARFD024
     1,(A(15685),EL)                                                     FARFD025
      EQUIVALENCE (A(30),IMAT),(A(31),ITEM),(A(32),IELT),(A(33),IPRS)    FARFD026
     1,(A(34),ITIC),(A(35),ITGY),(A(36),MBON),(A(37),MCV),(A(38),MNR)    FARFD027
     2,(A(39),ITGZ),(A(40),IARE),(A(41),IMMX),(A(42),IMMY),(A(43),IMMZ)  FARFD028
     3,(A(44),IMFI),(A(45),JBON),(A(46),NDT),(A(47),INR),(A(48),NTOT)    FARFD029
      DIMENSION IST(4),AD(200),DC(3,3),CO(3),CP(3),CMI(3),CMX(3),DUB(3)  FARFD030
     1,DUA(3,3),DMB(3),DMA(3,3),XX(17,17),YY(17,17)                      FARFD031
      EQUIVALENCE (A(101),IS),(A(102),ISP),(A(103),IB),(A(104),IBB)      FARFD032
     1,(A(105),IQ)          ,(A(107),IL),(A(108),IBC),(A(109),IC)        FARFD033
     2,(A(110),JBC),(A(111),JC),(A(112),ISPD),(A(113),IK),(A(114),IKD)   FARFD034
     3,(A(131),IST),(A(135),AD),(A(335),DC),(A(344),CO),(A(347),CP)      FARFD035
     4,(A(350),CMI),(A(353),CMX),(A(356),DUB),(A(359),DUA),(A(368),DMB)  FARFD036
     5,(A(371),DMA)                                                      FARFD037
      EQUIVALENCE (A(403),XTP),(A(404),YTP),(A(405),XX),(A(694),YY)      FARFD038
      ISDE=0                                                             FARFD039
      NC=0                                                               FARFD040
      LNG=0                                                              FARFD041
      IS=IS                                                              FARFD042
      DO 100 I=1,108                                                     FARFD043
      DO 100 J=1,3                                                       FARFD044
  100 EL(I,J)=0.                                                         FARFD045
      IF (MCV) 510,510,110                                               FARFD046
  110 IF (NVOL) 115,115,250                                              FARFD047
  115 DO 125 I=1,NNP                                                     FARFD048
      DO 120 J=1,NNP                                                     FARFD049
      XX(I,J)=CC(I,J,1)                                                  FARFD050
      YY(I,J)=CC(I,J,2)                                                  FARFD051
  120 CONTINUE                                                           FARFD052
  125 CONTINUE                                                           FARFD053
      CMI(1)=XX(1,1)                                                     FARFD054
      CMI(2)=YY(1,1)                                                     FARFD055
      CMX(1)=XX(1,1)                                                     FARFD056
      CMX(2)=YY(1,1)                                                     FARFD057
      DO 200 II=1,4                                                      FARFD058
      CALL CONT (II,IBA,ICR,JBA,JCR)                                     FARFD059
      DO 195 I=1,NNP                                                     FARFD060
      IBA=IBA+ICR                                                        FARFD061
      JBA=JBA+JCR                                                        FARFD062
      IF (XX(IBA,JBA)-CMI(1)) 130,140,140                                FARFD063
  130 CMI(1)=XX(IBA,JBA)                                                 FARFD064
  140 IF (YY(IBA,JBA)-CMI(2)) 150,160,160                                FARFD065
  150 CMI(2)=YY(IBA,JBA)                                                 FARFD066
  160 IF (XX(IBA,JBA)-CMX(1)) 180,180,170                                FARFD067
  170 CMX(1)=XX(IBA,JBA)                                                 FARFD068
  180 IF (YY(IBA,JBA)-CMX(2)) 195,195,190                                FARFD069
  190 CMX(2)=YY(IBA,JBA)                                                 FARFD070
  195 CONTINUE                                                           FARFD071
  200 CONTINUE                                                           FARFD072
      DO 210 I=1,2                                                       FARFD073
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      CMD=.5*ABSF(CMX(I)-CMI(I))                                        FARFD074
      CMI(I)=CMI(I)-CMD                                                 FARFD075
      CMX(I)=CMX(I)+CMD                                                 FARFD076
  210 CONTINUE                                                          FARFD077
      SCX=108./ABSF(CMX(1)-CMI(1))                                      FARFD078
      SCY=108./ABSF(CMX(2)-CMI(2))                                      FARFD079
      DER=.9/SCY                                                        FARFD080
      IF (SCY-SCX) 230,230,250                                          FARFD081
  230 DER=.9/SCX                                                        FARFD082
  250 DO 400 II=1,4                                                     FARFD083
      CALL CONT (II,IBA,ICR,JBA,JCR)                                    FARFD084
      DO 300 I=1,NN                                                     FARFD085
      IBA=IBA+ICR                                                       FARFD086
      IE=IBA+ICR                                                        FARFD087
      JBA=JBA+JCR                                                       FARFD088
      JE=JBA+JCR                                                        FARFD089
      CALL LEBN (IBA,IE,JBA,JE,I)                                       FARFD090
  300 CONTINUE                                                          FARFD091
  400 CONTINUE                                                          FARFD092
      IF (LNG) 410,410,420                                              FARFD093
  410 LNG=1                                                             FARFD094
      GO TO 250                                                         FARFD095
  420 CONTINUE                                                          FARFD096
  510 CONTINUE                                                          FARFD097
      RETURN                                                            FARFD098
      END                                                               FARFD099
CFAROT                                                                  FAROT000
      SUBROUTINE ROOT                                                   FAROT001
      DIMENSION A(16684),IA(16684),XO(50),YO(50),ZO(50),NMATE(50)       FAROT002
     1,NFL(50,6),MDM(100),MELMA(100),MPRTI(100),MTETG(100),MBOVR(100)   FAROT003
     2,ML(100,4),IDM(200),IELMA(200),IPRTE(200),IGYGZ(200),IARMX(200)   FAROT004
     3,IMYMZ(200),IMFBO(200),IDTNR(200),IFL(200,3),AN(2000),IBON(50,4)  FAROT005
     4,BORC(50,8),NCL(200),XIR(100),YIR(100),ZIR(100),NX(50),NY(50)     FAROT006
     5,NZ(50)                                                           FAROT007
      COMMON A                                                          FAROT008
      EQUIVALENCE (A,IA),(A(1001),XO),(A(1051),YO),(A(1101),ZO)         FAROT009
     1,(A(1151),NMATE),(A(1201),NFL),(A(1501),MDM),(A(1601),MELMA)      FAROT010
     2,(A(1701),MPRTI),(A(1801),MTETG),(A(1901),MBOVR),(A(2001),ML)     FAROT011
     3,(A(2401),IDM),(A(2601),IELMA),(A(2801),IPRTE),(A(3001),IGYGZ)    FAROT012
     4,(A(3201),IARMX),(A(3401),IMYMZ),(A(3601),IMFBO),(A(3801),IDTNR)  FAROT013
     5,(A(4001),IFL),(A(4601),AN),(A(6601),IBON),(A(6801),BORC)         FAROT014
     6,(A(7201),NCL),(A(7401),XIR),(A(7501),YIR),(A(7601),ZIR)          FAROT015
     7,(A(7701),NX),(A(7751),NY),(A(7801),NZ)                           FAROT016
      EQUIVALENCE (A(1),NE),(A(2),NVOL),(A(3),NSUR),(A(4),NLIN)         FAROT017
     1,(A(5),LNG),(A(6),ISDE),(A(7),NC),(A(8),IO),(A(9),CF),(A(10),XMI) FAROT018
     2,(A(11),YMI),(A(12),ZMI),(A(13),XMX),(A(14),YMX),(A(15),ZMX)      FAROT019
     3,(A(16),IBOT),(A(17),SCX),(A(18),SCY),(A(19),SCZ),(A(20),DER)     FAROT020
     4,(A(21),ER),(A(22),TER),(A(23),NN),(A(24),XNN),(A(25),NNP)        FAROT021
     5,(A(26),KR),(A(27),DT)                                            FAROT022
      DIMENSION XB(2000),YB(2000),ZB(2000),CC(17,17,6),EL(200,5)        FAROT023
      EQUIVALENCE (A(7951),XB),(A(9951),YB),(A(11951),ZB),(A(13951),CC) FAROT024
     1,(A(15685),EL)                                                    FAROT025
      DIMENSION IBTE(16),AL(10),AR(10),AE(10),CO(3),CP(3)               FAROT026
      EQUIVALENCE (A(30),IMAT),(A(31),ITEM),(A(32),IELT),(A(33),IPRS)   FAROT027
     1,(A(34),ITIC),(A(35),ITGY),(A(36),MBON),(A(37),MCV),(A(38),MNR)   FAROT028
     2,(A(39),ITGZ),(A(40),IARE),(A(41),IMMX),(A(42),IMMY),(A(43),IMMZ) FAROT029
     3,(A(44),IMFI),(A(45),JBON),(A(46),NDT),(A(47),INR),(A(48),NTOT)   FAROT030
     4,(A(49),IBTE),(A(65),ETT),(A(66),IL),(A(67),NBE1),(A(68),NBE2)    FAROT031
     5,(A(69),NBE3),(A(70),ISD),(A(71),AL),(A(81),AR),(A(91),AE)        FAROT032
     6,(A(103),INRP),(A(104),LEN),(A(105),CO),(A(102),IBN),(A(101),ELL) FAROT033
     7,(A(108),CP),(A(111),DX),(A(112),DY),(A(113),DZ),(A(114),LE)      FAROT034
     8,(A(115),DISD),(A(116),DXNL),(A(117),DISL),(A(118),ACL)           FAROT035
     9,(A(119),NDTM),(A(120),ID)                                        FAROT036
      EQUIVALENCE (A(122),X),(A(123),Y),(A(124),Z),(A(125),XE)          FAROT037
     1,(A(126),YE),(A(127),ZE),(A(128),XA),(A(129),YA),(A(130),ZA)      FAROT038
     2,(A(131),LB),(A(132),NBEP),(A(133),NBET),(A(134),NDXS)            FAROT039
      NDC=0                                                             FAROT040
      IF (ABSF(DX)-ABSF(DY)) 150,150,110                                FAROT041
  110 NK=1                                                              FAROT042
      X=X+DX*DT                                                         FAROT043
      Y=Y+DY*DT                                                         FAROT044
      AR=AL(5)                                                          FAROT045
      BR=AL(4)*X+AL(2)                                                  FAROT046
      CR=AL(6)*X*X+AL(3)*X+AL(1)                                        FAROT047
      GO TO 160                                                         FAROT048
  150 NK=2                                                              FAROT049
      Y=Y+DY*DT                                                         FAROT050
      X=X+DX*DT                                                         FAROT051
      AR=AL(6)                                                          FAROT052
      BR=AL(4)*Y+AL(3)                                                  FAROT053
      CR=AL(5)*Y*Y+AL(2)*Y+AL(1)                                        FAROT054
  160 IF (ABSF(AR)-ER) 170,180,180                                      FAROT055
  170 RT=-CR/DR                                                         FAROT056
      GO TO 190                                                         FAROT057
  180 DET=SQRTF(BR*BR-4.*AR*CR)                                         FAROT058
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  185 RT=(-BR+DET)/(2.*AR)                                                FAROT059
  190 GO TO (200,230),NK                                                  FAROT060
  200 IF (ABSF(RT-Y)-DER) 220,210,210                                     FAROT061
  210 DET=-DET                                                            FAROT062
      NDC=NDC+1                                                           FAROT063
      GO TO (185,300),NDC                                                 FAROT064
  220 Y=RT                                                                FAROT065
      GO TO 250                                                           FAROT066
  230 IF (ABSF(RT-X)-DER) 240,210,210                                     FAROT067
  240 X=RT                                                                FAROT068
  250 RETURN                                                              FAROT069
  300 WRITE OUTPUT TAPE 6,1                                               FAROT070
    1 FORMAT(93HOERROR IN THE COEFFICIENTS OF QUADRATIC. COORDINATES, COF FAROT071
     1MPUTED CONSTANTS, COEFFICIENTS FOLLOW//)                            FAROT072
      WRITE OUTPUT TAPE 6,2,(I,IA(I),A(I),I=1,150)                        FAROT073
    2 FORMAT (5(1X,I3,I8,F12.6))                                          FAROT074
      NAN=10*IL                                                           FAROT075
      WRITE OUTPUT TAPE 6,3,(I,AN(I),I=1,NAN)                             FAROT076
    3 FORMAT (10(1X,I4,F7.3))                                             FAROT077
      CALL EXIT                                                           FAROT078
      END                                                                 FAROT079
CFARTZ                                                                    FARTZ000
      SUBROUTINE ROTZ                                                     FARTZ001
      DIMENSION A(16684),IA(16684),XO(50),YO(50),ZO(50),NMATE(50)         FARTZ002
     1,NFL(50,6),MDM(100),MELMA(100),MPRTI(100),MTETG(100),MBOVR(100)     FARTZ003
     2,ML(100,4),IDM(200),IELMA(200),IPRTE(200),IGYGZ(200),IARMX(200)     FARTZ004
     3,IMYMZ(200),IMFBO(200),IDTNR(200),IFL(200,3),AN(2000),IBON(50,4)    FARTZ005
     4,BORC(50,8),NCL(200),XIR(100),YIR(100),ZIR(100),NX(50),NY(50)       FARTZ006
     5,NZ(50)                                                             FARTZ007
      COMMON A                                                            FARTZ008
      EQUIVALENCE (A,IA),(A(1001),XO),(A(1051),YO),(A(1101),ZO)           FARTZ009
     1,(A(1151),NMATE),(A(1201),NFL),(A(1501),MDM),(A(1601),MELMA)        FARTZ010
     2,(A(1701),MPRTI),(A(1801),MTETG),(A(1901),MBOVR),(A(2001),ML)       FARTZ011
     3,(A(2401),IDM),(A(2601),IELMA),(A(2801),IPRTE),(A(3001),IGYGZ)      FARTZ012
     4,(A(3201),IARMX),(A(3401),IMYMZ),(A(3601),IMFBO),(A(3801),IDTNR)    FARTZ013
     5,(A(4001),IFL),(A(4601),AN),(A(6601),IBON),(A(6801),BORC)           FARTZ014
     6,(A(7201),NCL),(A(7401),XIR),(A(7501),YIR),(A(7601),ZIR)            FARTZ015
     7,(A(7701),NX),(A(7751),NY),(A(7801),NZ)                             FARTZ016
      EQUIVALENCE (A(1),NE),(A(2),NVOL),(A(3),NSUR),(A(4),NLIN)           FARTZ017
     1,(A(5),LNG),(A(6),ISDE),(A(7),NC),(A(8),IO),(A(9),CF),(A(10),XMI)   FARTZ018
     2,(A(11),YMI),(A(12),ZMI),(A(13),XMX),(A(14),YMX),(A(15),ZMX)        FARTZ019
     3,(A(16),IBOT),(A(17),SCX),(A(18),SCY),(A(19),SCZ),(A(20),DER)       FARTZ020
     4,(A(21),ER),(A(22),TER),(A(23),NN),(A(24),XNN),(A(25),NNP)          FARTZ021
     5,(A(26),KR)                                                         FARTZ022
      DIMENSION XB(2000),YB(2000),ZB(2000),CC(17,17,6),EL(200,5)          FARTZ023
      EQUIVALENCE (A(7951),XB),(A(9951),YB),(A(11951),ZB),(A(13951),CC)   FARTZ024
     1,(A(15685),EL)                                                      FARTZ025
      EQUIVALENCE (A(30),IMAT),(A(31),ITEM),(A(32),IELT),(A(33),IPRS)     FARTZ026
     1,(A(34),ITIC),(A(35),ITGY),(A(36),MBON),(A(37),MCV),(A(38),MNR)     FARTZ027
     2,(A(39),ITGZ),(A(40),IARE),(A(41),IMMX),(A(42),IMMY),(A(43),IMMZ)   FARTZ028
     3,(A(44),IMFI),(A(45),JBON),(A(46),NDT),(A(47),INR),(A(48),NTOT)     FARTZ029
     4,(A(49),ISKE)                                                       FARTZ030
      DIMENSION IST(4),AD(200),DC(3,3),CO(3),CP(3),CMI(3),CMX(3)          FARTZ031
      EQUIVALENCE (A(101),IS),(A(102),ISP),(A(103),IB),(A(104),IBB)       FARTZ032
     1,(A(105),IQ),(A(106),I),(A(107),IL),(A(108),IBC),(A(109),IC)        FARTZ033
     2,(A(110),JBC),(A(111),JC),(A(112),ISPD),(A(113),IK),(A(114),IKD)    FARTZ034
     3,(A(131),IST),(A(135),AD),(A(335),DC),(A(344),NG),(A(345),AZ)       FARTZ035
     4,(A(346),BZ),(A(347),CZ),(A(348),R1),(A(349),ZG),(A(350),Z)         FARTZ036
     5,(A(351),ZN),(A(352),NCO),(A(353),M),(A(354),NNM),(A(355),J)        FARTZ037
     5,(A(356),X),(A(357),Y)                                              FARTZ038
      DIMENSION XX(17,17),YY(17,17)                                       FARTZ039
      EQUIVALENCE (A(405),XX),(A(694),YY)                                 FARTZ040
      NG=NG                                                               FARTZ041
      IS=IS                                                               FARTZ042
      IF (ABSF(AZ)-TER) 120,120,140                                       FARTZ043
  120 IF (ABSF(BZ)-TER) 9000,9000,130                                     FARTZ044
  130 R1=-CZ/BZ                                                           FARTZ045
      R2=1.E+20                                                           FARTZ046
      GO TO (300,170,220),NG                                              FARTZ047
  140 DET=BZ*BZ-4.*AZ*CZ                                                  FARTZ048
      IF (DET+ER) 150,160,160                                             FARTZ049
  150 GO TO (9000,9000,300),NG                                            FARTZ050
  160 DET=SQRTF(DET)                                                      FARTZ051
      R1=(-BZ+DET)/(2.*AZ)                                                FARTZ052
      R2=(-BZ-DET)/(2.*AZ)                                                FARTZ053
      GO TO (300,170,220),NG                                              FARTZ054
  170 IF (ABSF(R1-ZG)-ABSF(R2-ZG)) 180,190,190                            FARTZ055
  180 Z=R1                                                                FARTZ056
      GO TO 200                                                           FARTZ057
  190 Z=R2                                                                FARTZ058
  200 IF (ISPD) 205,205,210                                               FARTZ059
  205 NG=3                                                                FARTZ060
      GO TO 300                                                           FARTZ061
  210 M=M+10                                                              FARTZ062
      GO TO 300                                                           FARTZ063
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  220 IF (ABSF(R1-ZG)-ABSF(R2-ZG)) 230,240,240                                  FARTZ064
  230 ZN=R1                                                                     FARTZ065
      GO TO 250                                                                 FARTZ066
  240 ZN=R2                                                                     FARTZ067
  250 IF (ABSF(Z-ZG)-ABSF(ZN-ZG)) 280,280,260                                   FARTZ068
  260 Z=ZN                                                                      FARTZ069
      NCO=NCO+1                                                                 FARTZ070
      IF (NCO-NNM) 280,270,270                                                  FARTZ071
  270 ISPD=ISPD-1                                                               FARTZ072
      GO TO 300                                                                 FARTZ073
  280 M=M-10                                                                    FARTZ074
  300 RETURN                                                                    FARTZ075
 9000 WRITE OUTPUT TAPE 6,1                                                     FARTZ076
    1 FORMAT (79HOERROR IN THE COEFFICIENTS OF THE SURFACE EQUATION, REL       FARTZ077
     1ATED INFORMATIONS FOLLOW//)                                               FARTZ078
      WRITE OUTPUT TAPE 6,2,(I,IA(I),A(I),I=1,150)                              FARTZ079
    2 FORMAT (5(I4,I7,F13.6))                                                   FARTZ080
      NAS=10*IS                                                                 FARTZ081
      WRITE OUTPUT TAPE 6,3,(I,AN(I),I=1,NAS)                                   FARTZ082
    3 FORMAT (10(1X,I4,F7.3))                                                   FARTZ083
      CALL EXIT                                                                 FARTZ084
      END                                                                       FARTZ085
CFASAN                                                                          FASAN000
      SUBROUTINE SCAN                                                           FASAN001
      DIMENSION A(16684),IA(16684),XO(50),YO(50),ZO(50),NMATE(50)               FASAN002
     1,NFL(50,6),MDM(100),MELMA(100),MPRTI(100),MTETG(100),MBOVR(100)           FASAN003
     2,ML(100,4),IDM(200),IELMA(200),IPRTE(200),IGYGZ(200),IARMX(200)           FASAN004
     3,IMYMZ(200),IMFBO(200),IDTNR(200),IFL(200,3),AN(2000),IBON(50,4)          FASAN005
     4,BORC(50,8),NCL(200),XIR(100),YIR(100),ZIR(100),NX(50),NY(50)             FASAN006
     5,NZ(50)                                                                   FASAN007
      COMMON A                                                                  FASAN008
      EQUIVALENCE (A,IA),(A(1001),XO),(A(1051),YO),(A(1101),ZO)                 FASAN009
     1,(A(1151),NMATE),(A(1201),NFL),(A(1501),MDM),(A(1601),MELMA)              FASAN010
     2,(A(1701),MPRTI),(A(1801),MTETG),(A(1901),MBOVR),(A(2001),ML)             FASAN011
     3,(A(2401),IDM),(A(2601),IELMA),(A(2801),IPRTE),(A(3001),IGYGZ)            FASAN012
     4,(A(3201),IARMX),(A(3401),IMYMZ),(A(3601),IMFBO),(A(3801),IDTNR)          FASAN013
     5,(A(4001),IFL),(A(4601),AN),(A(6601),IBON),(A(6801),BORC)                 FASAN014
     6,(A(7201),NCL),(A(7401),XIR),(A(7501),YIR),(A(7601),ZIR)                  FASAN015
     7,(A(7701),NX),(A(7751),NY),(A(7801),NZ)                                   FASAN016
      EQUIVALENCE (A(1),NE),(A(2),NVOL),(A(3),NSUR),(A(4),NLIN)                 FASAN017
     1,(A(5),LNG),(A(6),ISDE),(A(7),NC),(A(8),IO),(A(9),CF),(A(10),XMI)         FASAN018
     2,(A(11),YMI),(A(12),ZMI),(A(13),XMX),(A(14),YMX),(A(15),ZMX)              FASAN019
     3,(A(16),IBOT),(A(17),SCX),(A(18),SCY),(A(19),SCZ),(A(20),DER)             FASAN020
     4,(A(21),ER),(A(22),TER),(A(23),NN),(A(24),XNN),(A(25),NNP)                FASAN021
     5,(A(26),KR)                                                               FASAN022
      DIMENSION XB(2000),YB(2000),ZB(2000),CC(17,17,6),EL(200,5)                FASAN023
      EQUIVALENCE (A(7951),XB),(A(9951),YB),(A(11951),ZB),(A(13951),CC)         FASAN024
     1,(A(15685),EL)                                                            FASAN025
      EQUIVALENCE (A(30),IMAT),(A(31),ITEM),(A(32),IELT),(A(33),IPRS)           FASAN026
     1,(A(34),ITIC),(A(35),ITGY),(A(36),MBON),(A(37),MCV),(A(38),MNR)           FASAN027
     2,(A(39),ITGZ),(A(40),IARE),(A(41),IMMX),(A(42),IMMY),(A(43),IMMZ)         FASAN028
     3,(A(44),IMFI),(A(45),JBON),(A(46),NDT),(A(47),INR),(A(48),NTOT)           FASAN029
      DIMENSION IST(4),AD(200),DC(3,3),CO(3),CP(3),CMI(3),CMX(3),DUB(3)         FASAN030
     1,DUA(3,3),DMB(3),DMA(3,3),LL(4,2),XX(17,17),YY(17,17)                     FASAN031
      EQUIVALENCE (A(101),IS),(A(102),ISP),(A(103),IB),(A(104),IBB)             FASAN032
     1,(A(105),IQ),(A(106),I),(A(107),IL),(A(108),IBC),(A(109),IC)              FASAN033
     2,(A(110),JBC),(A(111),JC),(A(112),ISPD),(A(113),IK),(A(114),IKD)          FASAN034
     3,(A(131),IST),(A(135),AD),(A(335),DC),(A(344),CO),(A(347),CP)             FASAN035
     4,(A(350),CMI),(A(353),CMX),(A(356),DUB),(A(359),DUA),(A(368),DMB)         FASAN036
     5,(A(371),DMA),(A(380),LL),(A(388),J),(A(389),IM),(A(390),JM)              FASAN037
     6,(A(391),IIM),(A(392),JJM),(A(393),I2),(A(394),J2),(A(395),DN)            FASAN038
     7,(A(396),DD),(A(397),X2),(A(398),Y2),(A(399),NDX),(A(400),I1)             FASAN039
     8,(A(401),J1),(A(402),PRIJ)                                                FASAN040
      EQUIVALENCE (A(403),XTP),(A(404),YTP),(A(405),XX),(A(694),YY)             FASAN041
      XTP=0.                                                                    FASAN042
      YTP=0.                                                                    FASAN043
      I=I                                                                       FASAN044
      J=J                                                                       FASAN045
      NC=0                                                                      FASAN046
      LAS1=LL(1,1)                                                              FASAN047
      LBS1=LL(1,2)                                                              FASAN048
      LAS2=LL(2,1)                                                              FASAN049
      LBS2=LL(2,2)                                                              FASAN050
      LAS3=LL(3,1)                                                              FASAN051
      LBS3=LL(3,2)                                                              FASAN052
      LAS4=LL(4,1)                                                              FASAN053
      LBS4=LL(4,2)                                                              FASAN054
      IF (LBS1-NNP) 102,102,101                                                 FASAN055
  101 LBS1=NNP                                                                  FASAN056
  102 IF (LBS2-NN) 104,104,103                                                  FASAN057
  103 LBS2=NN                                                                   FASAN058
  104 IF (LBS3-NNP) 106,106,105                                                 FASAN059
  105 LBS3=NNP                                                                  FASAN060
  106 IF (LBS4-NN) 108,108,107                                                  FASAN061
  107 LBS4=NN                                                                   FASAN062
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108 LBB1=LAS1+1                                                    FASAN063
    LCB1=LBS1+1                                                    FASAN064
    LBB2=LAS2+1                                                    FASAN065
    LCB2=LBS2+1                                                    FASAN066
    LBB3=LAS3+1                                                    FASAN067
    LCB3=LBS3+1                                                    FASAN068
    LBB4=LAS4+1                                                    FASAN069
    LCB4=LBS4+1                                                    FASAN070
    IF (LAS1-1) 200,110,110                                        FASAN071
110 J1=1                                                           FASAN072
    I2=NNP                                                         FASAN073
    NDX=1                                                          FASAN074
    DO 150 I1=1,LAS1                                               FASAN075
    DN=I-I1                                                        FASAN076
    DD=NNP-I1                                                      FASAN077
    PRIJ=DN/DD                                                     FASAN078
    DN=(NNP-I1)*JM                                                 FASAN079
    DD=I-I1                                                        FASAN080
    CALL PREP                                                      FASAN081
    CALL CORD                                                      FASAN082
150 CONTINUE                                                       FASAN083
200 IF (LBS1-LBB1) 300,210,210                                     FASAN084
210 J1=1                                                           FASAN085
    J2=NNP                                                         FASAN086
    NDX=2                                                          FASAN087
    DO 250 I1=LBB1,LBS1                                            FASAN088
    DN=J-J1                                                        FASAN089
    DD=J2-J1                                                       FASAN090
    PRIJ=DN/DD                                                     FASAN091
    DN=NN*(I-I1)+(I1-1)*JM                                         FASAN092
    DD=JM                                                          FASAN093
    CALL PREP                                                      FASAN094
    CALL CORD                                                      FASAN095
250 CONTINUE                                                       FASAN096
300 IF (NNP-LCB1) 400,310,310                                      FASAN097
310 J1=1                                                           FASAN098
    I2=1                                                           FASAN099
    NDX=1                                                          FASAN100
    DO 350 I1=LCB1,NNP                                             FASAN101
    DN=I-I1                                                        FASAN102
    DD=I2-I1                                                       FASAN103
    PRIJ=DN/DD                                                     FASAN104
    DN=(I1-1)*JM                                                   FASAN105
    DD=I1-I                                                        FASAN106
    CALL PREP                                                      FASAN107
    CALL CORD                                                      FASAN108
350 CONTINUE                                                       FASAN109
400 IF (LAS2-2) 500,410,410                                        FASAN110
410 I1=NNP                                                         FASAN111
    J2=NNP                                                         FASAN112
    NDX=2                                                          FASAN113
    DO 450 J1=2,LAS2                                               FASAN114
    DN=J-J1                                                        FASAN115
    DD=J2-J1                                                       FASAN116
    PRIJ=DN/DD                                                     FASAN117
    DN=NN*(J-J1)-IIM*(NNP-J1)                                      FASAN118
    DD=J-J1                                                        FASAN119
    CALL PREP                                                      FASAN120
    CALL CORD                                                      FASAN121
450 CONTINUE                                                       FASAN122
500 IF (LBS2-LBB2) 600,510,510                                     FASAN123
510 I1=NNP                                                         FASAN124
    I2=1                                                           FASAN125
    NDX=1                                                          FASAN126
    DO 550 J1=LBB2,LBS2                                            FASAN127
    DN=I-I1                                                        FASAN128
    DD=I2-I1                                                       FASAN129
    PRIJ=DN/DD                                                     FASAN130
    DN=NN*(J-J1)+IIM*(J1-1)                                        FASAN131
    DD=IIM                                                         FASAN132
    CALL PREP                                                      FASAN133
    CALL CORD                                                      FASAN134
550 CONTINUE                                                       FASAN135
600 IF (NN-LCB2) 700,610,610                                       FASAN136
610 I1=NNP                                                         FASAN137
    J2=1                                                           FASAN138
    NDX=2                                                          FASAN139
    DO 650 J1=LCB2,NN                                              FASAN140
    DN=J-J1                                                        FASAN141
    DD=J2-J1                                                       FASAN142
    PRIJ=DN/DD                                                     FASAN143
    DN=NN*(J1-J)-IIM*(J1-1)                                        FASAN144
    DD=J1-J                                                        FASAN145
    CALL PREP                                                      FASAN146
    CALL CORD                                                      FASAN147
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 650 CONTINUE                                                    FASAN148
 700 IF (LAS3-1) 800,710,710                                     FASAN149
 710 J1=NNP                                                      FASAN150
     I2=NNP                                                      FASAN151
     NDX=1                                                       FASAN152
     DO 750 I1=1,LAS3                                            FASAN153
     DN=I-I1                                                     FASAN154
     DD=I2-I1                                                    FASAN155
     PRIJ=DN/DD                                                  FASAN156
     DN=NN*(I-I1)-(NNP-I1)*JJM                                   FASAN157
     DD=I-I1                                                     FASAN158
     CALL PREP                                                   FASAN159
     CALL CORD                                                   FASAN160
 750 CONTINUE                                                    FASAN161
 800 IF (LBS3-LBB3) 900,810,810                                  FASAN162
 810 J1=NNP                                                      FASAN163
     J2=1                                                        FASAN164
     NDX=2                                                       FASAN165
     DO 850 I1=LBB3,LBS3                                         FASAN166
     DN=J-J1                                                     FASAN167
     DD=J2-J1                                                    FASAN168
     PRIJ=DN/DD                                                  FASAN169
     DN=NN*(I-I1)+JJM*(I1-1)                                     FASAN170
     DD=JJM                                                      FASAN171
     CALL PREP                                                   FASAN172
     CALL CORD                                                   FASAN173
 850 CONTINUE                                                    FASAN174
 900 IF (NNP-LCB3) 1000,910,910                                  FASAN175
 910 J1=NNP                                                      FASAN176
     I2=1                                                        FASAN177
     NDX=1                                                       FASAN178
     DO 950 I1=LCB3,NNP                                          FASAN179
     DN=I-I1                                                     FASAN180
     DD=I2-I1                                                    FASAN181
     PRIJ=DN/DD                                                  FASAN182
     DN=NN*(I1-I)-JJM*(I1-1)                                     FASAN183
     DD=I1-I                                                     FASAN184
     CALL PREP                                                   FASAN185
     CALL CORD                                                   FASAN186
 950 CONTINUE                                                    FASAN187
1000 IF (LAS4-2) 1100,1010,1010                                  FASAN188
1010 I1=1                                                        FASAN189
     J2=NNP                                                      FASAN190
     NDX=2                                                       FASAN191
     DO 1050 J1=2,LAS4                                           FASAN192
     DN=J-J1                                                     FASAN193
     DD=J2-J1                                                    FASAN194
     PRIJ=DN/DD                                                  FASAN195
     DN=IM*(NNP-J1)                                              FASAN196
     DD=J-J1                                                     FASAN197
     CALL PREP                                                   FASAN198
     CALL CORD                                                   FASAN199
1050 CONTINUE                                                    FASAN200
1100 IF (LBS4-LBB4) 1200,1110,1110                               FASAN201
1110 I1=1                                                        FASAN202
     I2=NNP                                                      FASAN203
     NDX=1                                                       FASAN204
     DO 1150 J1=LBB4,LBS4                                        FASAN205
     DN=I-I1                                                     FASAN206
     DD=I2-I1                                                    FASAN207
     PRIJ=DN/DD                                                  FASAN208
     DN=IM*(J1-1)-NN*(J1-J)                                      FASAN209
     DD=IM                                                       FASAN210
     CALL PREP                                                   FASAN211
     CALL CORD                                                   FASAN212
1150 CONTINUE                                                    FASAN213
1200 IF (NN-LCB4) 1300,1210,1210                                 FASAN214
1210 I1=1                                                        FASAN215
     J2=1                                                        FASAN216
     NDX=2                                                       FASAN217
     DO 1250 J1=LCB4,NN                                          FASAN218
     DN=J-J1                                                     FASAN219
     DD=J2-J1                                                    FASAN220
     PRIJ=DN/DD                                                  FASAN221
     DN=IM*(J1-1)                                                FASAN222
     DD=J1-J                                                     FASAN223
     CALL PREP                                                   FASAN224
     CALL CORD                                                   FASAN225
1250 CONTINUE                                                    FASAN226
1300 ANC=NC                                                      FASAN227
     XX(I,J)=XTP/ANC                                             FASAN228
     YY(I,J)=YTP/ANC                                             FASAN229
     RETURN                                                      FASAN230
     END                                                         FASAN231
CFASCO                                                           FASC0000
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      SUBROUTINE SLCO                                                   FASCO001
      DIMENSION A(16684),IA(16684),XO(50),YO(50),ZO(50),NMATE(50)       FASCO002
     1,NFL(50,6),MDM(100),MELMA(100),MPRTI(100),MTETG(100),MBOVR(100)   FASCO003
     2,ML(100,4),IDM(200),IELMA(200),IPRTE(200),IGYGZ(200),IARMX(200)   FASCO004
     3,IMYMZ(200),IMFBO(200),IDTNR(200),IFL(200,3),AN(2000),IBON(50,4)  FASCO005
     4,BORC(50,8),NCL(200),XIR(100),YIR(100),ZIR(100),NX(50),NY(50)     FASCO006
     5,NZ(50)                                                           FASCO007
      COMMON A                                                          FASCO008
      EQUIVALENCE (A,IA),(A(1001),XO),(A(1051),YO),(A(1101),ZO)         FASCO009
     1,(A(1151),NMATE),(A(1201),NFL),(A(1501),MDM),(A(1601),MELMA)      FASCO010
     2,(A(1701),MPRTI),(A(1801),MTETG),(A(1901),MBOVR),(A(2001),ML)     FASCO011
     3,(A(2401),IDM),(A(2601),IELMA),(A(2801),IPRTE),(A(3001),IGYGZ)    FASCO012
     4,(A(3201),IARMX),(A(3401),IMYMZ),(A(3601),IMFBO),(A(3801),IDTNR)  FASCO013
     5,(A(4001),IFL),(A(4601),AN),(A(6601),IBON),(A(6801),BORC)         FASCO014
     6,(A(7201),NCL),(A(7401),XIR),(A(7501),YIR),(A(7601),ZIR)          FASCO015
     7,(A(7701),NX),(A(7751),NY),(A(7801),NZ)                           FASCO016
      EQUIVALENCE (A(1),NE),(A(2),NVOL),(A(3),NSUR),(A(4),NLIN)         FASCO017
     1,(A(5),LNG),(A(6),ISDE),(A(7),NC),(A(8),IO),(A(9),CF),(A(10),XMI) FASCO018
     2,(A(11),YMI),(A(12),ZMI),(A(13),XMX),(A(14),YMX),(A(15),ZMX)      FASCO019
     3,(A(16),IBOT),(A(17),SCX),(A(18),SCY),(A(19),SCZ),(A(20),DER)     FASCO020
     4,(A(21),ER),(A(22),TER),(A(23),NN),(A(24),XNN),(A(25),NNP)        FASCO021
     5,(A(26),KR)                                                      FASCO022
      DIMENSION XB(2000),YB(2000),ZB(2000),CC(17,17,6),EL(200,5)        FASCO023
      EQUIVALENCE (A(7951),XB),(A(9951),YB),(A(11951),ZB),(A(13951),CC) FASCO024
     1,(A(15685),EL)                                                    FASCO025
      DIMENSION IBTE(16),AL(10),AR(10),AE(10),CO(3),CP(3)               FASCO026
      EQUIVALENCE (A(30),IMAT),(A(31),ITEM),(A(32),IELT),(A(33),IPRS)   FASCO027
     1,(A(34),ITIC),(A(35),ITGY),(A(36),MBON),(A(37),MCV),(A(38),MNR)   FASCO028
     2,(A(39),ITGZ),(A(40),IARE),(A(41),IMMX),(A(42),IMMY),(A(43),IMMZ) FASCO029
     3,(A(44),IMFI),(A(45),JBON),(A(46),NDT),(A(47),INR),(A(48),NTOT)   FASCO030
     4,(A(49),IBTE),(A(65),ETT),(A(66),IL),(A(67),NBE1),(A(68),NBE2)    FASCO031
     5,(A(69),NBE3),(A(70),ISD),(A(71),AL),(A(81),AR),(A(91),AE)        FASCO032
     6,(A(103),INRP),(A(104),LEN),(A(105),CO),(A(102),IBN),(A(101),ELL) FASCO033
     7,(A(108),CP),(A(111),DX),(A(112),DY),(A(113),DZ),(A(114),LE)      FASCO034
     8,(A(115),DISD),(A(116),DXNL),(A(117),DISL),(A(118),ACL)           FASCO035
     9,(A(119),NDTM),(A(120),ID),(A(121),DT)                            FASCO036
      EQUIVALENCE (A(122),X),(A(123),Y),(A(124),Z),(A(125),XE)          FASCO037
     1,(A(126),YE),(A(127),ZE),(A(128),XA),(A(129),YA),(A(130),ZA)      FASCO038
     2,(A(131),LB),(A(132),NBEP),(A(133),NBET),(A(134),NDXS)            FASCO039
      CALL DIRC                                                         FASCO040
      IL=IL                                                             FASCO041
      IF (IL-1) 310,310,110                                             FASCO042
  110 DU=CO(2)*CP(3)-CO(3)*CP(2)                                        FASCO043
      DV=-(CO(1)*CP(3)-CO(3)*CP(1))                                     FASCO044
      DW=CO(1)*CP(2)-CO(2)*CP(1)                                        FASCO045
      COL=SQRTF(DU*DU+DV*DV+DW*DW)                                      FASCO046
      IF (COL-.1) 210,210,310                                           FASCO047
  210 LEN=NBET                                                          FASCO048
      GO TO 400                                                         FASCO049
  310 LEN=1                                                             FASCO050
  400 RETURN                                                            FASCO051
      END                                                               FASCO052
CFASEP                                                                  FASEP000
      SUBROUTINE STEP                                                   FASEP001
      DIMENSION A(16684),IA(16684),XO(50),YO(50),ZO(50),NMATE(50)       FASEP002
     1,NFL(50,6),MDM(100),MELMA(100),MPRTI(100),MTETG(100),MBOVR(100)   FASEP003
     2,ML(100,4),IDM(200),IELMA(200),IPRTE(200),IGYGZ(200),IARMX(200)   FASEP004
     3,IMYMZ(200),IMFBO(200),IDTNR(200),IFL(200,3),AN(2000),IBON(50,4)  FASEP005
     4,BORC(50,8),NCL(200),XIR(100),YIR(100),ZIR(100),NX(50),NY(50)     FASEP006
     5,NZ(50)                                                           FASEP007
      COMMON A                                                          FASEP008
      EQUIVALENCE (A,IA),(A(1001),XO),(A(1051),YO),(A(1101),ZO)         FASEP009
     1,(A(1151),NMATE),(A(1201),NFL),(A(1501),MDM),(A(1601),MELMA)      FASEP010
     2,(A(1701),MPRTI),(A(1801),MTETG),(A(1901),MBOVR),(A(2001),ML)     FASEP011
     3,(A(2401),IDM),(A(2601),IELMA),(A(2801),IPRTE),(A(3001),IGYGZ)    FASEP012
     4,(A(3201),IARMX),(A(3401),IMYMZ),(A(3601),IMFBO),(A(3801),IDTNR)  FASEP013
     5,(A(4001),IFL),(A(4601),AN),(A(6601),IBON),(A(6801),BORC)         FASEP014
     6,(A(7201),NCL),(A(7401),XIR),(A(7501),YIR),(A(7601),ZIR)          FASEP015
     7,(A(7701),NX),(A(7751),NY),(A(7801),NZ)                           FASEP016
      EQUIVALENCE (A(1),NE),(A(2),NVOL),(A(3),NSUR),(A(4),NLIN)         FASEP017
     1,(A(5),LNG),(A(6),ISDE),(A(7),NC),(A(8),IO),(A(9),CF),(A(10),XMI) FASEP018
     2,(A(11),YMI),(A(12),ZMI),(A(13),XMX),(A(14),YMX),(A(15),ZMX)      FASEP019
     3,(A(16),IBOT),(A(17),SCX),(A(18),SCY),(A(19),SCZ),(A(20),DER)     FASEP020
     4,(A(21),ER),(A(22),TER),(A(23),NN),(A(24),XNN),(A(25),NNP)        FASEP021
     5,(A(26),KR),(A(27),DT)                                           FASEP022
      DIMENSION XB(2000),YB(2000),ZB(2000),CC(17,17,6),EL(200,5)        FASEP023
      EQUIVALENCE (A(7951),XB),(A(9951),YB),(A(11951),ZB),(A(13951),CC) FASEP024
     1,(A(15685),EL)                                                    FASEP025
      DIMENSION IBTE(16),AL(10),AR(10),AE(10),CO(3),CP(3)               FASEP026
      EQUIVALENCE (A(30),IMAT),(A(31),ITEM),(A(32),IELT),(A(33),IPRS)   FASEP027
     1,(A(34),ITIC),(A(35),ITGY),(A(36),MBON),(A(37),MCV),(A(38),MNR)   FASEP028
     2,(A(39),ITGZ),(A(40),IARE),(A(41),IMMX),(A(42),IMMY),(A(43),IMMZ) FASEP029
     3,(A(44),IMFI),(A(45),JBON),(A(46),NDT),(A(47),INR),(A(48),NTOT)   FASEP030
     4,(A(49),IBTE),(A(65),ETT),(A(66),IL),(A(67),NBE1),(A(68),NBE2)    FASEP031
     5,(A(69),NBE3),(A(70),ISD),(A(71),AL),(A(81),AR),(A(91),AE)        FASEP032
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     6,(A(103),INRP),(A(104),LEN),(A(105),CO),(A(102),IBN),(A(101),ELL) FASEP033
     7,(A(108),CP),(A(111),DX),(A(112),DY),(A(113),DZ),(A(114),LE)      FASEP034
     8,(A(115),DISD),(A(116),DXNL),(A(117),DISL),(A(118),ACL)           FASEP035
     9,(A(119),NDTM),(A(120),ID)                                        FASEP036
      EQUIVALENCE (A(122),X),(A(123),Y),(A(124),Z),(A(125),XE)          FASEP037
     1,(A(126),YE),(A(127),ZE),(A(128),XA),(A(129),YA),(A(130),ZA)      FASEP038
     2,(A(131),LB),(A(132),NBEP),(A(133),NBET),(A(134),NDXS)            FASEP039
      NK=1                                                              FASEP040
      CT=.5                                                             FASEP041
  110 X=XA+DX*CT*DT                                                     FASEP042
      Y=YA+DY*CT*DT                                                     FASEP043
      Z=ZA+DZ*CT*DT                                                     FASEP044
      GO TO (120,200),NK                                                FASEP045
  120 CALL DIRC                                                         FASEP046
      CT=1.                                                             FASEP047
      NK=2                                                              FASEP048
      GO TO 110                                                         FASEP049
  200 RETURN                                                            FASEP050
      END                                                               FASEP051
CFASTR                                                                  FASTR000
      SUBROUTINE SUTR                                                   FASTR001
      DIMENSION A(16684),IA(16684),XO(50),YO(50),ZO(50),NMATE(50)       FASTR002
     1,NFL(50,6),MDM(100),MELMA(100),MPRTI(100),MTETG(100),MBOVR(100)   FASTR003
     2,ML(100,4),IDM(200),IELMA(200),IPRTE(200),IGYGZ(200),IARMX(200)   FASTR004
     3,IMYMZ(200),IMFBO(200),IDTNR(200),IFL(200,3),AN(2000),IBON(50,4)  FASTR005
     4,BORC(50,8),NCL(200),XIR(100),YIR(100),ZIR(100),NX(50),NY(50)     FASTR006
     5,NZ(50)                                                           FASTR007
      COMMON A                                                          FASTR008
      EQUIVALENCE (A,IA),(A(1001),XO),(A(1051),YO),(A(1101),ZO)         FASTR009
     1,(A(1151),NMATE),(A(1201),NFL),(A(1501),MDM),(A(1601),MELMA)      FASTR010
     2,(A(1701),MPRTI),(A(1801),MTETG),(A(1901),MBOVR),(A(2001),ML)     FASTR011
     3,(A(2401),IDM),(A(2601),IELMA),(A(2801),IPRTE),(A(3001),IGYGZ)    FASTR012
     4,(A(3201),IARMX),(A(3401),IMYMZ),(A(3601),IMFBO),(A(3801),IDTNR)  FASTR013
     5,(A(4001),IFL),(A(4601),AN),(A(6601),IBON),(A(6801),BORC)         FASTR014
     6,(A(7201),NCL),(A(7401),XIR),(A(7501),YIR),(A(7601),ZIR)          FASTR015
     7,(A(7701),NX),(A(7751),NY),(A(7801),NZ)                           FASTR016
      EQUIVALENCE (A(1),NE),(A(2),NVOL),(A(3),NSUR),(A(4),NLIN)         FASTR017
     1,(A(5),LNG),(A(6),ISDE),(A(7),NC),(A(8),IO),(A(9),CF),(A(10),XMI) FASTR018
     2,(A(11),YMI),(A(12),ZMI),(A(13),XMX),(A(14),YMX),(A(15),ZMX)      FASTR019
     3,(A(16),IBOT),(A(17),SCX),(A(18),SCY),(A(19),SCZ),(A(20),DER)     FASTR020
     4,(A(21),ER),(A(22),TER),(A(23),NN),(A(24),XNN),(A(25),NNP)        FASTR021
     5,(A(26),KR)                                                      FASTR022
      DIMENSION XB(2000),YB(2000),ZB(2000),CC(17,17,6),EL(200,5)        FASTR023
      EQUIVALENCE (A(7951),XB),(A(9951),YB),(A(11951),ZB),(A(13951),CC) FASTR024
     1,(A(15685),EL)                                                    FASTR025
      EQUIVALENCE (A(30),IMAT),(A(31),ITEM),(A(32),IELT),(A(33),IPRS)   FASTR026
     1,(A(34),ITIC),(A(35),ITGY),(A(36),MBON),(A(37),MCV),(A(38),MNR)   FASTR027
     2,(A(39),ITGZ),(A(40),IARE),(A(41),IMMX),(A(42),IMMY),(A(43),IMMZ) FASTR028
     3,(A(44),IMFI),(A(45),JBON),(A(46),NDT),(A(47),INR),(A(48),NTOT)   FASTR029
      DIMENSION IST(4),AD(200),DC(3,3),CO(3),CP(3),CMI(3),CMX(3),DUB(3) FASTR030
     1,DUA(3,3),DMB(3),DMA(3,3),XX(17,17),YY(17,17)                     FASTR031
      EQUIVALENCE (A(101),IS),(A(102),ISP),(A(103),IB),(A(104),IBB)     FASTR032
     1,(A(105),IQ),(A(106),I),(A(107),IL),(A(108),IBC),(A(109),IC)      FASTR033
     2,(A(110),JBC),(A(111),JC),(A(112),ISPD),(A(113),IK),(A(114),IKD)  FASTR034
     3,(A(131),IST),(A(135),AD),(A(335),DC),(A(344),CO),(A(347),CP)     FASTR035
     4,(A(350),CMI),(A(353),CMX),(A(356),DUB),(A(359),DUA),(A(368),DMB) FASTR036
     5,(A(371),DMA)                                                     FASTR037
      EQUIVALENCE (A(403),XTP),(A(404),YTP),(A(405),XX),(A(694),YY)     FASTR038
C     FIND THE TRANSFORMATION MATRIX                                    FASTR039
      DC(1,2)=-DC(2,3)                                                  FASTR040
      DC(2,2)=DC(1,3)                                                   FASTR041
      DC(3,2)=0.                                                        FASTR042
  110 COL=SQRTF(DC(1,2)*DC(1,2)+DC(2,2)*DC(2,2))                        FASTR043
      IF (COL-.01) 120,120,130                                          FASTR044
  120 DC(1,2)=DC(3,3)                                                   FASTR045
      DC(2,2)=0.                                                        FASTR046
      DC(3,2)=-DC(1,3)                                                  FASTR047
      GO TO 110                                                         FASTR048
  130 DO 150 I=1,3                                                      FASTR049
      DC(I,2)=DC(I,2)/COL                                               FASTR050
  150 CONTINUE                                                          FASTR051
      DC(1,1)=DC(2,2)*DC(3,3)-DC(2,3)*DC(3,2)                           FASTR052
      DC(2,1)=-(DC(1,2)*DC(3,3)-DC(1,3)*DC(3,2))                        FASTR053
      DC(3,1)=DC(1,2)*DC(2,3)-DC(1,3)*DC(2,2)                           FASTR054
C     TRANSFORM THE MAXIMUM AND MINIMUM COORDINATES,BOUNDARY LINES      FASTR055
      DO 300 II=1,4                                                     FASTR056
      CALL CONT (II,IBA,ICR,JBA,JCR)                                    FASTR057
      DO 250 I=1,NNP                                                    FASTR058
      IBA=IBA+ICR                                                       FASTR059
      JBA=JBA+JCR                                                       FASTR060
      DO 220 K=1,3                                                      FASTR061
      KP=K+3                                                            FASTR062
      CC(IBA,JBA,KP)=0.                                                 FASTR063
      DO 210 L=1,3                                                      FASTR064
      CC(IBA,JBA,KP)=CC(IBA,JBA,KP)+DC(L,K)*CC(IBA,JBA,L)               FASTR065
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  210 CONTINUE                                                          FASTR066
  220 CONTINUE                                                          FASTR067
  250 CONTINUE                                                          FASTR068
  300 CONTINUE                                                          FASTR069
      DO 350 I=1,2                                                      FASTR070
      IP=I+3                                                            FASTR071
      CMI(I)=CC(1,1,IP)                                                 FASTR072
      CMX(I)=CC(1,1,IP)                                                 FASTR073
  350 CONTINUE                                                          FASTR074
      DO 450 II=1,4                                                     FASTR075
      CALL CONT (II,IBA,ICR,JBA,JCR)                                    FASTR076
      DO 445 I=1,NNP                                                    FASTR077
      IBA=IBA+ICR                                                       FASTR078
      JBA=JBA+JCR                                                       FASTR079
      XX(IBA,JBA)=CC(IBA,JBA,4)                                         FASTR080
      YY(IBA,JBA)=CC(IBA,JBA,5)                                         FASTR081
      DO 440 K=1,2                                                      FASTR082
      KP=K+3                                                            FASTR083
      IF (CC(IBA,JBA,KP)-CMI(K)) 410,420,420                            FASTR084
  410 CMI(K)=CC(IBA,JBA,KP)                                             FASTR085
  420 IF (CC(IBA,JBA,KP)-CMX(K)) 440,440,430                            FASTR086
  430 CMX(K)=CC(IBA,JBA,KP)                                             FASTR087
  440 CONTINUE                                                          FASTR088
  445 CONTINUE                                                          FASTR089
  450 CONTINUE                                                          FASTR090
      DO 455 I=1,2                                                      FASTR091
      CMD=.5*ABSF(CMX(I)-CMI(I))                                        FASTR092
      CMI(I)=CMI(I)-CMD                                                 FASTR093
      CMX(I)=CMX(I)+CMD                                                 FASTR094
  455 CONTINUE                                                          FASTR095
      SCX=108./ABSF(CMX(1)-CMI(1))                                      FASTR096
      SCY=108./ABSF(CMX(2)-CMI(2))                                      FASTR097
      DER=.9/SCX                                                        FASTR098
      IF (SCY-SCX) 457,457,456                                          FASTR099
  456 DER=.9/SCY                                                        FASTR100
  457 ISPP=ISP-IS+1                                                     FASTR101
C     TRANSFORM SURFACE EQUATIONS                                       FASTR102
      DO 900 IX=1,ISPP                                                  FASTR103
      NB=10*IX+1                                                        FASTR104
      DT=1.                                                             FASTR105
      ND=3                                                              FASTR106
      NC=0                                                              FASTR107
      IDB=0                                                             FASTR108
  460 DO 500 J=1,ND                                                     FASTR109
      NB=NB-1                                                           FASTR110
      IF (NC) 480,480,470                                               FASTR111
  470 IDB=IDB+1                                                         FASTR112
      NBD=NB-3                                                          FASTR113
      DUB(IDB)=AD(NBD)                                                  FASTR114
  480 K=J+NC                                                            FASTR115
      DUA(J,K)=AD(NB)*DT                                                FASTR116
      DUA(K,J)=DUA(J,K)                                                 FASTR117
  500 CONTINUE                                                          FASTR118
      NC=NC+1                                                           FASTR119
      ND=ND-1                                                           FASTR120
      DT=.5                                                             FASTR121
      IF (ND) 510,510,460                                               FASTR122
  510 DO 600 I=1,3                                                      FASTR123
      DMB(I)=0.                                                         FASTR124
      DO 590 J=1,3                                                      FASTR125
      DMA(I,J)=0.                                                       FASTR126
      DMB(I)=DMB(I)+DUB(J)*DC(J,I)                                      FASTR127
      DO 580 K=1,3                                                      FASTR128
      DMA(I,J)=DMA(I,J)+DUA(I,K)*DC(K,J)                                FASTR129
  580 CONTINUE                                                          FASTR130
  590 CONTINUE                                                          FASTR131
  600 CONTINUE                                                          FASTR132
      DO 700 I=1,3                                                      FASTR133
      DUB(I)=DMB(I)                                                     FASTR134
      DO 690 J=1,3                                                      FASTR135
      DUA(I,J)=0.                                                       FASTR136
      DO 680 K=1,3                                                      FASTR137
      DUA(I,J)=DUA(I,J)+DC(K,I)*DMA(K,J)                                FASTR138
  680 CONTINUE                                                          FASTR139
  690 CONTINUE                                                          FASTR140
  700 CONTINUE                                                          FASTR141
      NB=10*IX+1                                                        FASTR142
      DT=1.                                                             FASTR143
      ND=3                                                              FASTR144
      NC=0                                                              FASTR145
      IDB=0                                                             FASTR146
  710 DO 800 J=1,ND                                                     FASTR147
      NB=NB-1                                                           FASTR148
      IF (NC) 730,730,720                                               FASTR149
  720 IDB=IDB+1                                                         FASTR150
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      NBD=NB-3                                                          FASTR151
      AD(NBD)=DUB(IDB)                                                  FASTR152
  730 K=J+NC                                                            FASTR153
      AD(NB)=DUA(J,K)*DT                                                FASTR154
  800 CONTINUE                                                          FASTR155
      NC=NC+1                                                           FASTR156
      ND=ND-1                                                           FASTR157
      DT=2.                                                             FASTR158
      IF (ND) 900,900,710                                               FASTR159
  900 CONTINUE                                                          FASTR160
      RETURN                                                            FASTR161
      END                                                               FASTR162
CFASDI                                                                  FASDI000
      SUBROUTINE SUDI                                                   FASDI001
      DIMENSION A(16684),IA(16684),XO(50),YO(50),ZO(50),NMATE(50)       FASDI002
     1,NFL(50,6),MDM(100),MELMA(100),MPRTI(100),MTETG(100),MBOVR(100)   FASDI003
     2,ML(100,4),IDM(200),IELMA(200),IPRTE(200),IGYGZ(200),IARMX(200)   FASDI004
     3,IMYMZ(200),IMFBO(200),IDTNR(200),IFL(200,3),AN(2000),IBON(50,4)  FASDI005
     4,BORC(50,8),NCL(200),XIR(100),YIR(100),ZIR(100),NX(50),NY(50)     FASDI006
     5,NZ(50)                                                           FASDI007
      COMMON A                                                          FASDI008
      EQUIVALENCE (A,IA),(A(1001),XO),(A(1051),YO),(A(1101),ZO)         FASDI009
     1,(A(1151),NMATE),(A(1201),NFL),(A(1501),MDM),(A(1601),MELMA)      FASDI010
     2,(A(1701),MPRTI),(A(1801),MTETG),(A(1901),MBOVR),(A(2001),ML)     FASDI011
     3,(A(2401),IDM),(A(2601),IELMA),(A(2801),IPRTE),(A(3001),IGYGZ)    FASDI012
     4,(A(3201),IARMX),(A(3401),IMYMZ),(A(3601),IMFBO),(A(3801),IDTNR)  FASDI013
     5,(A(4001),IFL),(A(4601),AN),(A(6601),IBON),(A(6801),BORC)         FASDI014
     6,(A(7201),NCL),(A(7401),XIR),(A(7501),YIR),(A(7601),ZIR)          FASDI015
     7,(A(7701),NX),(A(7751),NY),(A(7801),NZ)                           FASDI016
      EQUIVALENCE (A(1),NE),(A(2),NVOL),(A(3),NSUR),(A(4),NLIN)         FASDI017
     1,(A(5),LNG),(A(6),ISDE),(A(7),NC),(A(8),IO),(A(9),CF),(A(10),XMI) FASDI018
     2,(A(11),YMI),(A(12),ZMI),(A(13),XMX),(A(14),YMX),(A(15),ZMX)      FASDI019
     3,(A(16),IBOT),(A(17),SCX),(A(18),SCY),(A(19),SCZ),(A(20),DER)     FASDI020
     4,(A(21),ER),(A(22),TER),(A(23),NN),(A(24),XNN),(A(25),NNP)        FASDI021
     5,(A(26),KR)                                                      FASDI022
      DIMENSION XB(2000),YB(2000),ZB(2000),CC(17,17,6),EL(200,5)        FASDI023
      EQUIVALENCE (A(7951),XB),(A(9951),YB),(A(11951),ZB),(A(13951),CC) FASDI024
     1,(A(15685),EL)                                                    FASDI025
      EQUIVALENCE (A(30),IMAT),(A(31),ITEM),(A(32),IELT),(A(33),IPRS)   FASDI026
     1,(A(34),ITIC),(A(35),ITGY),(A(36),MBON),(A(37),MCV),(A(38),MNR)   FASDI027
     2,(A(39),ITGZ),(A(40),IARE),(A(41),IMMX),(A(42),IMMY),(A(43),IMMZ) FASDI028
     3,(A(44),IMFI),(A(45),JBON),(A(46),NDT),(A(47),INR),(A(48),NTOT)   FASDI029
     4,(A(49),ISKE)                                                     FASDI030
      DIMENSION IST(4),AD(200),DC(3,3),CO(3),CP(3),CMI(3),CMX(3),DUB(3) FASDI031
     1,DUA(3,3),DMB(3),DMA(3,3),LL(4,2)                                 FASDI032
      EQUIVALENCE (A(101),IS),(A(102),ISP),(A(103),IB),(A(104),IBB)     FASDI033
     1,(A(105),IQ),(A(106),I),(A(107),IL),(A(108),IBC),(A(109),IC)      FASDI034
     2,(A(110),JBC),(A(111),JC),(A(112),ISPD),(A(113),IK),(A(114),IKD)  FASDI035
     3,(A(131),IST),(A(135),AD),(A(335),DC),(A(344),CO),(A(347),CP)     FASDI036
     4,(A(350),CMI),(A(353),CMX),(A(356),DUB),(A(359),DUA),(A(368),DMB) FASDI037
     5,(A(371),DMA),(A(380),LL),(A(388),J),(A(389),IM),(A(390),JM)      FASDI038
     6,(A(391),IIM),(A(392),JJM),(A(393),I2),(A(394),J2),(A(395),DN)    FASDI039
     7,(A(396),DD),(A(397),X2),(A(398),Y2),(A(399),NDX),(A(400),I1)     FASDI040
     8,(A(401),J1),(A(402),PRIJ)                                        FASDI041
      ISP=0                                                             FASDI042
      DO 300 IS=1,NSUR                                                  FASDI043
      IF (ML(IS,1)+ML(IS,2)+ML(IS,3)+ML(IS,4)) 300,300,90               FASDI044
   90 IS=IS                                                             FASDI045
      MBON=MBOVR(IS)/100                                                FASDI046
      MCV=MBOVR(IS)/10-10*MBON                                          FASDI047
      MNR=MBOVR(IS)-10*MCV-100*MBON                                     FASDI048
      DO 100 I=1,3                                                      FASDI049
  100 CO(I)=0.                                                          FASDI050
      DO 105 I=1,200                                                    FASDI051
  105 AD(I)=0.                                                          FASDI052
      IF (IS-ISP) 300,300,110                                           FASDI053
  110 ISP=IS                                                            FASDI054
      IK=0                                                              FASDI055
  120 NC=10*(ISP-1)+1                                                   FASDI056
      NCE=NC+9                                                          FASDI057
      DO 200 I=NC,NCE                                                   FASDI058
      IK=IK+1                                                           FASDI059
      AD(IK)=AN(I)                                                      FASDI060
  200 CONTINUE                                                          FASDI061
      IF (MDM(ISP)-MDM(ISP+1)) 220,210,220                              FASDI062
  210 ISP=ISP+1                                                         FASDI063
      GO TO 120                                                         FASDI064
  220 CALL BOLI                                                         FASDI065
      CALL NOGE                                                         FASDI066
      IF (NVOL) 240,240,230                                             FASDI067
  230 CALL SUTR                                                         FASDI068
  240 CALL REFD                                                         FASDI069
      CALL NPUT                                                         FASDI070
      IF (NVOL) 260,260,250                                             FASDI071
  250 CALL SUZC                                                         FASDI072
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  260 CONTINUE                                                          FASDI073
      WRITE TAPE10,(((CC(I,J,K),K=1,3),I=1,NNP),J=1,NNP)                FASDI074
  300 CONTINUE                                                          FASDI075
      RETURN                                                            FASDI076
      END                                                               FASDI077
CFASZC                                                                  FASZC000
      SUBROUTINE SUZC                                                   FASZC001
      DIMENSION A(16684),IA(16684),XO(50),YO(50),ZO(50),NMATE(50)       FASZC002
     1,NFL(50,6),MDM(100),MELMA(100),MPRTI(100),MTETG(100),MBOVR(100)   FASZC003
     2,ML(100,4),IDM(200),IELMA(200),IPRTE(200),IGYGZ(200),IARMX(200)   FASZC004
     3,IMYMZ(200),IMFBO(200),IDTNR(200),IFL(200,3),AN(2000),IBON(50,4)  FASZC005
     4,BORC(50,8),NCL(200),XIR(100),YIR(100),ZIR(100),NX(50),NY(50)     FASZC006
     5,NZ(50)                                                           FASZC007
      COMMON A                                                          FASZC008
      EQUIVALENCE (A,IA),(A(1001),XO),(A(1051),YO),(A(1101),ZO)         FASZC009
     1,(A(1151),NMATE),(A(1201),NFL),(A(1501),MDM),(A(1601),MELMA)      FASZC010
     2,(A(1701),MPRTI),(A(1801),MTETG),(A(1901),MBOVR),(A(2001),ML)     FASZC011
     3,(A(2401),IDM),(A(2601),IELMA),(A(2801),IPRTE),(A(3001),IGYGZ)    FASZC012
     4,(A(3201),IARMX),(A(3401),IMYMZ),(A(3601),IMFBO),(A(3801),IDTNR)  FASZC013
     5,(A(4001),IFL),(A(4601),AN),(A(6601),IBON),(A(6801),BORC)         FASZC014
     6,(A(7201),NCL),(A(7401),XIR),(A(7501),YIR),(A(7601),ZIR)          FASZC015
     7,(A(7701),NX),(A(7751),NY),(A(7801),NZ)                           FASZC016
      EQUIVALENCE (A(1),NE),(A(2),NVOL),(A(3),NSUR),(A(4),NLIN)         FASZC017
     1,(A(5),LNG),(A(6),ISDE),(A(7),NC),(A(8),IO),(A(9),CF),(A(10),XMI) FASZC018
     2,(A(11),YMI),(A(12),ZMI),(A(13),XMX),(A(14),YMX),(A(15),ZMX)      FASZC019
     3,(A(16),IBOT),(A(17),SCX),(A(18),SCY),(A(19),SCZ),(A(20),DER)     FASZC020
     4,(A(21),ER),(A(22),TER),(A(23),NN),(A(24),XNN),(A(25),NNP)        FASZC021
     5,(A(26),KR)                                                      FASZC022
      DIMENSION XB(2000),YB(2000),ZB(2000),CC(17,17,6),EL(200,5)        FASZC023
      EQUIVALENCE (A(7951),XB),(A(9951),YB),(A(11951),ZB),(A(13951),CC) FASZC024
     1,(A(15685),EL)                                                    FASZC025
      EQUIVALENCE (A(30),IMAT),(A(31),ITEM),(A(32),IELT),(A(33),IPRS)   FASZC026
     1,(A(34),ITIC),(A(35),ITGY),(A(36),MBON),(A(37),MCV),(A(38),MNR)   FASZC027
     2,(A(39),ITGZ),(A(40),IARE),(A(41),IMMX),(A(42),IMMY),(A(43),IMMZ) FASZC028
     3,(A(44),IMFI),(A(45),JBON),(A(46),NDT),(A(47),INR),(A(48),NTOT)   FASZC029
     4,(A(49),ISKE)                                                     FASZC030
      DIMENSION IST(4),AD(200),DC(3,3),CO(3),CP(3),CMI(3),CMX(3)        FASZC031
      EQUIVALENCE (A(101),IS),(A(102),ISP),(A(103),IB),(A(104),IBB)     FASZC032
     1,(A(105),IQ),(A(106),I),(A(107),IL),(A(108),IBC),(A(109),IC)      FASZC033
     2,(A(110),JBC),(A(111),JC),(A(112),ISPD),(A(113),IK),(A(114),IKD)  FASZC034
     3,(A(131),IST),(A(135),AD),(A(335),DC),(A(344),NG),(A(345),AZ)     FASZC035
     4,(A(346),BZ),(A(347),CZ),(A(348),R1),(A(349),ZG),(A(350),Z)       FASZC036
     5,(A(351),ZN),(A(352),NCO),(A(353),M),(A(354),NNM),(A(355),J)      FASZC037
     5,(A(356),X),(A(357),Y)                                            FASZC038
      DIMENSION XX(17,17),YY(17,17)                                     FASZC039
      EQUIVALENCE (A(405),XX),(A(694),YY)                               FASZC040
      NNM=NN-1                                                          FASZC041
      ISPD=ISP-IS                                                       FASZC042
      M=0                                                               FASZC043
      DO 300 ID=1,NNP                                                   FASZC044
      NCO=0                                                             FASZC045
      IF (ISKE) 105,105,110                                             FASZC046
  105 I=ID                                                              FASZC047
      GO TO 120                                                         FASZC048
  110 J=ID                                                              FASZC049
  120 DO 200 JD=1,NNP                                                   FASZC050
      IF (ISKE) 125,125,130                                             FASZC051
  125 J=JD                                                              FASZC052
      GO TO 140                                                         FASZC053
  130 I=JD                                                              FASZC054
  140 X=XX(I,J)                                                         FASZC055
      Y=YY(I,J)                                                         FASZC056
      IF ((I-1)*(J-1)) 141,143,141                                      FASZC057
  141 IF ((I-NNP)*(J-NNP)) 144,143,144                                  FASZC058
  143 ZG=CC(I,J,6)                                                      FASZC059
      GO TO 145                                                         FASZC060
  144 IM=I-1                                                            FASZC061
      JM=J-1                                                            FASZC062
      AU=CC(IM,J,4)-CC(IM,JM,4)                                         FASZC063
      AV=CC(IM,J,5)-CC(IM,JM,5)                                         FASZC064
      AW=CC(IM,J,6)-CC(IM,JM,6)                                         FASZC065
      BU=CC(I,JM,4)-CC(IM,JM,4)                                         FASZC066
      BV=CC(I,JM,5)-CC(IM,JM,5)                                         FASZC067
      BW=CC(I,JM,6)-CC(IM,JM,6)                                         FASZC068
      AZ=AV*BW-BV*AW                                                    FASZC069
      BZ=-(AU*BW-BU*AW)                                                 FASZC070
      CZ=AU*BV-BU*AV                                                    FASZC071
      DZ=-XX(IM,JM)*AZ-YY(IM,JM)*BZ-CC(IM,JM,6)*CZ+X*AZ+Y*BZ            FASZC072
      AZ=0.                                                             FASZC073
      BZ=CZ                                                             FASZC074
      CZ=DZ                                                             FASZC075
      NG=1                                                              FASZC076
      CALL ROTZ                                                         FASZC077
      ZG=R1                                                             FASZC078
  145 NG=2                                                              FASZC079
```

```
  150 M=M                                                                FASZC080
      AZ=AD(M+8)                                                         FASZC081
      BZ=AD(M+6)*Y+AD(M+5)*X+AD(M+2)                                     FASZC082
      CZ=AD(M+10)*X*X+AD(M+9)*Y*Y+AD(M+7)*X*Y+AD(M+4)*X+AD(M+3)*Y+AD(M+1FASZC083
     1)                                                                  FASZC084
      CALL ROTZ                                                          FASZC085
      NG=NG                                                              FASZC086
      GO TO (150,160,190),NG                                             FASZC087
  160 NG=3                                                               FASZC088
      GO TO 150                                                          FASZC089
  190 CC(I,J,6)=Z                                                        FASZC090
  200 CONTINUE                                                           FASZC091
  300 CONTINUE                                                           FASZC092
      DO 600 I=1,NNP                                                     FASZC093
      DO 500 J=1,NNP                                                     FASZC094
      DO 400 K=1,3                                                       FASZC095
      CC(I,J,K)=0.                                                       FASZC096
      DO 350 L=1,3                                                       FASZC097
      LP=L+3                                                             FASZC098
      CC(I,J,K)=CC(I,J,K)+DC(K,L)*CC(I,J,LP)                             FASZC099
  350 CONTINUE                                                           FASZC100
  400 CONTINUE                                                           FASZC101
  500 CONTINUE                                                           FASZC102
  600 CONTINUE                                                           FASZC103
      RETURN                                                             FASZC104
      END                                                                FASZC105
CFATST                                                                   FATST000
      SUBROUTINE TEST                                                    FATST001
      DIMENSION A(16684),IA(16684),XO(50),YO(50),ZO(50),NMATE(50)        FATST002
     1,NFL(50,6),MDM(100),MELMA(100),MPRTI(100),MTETG(100),MBOVR(100)    FATST003
     2,ML(100,4),IDM(200),IELMA(200),IPRTE(200),IGYGZ(200),IARMX(200)    FATST004
     3,IMYMZ(200),IMFBO(200),IDTNR(200),IFL(200,3),AN(2000),IBON(50,4)   FATST005
     4,BORC(50,8),NCL(200),XIR(100),YIR(100),ZIR(100),NX(50),NY(50)      FATST006
     5,NZ(50)                                                            FATST007
      COMMON A                                                           FATST008
      EQUIVALENCE (A,IA),(A(1001),XO),(A(1051),YO),(A(1101),ZO)          FATST009
     1,(A(1151),NMATE),(A(1201),NFL),(A(1501),MDM),(A(1601),MELMA)       FATST010
     2,(A(1701),MPRTI),(A(1801),MTETG),(A(1901),MBOVR),(A(2001),ML)      FATST011
     3,(A(2401),IDM),(A(2601),IELMA),(A(2801),IPRTE),(A(3001),IGYGZ)     FATST012
     4,(A(3201),IARMX),(A(3401),IMYMZ),(A(3601),IMFBO),(A(3801),IDTNR)   FATST013
     5,(A(4001),IFL),(A(4601),AN),(A(6601),IBON),(A(6801),BORC)          FATST014
     6,(A(7201),NCL),(A(7401),XIR),(A(7501),YIR),(A(7601),ZIR)           FATST015
     7,(A(7701),NX),(A(7751),NY),(A(7801),NZ)                            FATST016
      EQUIVALENCE (A(1),NE),(A(2),NVOL),(A(3),NSUR),(A(4),NLIN)          FATST017
     1,(A(5),LNG),(A(6),ISDE),(A(7),NC),(A(8),IO),(A(9),CF),(A(10),XMI)  FATST018
     2,(A(11),YMI),(A(12),ZMI),(A(13),XMX),(A(14),YMX),(A(15),ZMX)       FATST019
     3,(A(16),IBOT),(A(17),SCX),(A(18),SCY),(A(19),SCZ),(A(20),DER)      FATST020
     4,(A(21),ER),(A(22),TER),(A(23),NN),(A(24),XNN),(A(25),NNP)         FATST021
     5,(A(26),KR)                                                       FATST022
      DIMENSION XB(2000),YB(2000),ZB(2000),CC(17,17,6),EL(200,5)         FATST023
      EQUIVALENCE (A(7951),XB),(A(9951),YB),(A(11951),ZB),(A(13951),CC)  FATST024
     1,(A(15685),EL)                                                     FATST025
      EQUIVALENCE (A(30),IMAT),(A(31),ITEM),(A(32),IELT),(A(33),IPRS)    FATST026
     1,(A(34),ITIC),(A(35),ITGY),(A(36),MBON),(A(37),MCV),(A(38),MNR)    FATST027
     2,(A(39),ITGZ),(A(40),IARE),(A(41),IMMX),(A(42),IMMY),(A(43),IMMZ)  FATST028
     3,(A(44),IMFI),(A(45),JBON),(A(46),NDT),(A(47),INR),(A(48),NTOT)    FATST029
      DIMENSION IST(4),AD(200),DC(3,3),CO(3),CP(3),CMI(3),CMX(3),DUB(3)  FATST030
     1,DUA(3,3),DMB(3),DMA(3,3)                                          FATST031
      EQUIVALENCE (A(101),IS),(A(102),ISP),(A(103),IB),(A(104),IBB)      FATST032
     1,(A(105),IQ),(A(106),I),(A(107),IL),(A(108),IBC),(A(109),IC)       FATST033
     2,(A(110),JBC),(A(111),JC),(A(112),ISPD),(A(113),IK),(A(114),IKD)   FATST034
     3,(A(131),IST),(A(135),AD),(A(335),DC),(A(344),CO),(A(347),CP)      FATST035
     4,(A(350),CMI),(A(353),CMX),(A(356),DUB),(A(359),DUA),(A(368),DMB)  FATST036
     5,(A(371),DMA)                                                      FATST037
      I=I                                                                FATST038
      IB=IB                                                              FATST039
      IBP1=IB+1                                                          FATST040
      IBC=IBC                                                            FATST041
      JBC=JBC                                                            FATST042
      IBB=IB+1                                                           FATST043
      IQ=1                                                               FATST044
      NG=1                                                               FATST045
  110 IF (ABSF(CC(IBC,JBC,1)-XB(IBB))-DER) 120,120,140                   FATST046
  120 IF (ABSF(CC(IBC,JBC,2)-YB(IBB))-DER) 130,130,140                   FATST047
  130 IF (ABSF(CC(IBC,JBC,3)-ZB(IBB))-DER) 200,200,140                   FATST048
  140 GO TO (150,9000),NG                                                FATST049
  150 NG=2                                                               FATST050
      IBB=IB+NNP                                                         FATST051
      IQ=-1                                                              FATST052
      GO TO 110                                                          FATST053
  200 GO TO (210,220),NG                                                 FATST054
  210 IBB=IBB-1                                                          FATST055
      GO TO 250                                                          FATST056
  220 IBB=IBB+1                                                          FATST057
  250 RETURN                                                             FATST058
```

```
 9000 WRITE OUTPUT TAPE 6,1,IST(I),IST(I-1),XB(IBP1),YB(IBP1),ZB(IBP1)  FATST059
     1,XB(IBB),YB(IBB),ZB(IBB),(CC(IBC,JBC,J),J=1,3)                   FATST060
    1 FORMAT (18HOEND POINTS OF THE,I6,52H TH LINE DO NOT MATCH END POINFATST061
     1T OF THE PREVIOUS LINE,I6,2X,18HCOORDINATES FOLLOW/(3(3X,3E12.4)))FATST062
      GO TO 250                                                        FATST063
      END                                                              FATST064
*      FAP                                                             FATCK000
       COUNT   25                                                      FATCK001
       LBL     TICK                                                    FATCK002
       ENTRY   TICK                                                    FATCK003
TICK   NZT     ONCE                                                    FATCK004
       TRA     FIRST                                                   FATCK005
       CAL     5                                                       FATCK006
       SUB     INITL                                                   FATCK007
       ALS     18                                                      FATCK008
       SLW*    1,4                                                     FATCK009
       TRA     2,4                                                     FATCK010
FIRST  STL     ONCE                                                    FATCK011
       CAL     5                                                       FATCK012
       SLW     INITL                                                   FATCK013
       STZ*    1,4                                                     FATCK014
       TRA     2,4                                                     FATCK015
ONCE   PZE                                                             FATCK016
INITL  PZE                                                             FATCK017
       END                                                             FATCK018
```

IV. Listing of the Programs in Link 2

This section contains a list of programs, their functions, and their decimal word length (Table 4), a flow chart (Fig. 2), and a complete listing of the FORTRAN and FAP programs of link 2.

Table 4. Programs in link 2 of FEDGE

Program name	Length in 36-bit words	Label	Function
MAIN	790	FAMN2	Governs loops on subdomains, generates the natural coordinate system in three-dimensional subdomains, and prints the time message
COIN	533	FACIN	Computes final-mesh coordinates by transformation from the natural coordinate system
COJI	152	FACJI	Computes constants related to the *J* direction for transformation of coordinates
COKI	172	FACKI	Computes constants related to the *K* direction for transformation of coordinates
CRBU	988	FACBU	Governs loops for generation of final mesh, transforms the coordinates from overall to natural coordinate systems, and determines constants for generation of final-mesh coordinates
DIBO	276	FADBO	Checks to determine whether the point is on boundary or is a special point
DICO	503	FADCO	Determines special point location and checks adjacent subdomains for determination of the number of divisions in the adjacent domains
DISO	67	FADSO	Computes number of divisions in the adjacent domain
DSPL	574	FADPL	Checks to determine whether the point in question will be labelled
ENFI	85	FAEFI	Finds true label of the line
PUNC	112	FAPNC	Prints and punches computed coordinates of the final mesh
ROTA	356	FARTA	Computes rotation matrix for coordinate transformation
TICK[a]	15	FATCK	Measures time
TTRA	246	FATRA	Computes tensor transformation matrix

[a] In FAP language.

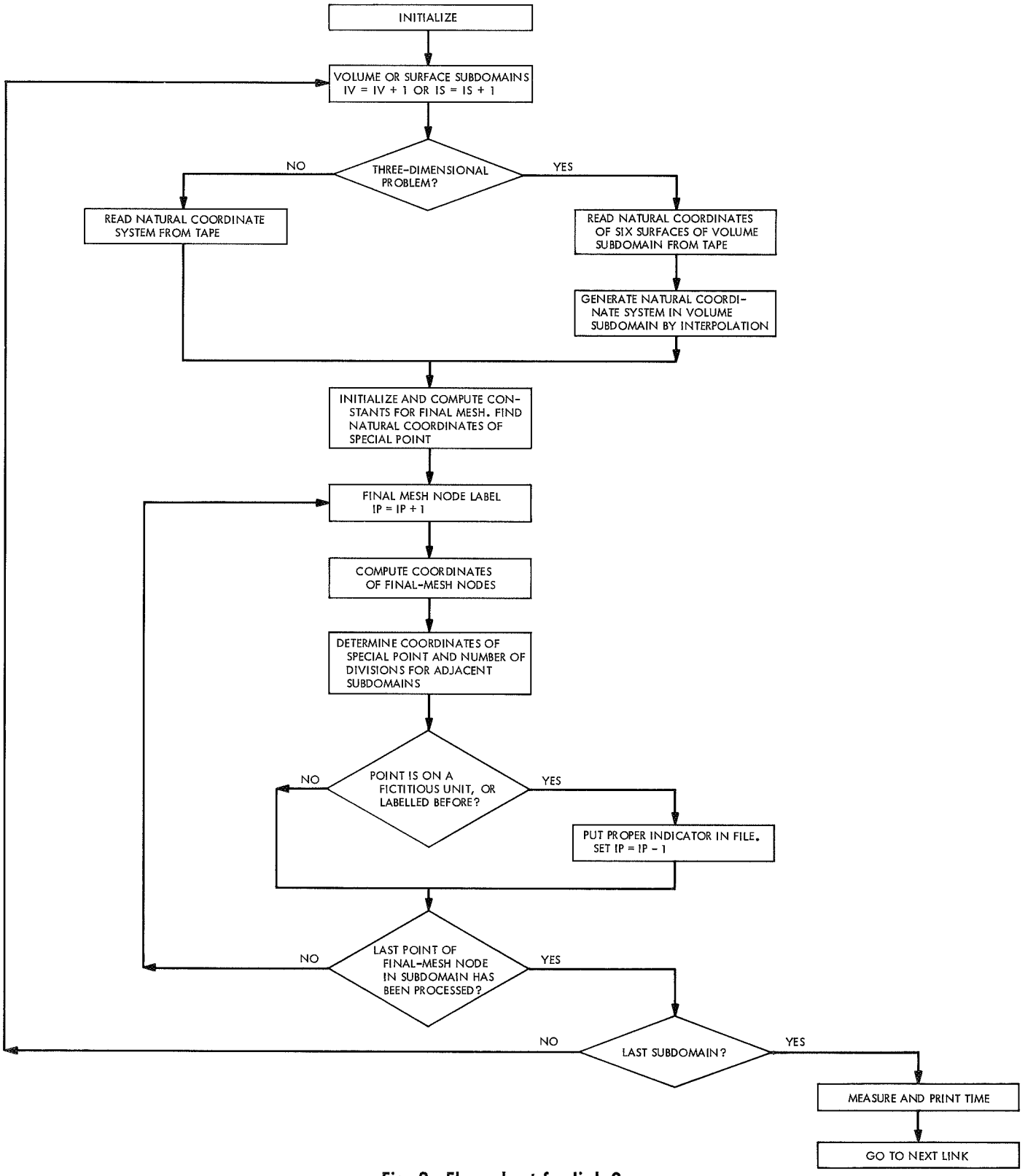

Fig. 2. Flow chart for link 2

FORTRAN and FAP Programs—Link 2

```
CFAMN2                                                                  FAMN2000
      DIMENSION A(22140),IA(22140),XO(50),YO(50),ZO(50),NMATE(50)       FAMN2001
     1,NFL(50,6),MDM(100),MELMA(100),MPRTI(100),MTETG(100),MBOVR(100)   FAMN2002
     2,ML(100,4),IDM(200),IELMA(200),IPRTE(200),IGYGZ(200),IARMX(200)   FAMN2003
     3,IMYMZ(200),IMFBO(200),IDTNR(200),IFL(200,3),AN(2000),IBON(50,4)  FAMN2004
     4,BORC(50,8),NCL(200)                                              FAMN2005
      COMMON A                                                          FAMN2006
      EQUIVALENCE (A,IA),(A(1001),XO),(A(1051),YO),(A(1101),ZO)         FAMN2007
     1,(A(1151),NMATE),(A(1201),NFL),(A(1501),MDM),(A(1601),MELMA)      FAMN2008
     2,(A(1701),MPRTI),(A(1801),MTETG),(A(1901),MBOVR),(A(2001),ML)     FAMN2009
     3,(A(2401),IDM),(A(2601),IELMA),(A(2801),IPRTE),(A(3001),IGYGZ)    FAMN2010
     4,(A(3201),IARMX),(A(3401),IMYMZ),(A(3601),IMFBO),(A(3801),IDTNR)  FAMN2011
     5,(A(4001),IFL),(A(4601),AN),(A(6601),IBON),(A(6801),BORC)         FAMN2012
     6,(A(7201),NCL)                                                    FAMN2013
      EQUIVALENCE (A(1),NE),(A(2),NVOL),(A(3),NSUR),(A(4),NLIN)         FAMN2014
     1,(A(5),LNG),(A(6),ISDE),(A(7),NC),(A(8),IO),(A(9),CF),(A(10),XMI) FAMN2015
     2,(A(11),YMI),(A(12),ZMI),(A(13),XMX),(A(14),YMX),(A(15),ZMX)      FAMN2016
     3,(A(16),IBOT),(A(17),SCX),(A(18),SCY),(A(19),SCZ),(A(20),DER)     FAMN2017
     4,(A(21),ER),(A(22),TER),(A(23),NN),(A(24),XNN),(A(25),NNP)        FAMN2018
     5,(A(26),KR)                                                       FAMN2019
      DIMENSION XX(17,17,17),YY(17,17,17),ZZ(17,17,17),DC(3,3),R(3,3)   FAMN2020
     1,CO(3),SQ(3),CT(3)                                                FAMN2021
      EQUIVALENCE (A(7401),XX),(A(12314),YY),(A(17227),ZZ)              FAMN2022
      EQUIVALENCE (A(31),DC),(A(40),R),(A(49),CO),(A(52),SQ)            FAMN2023
     1,(A(58),IP),(A(59),IB),(A(60),IV,IS),(A(61),I),(A(62),J),(A(63),K)FAMN2024
     2,(A(64),IM),(A(65),JM),(A(66),KM),(A(67),IIM),(A(68),JJM)         FAMN2025
     3,(A(69),KKM),(A(70),AX),(A(71),AY),(A(72),AZ),(A(73),BX)          FAMN2026
     4,(A(74),BY),(A(75),BZ),(A(76),CT,CX),(A(77),CY),(A(78),CZ)        FAMN2027
     5,(A(79),ACI),(A(80),ACJ),(A(81),ACK),(A(82),C2),(A(83),DIS)       FAMN2028
     6,(A(84),CFL),(A(85),I1),(A(86),J1),(A(87),K1),(A(88),IC)          FAMN2029
     7,(A(89),JC),(A(90),KC),(A(91),II),(A(92),JJ),(A(93),KK)           FAMN2030
     8,(A(94),XCOA),(A(95),XCOB),(A(96),YCOA),(A(97),YCOB),(A(98),ZCOA) FAMN2031
     9,(A(99),ZCOB),(A(100),CI),(A(101),CJ),(A(102),CK)                 FAMN2032
      DIMENSION XN(500),YN(500),ZN(500),NCN(500),NX(50),NY(50),NZ(50)   FAMN2033
      EQUIVALENCE (AN(1),XN),(AN(501),YN),(AN(1001),ZN),(AN(1501),NCN)  FAMN2034
     1,(A(112),IJK),(A(118),Q),(A(190),QQ),(A(226),NXP),(A(227),NYP)    FAMN2035
     2,(A(228),NZP),(A(301),NX),(A(351),NY),(A(401),NZ)                 FAMN2036
      CALL TICK (ITM)                                                   FAMN2037
      REWIND 10                                                         FAMN2038
      REWIND 4                                                          FAMN2039
      ISDE=0                                                            FAMN2040
      NC=0                                                              FAMN2041
      IP=0                                                              FAMN2042
      DO 100 I=1,50                                                     FAMN2043
      NCN(I)=0                                                          FAMN2044
      NCL(I)=0                                                          FAMN2045
      NX(I)=0                                                           FAMN2046
      NY(I)=0                                                           FAMN2047
      NZ(I)=0                                                           FAMN2048
  100 CONTINUE                                                          FAMN2049
      IO=IO                                                             FAMN2050
      NX(IO)=IA(7701)                                                   FAMN2051
      NY(IO)=IA(7751)                                                   FAMN2052
      NZ(IO)=IA(7801)                                                   FAMN2053
      IF (NVOL) 490,490,110                                             FAMN2054
  110 DO 450 IV=1,NVOL                                                  FAMN2055
      DO 300 I=1,3                                                      FAMN2056
      GO TO (220,240,260),I                                             FAMN2057
  220 NV=1                                                              FAMN2058
      MV=1                                                              FAMN2059
  225 NS=NFL(IV,MV)                                                     FAMN2060
      DO 230 J=1,NS                                                     FAMN2061
      READ TAPE10,((XX(NV,K,L),YY(NV,K,L),ZZ(NV,K,L),K=1,NNP),L=1,NNP)  FAMN2062
  230 CONTINUE                                                          FAMN2063
      REWIND 10                                                         FAMN2064
      IF (NV-1) 235,235,300                                             FAMN2065
  235 MV=MV+1                                                           FAMN2066
      NV=NNP                                                            FAMN2067
      GO TO 225                                                         FAMN2068
  240 NV=1                                                              FAMN2069
      MV=3                                                              FAMN2070
  245 NS=NFL(IV,MV)                                                     FAMN2071
      DO 250 J=1,NS                                                     FAMN2072
      READ TAPE10,((XX(K,NV,L),YY(K,NV,L),ZZ(K,NV,L),L=1,NNP),K=1,NNP)  FAMN2073
  250 CONTINUE                                                          FAMN2074
      REWIND 10                                                         FAMN2075
      IF (NV-1) 255,255,300                                             FAMN2076
  255 MV=MV+1                                                           FAMN2077
      NV=NNP                                                            FAMN2078
      GO TO 245                                                         FAMN2079
  260 NV=1                                                              FAMN2080
      MV=5                                                              FAMN2081
  265 NS=NFL(IV,MV)                                                     FAMN2082
      DO 270 J=1,NS                                                     FAMN2083
      READ TAPE10,((XX(K,L,NV),YY(K,L,NV),ZZ(K,L,NV),K=1,NNP),L=1,NNP)  FAMN2084
```

```
  270 CONTINUE                                                          FAMN2085
      REWIND 10                                                         FAMN2086
      IF (NV-1) 275,275,300                                             FAMN2087
  275 MV=MV+1                                                           FAMN2088
      NV=NNP                                                            FAMN2089
      GO TO 265                                                         FAMN2090
  300 CONTINUE                                                          FAMN2091
      XNNT=3*NN                                                         FAMN2092
      CI3=1./3.                                                         FAMN2093
      DO 402 I=2,NN                                                     FAMN2094
      CI=I-1                                                            FAMN2095
      CI=CI/XNNT                                                        FAMN2096
      DO 401 J=2,NN                                                     FAMN2097
      CJ=J-1                                                            FAMN2098
      CJ=CJ/XNNT                                                        FAMN2099
      DO 400 K=2,NN                                                     FAMN2100
      CK=K-1                                                            FAMN2101
      CK=CK/XNNT                                                        FAMN2102
      XX(I,J,K)=CI3*(XX(I,J,1)+XX(I,1,K)+XX(1,J,K))+CI*(XX(NNP,J,K)-XX(1FAMN2103
     1,J,K))+CJ*(XX(I,NNP,K)-XX(I,1,K))+CK*(XX(I,J,NNP)-XX(I,J,1))      FAMN2104
      YY(I,J,K)=CI3*(YY(I,J,1)+YY(I,1,K)+YY(1,J,K))+CI*(YY(NNP,J,K)-YY(1FAMN2105
     1,J,K))+CJ*(YY(I,NNP,K)-YY(I,1,K))+CK*(YY(I,J,NNP)-YY(I,J,1))      FAMN2106
      ZZ(I,J,K)=CI3*(ZZ(I,J,1)+ZZ(I,1,K)+ZZ(1,J,K))+CI*(ZZ(NNP,J,K)-ZZ(1FAMN2107
     1,J,K))+CJ*(ZZ(I,NNP,K)-ZZ(I,1,K))+CK*(ZZ(I,J,NNP)-ZZ(I,J,1))      FAMN2108
  400 CONTINUE                                                          FAMN2109
  401 CONTINUE                                                          FAMN2110
  402 CONTINUE                                                          FAMN2111
      CALL CRBU                                                         FAMN2112
      NCL(IV)=1                                                         FAMN2113
  450 CONTINUE                                                          FAMN2114
      GO TO 510                                                         FAMN2115
  490 DO 500 IS=1,NSUR                                                  FAMN2116
      IV=IS                                                             FAMN2117
      READ TAPE10,((XX(K,L,1),YY(K,L,1),ZZ(K,L,1),K=1,NNP),L=1,NNP)     FAMN2118
      CALL CRBU                                                         FAMN2119
      NCL(IS)=1                                                         FAMN2120
  500 CONTINUE                                                          FAMN2121
  510 CONTINUE                                                          FAMN2122
      IF (IP-500) 520,610,610                                           FAMN2123
  520 CALL PUNC                                                         FAMN2124
  610 CALL TICK (ITM)                                                   FAMN2125
      XTM=ITM                                                           FAMN2126
      XTM=XTM/60.                                                       FAMN2127
      WRITE OUTPUT TAPE 6,5,XTM                                         FAMN2128
    5 FORMAT (42HOGENERATION OF FINAL MESH COORDINATES TOOK,F8.2,9H SECOFAMN2129
     1NDS.)                                                             FAMN2130
      CALL CHAIN (3,2)                                                  FAMN2131
      END                                                               FAMN2132
CFACIN                                                                  FACIN000
      SUBROUTINE COIN                                                   FACIN001
      DIMENSION A(22140),IA(22140),XO(50),YO(50),ZO(50),NMATE(50)       FACIN002
     1,NFL(50,6),MDM(100),MELMA(100),MPRTI(100),MTETG(100),MBOVR(100)   FACIN003
     2,ML(100,4),IDM(200),IELMA(200),IPRTE(200),IGYGZ(200),IARMX(200)   FACIN004
     3,IMYMZ(200),IMFBO(200),IDTNR(200),IFL(200,3),AN(2000),IBON(50,4)  FACIN005
     4,BORC(50,8),NCL(200)                                              FACIN006
      COMMON A                                                          FACIN007
      EQUIVALENCE (A,IA),(A(1001),XO),(A(1051),YO),(A(1101),ZO)         FACIN008
     1,(A(1151),NMATE),(A(1201),NFL),(A(1501),MDM),(A(1601),MELMA)      FACIN009
     2,(A(1701),MPRTI),(A(1801),MTETG),(A(1901),MBOVR),(A(2001),ML)     FACIN010
     3,(A(2401),IDM),(A(2601),IELMA),(A(2801),IPRTE),(A(3001),IGYGZ)    FACIN011
     4,(A(3201),IARMX),(A(3401),IMYMZ),(A(3601),IMFBO),(A(3801),IDTNR)  FACIN012
     5,(A(4001),IFL),(A(4601),AN),(A(6601),IBON),(A(6801),BORC)         FACIN013
     6,(A(7201),NCL)                                                    FACIN014
      EQUIVALENCE (A(1),NE),(A(2),NVOL),(A(3),NSUR),(A(4),NLIN)         FACIN015
     1,(A(5),LNG),(A(6),ISDE),(A(7),NC),(A(8),IO),(A(9),CF),(A(10),XMI) FACIN016
     2,(A(11),YMI),(A(12),ZMI),(A(13),XMX),(A(14),YMX),(A(15),ZMX)      FACIN017
     3,(A(16),IBOT),(A(17),SCX),(A(18),SCY),(A(19),SCZ),(A(20),DER)     FACIN018
     4,(A(21),ER),(A(22),TER),(A(23),NN),(A(24),XNN),(A(25),NNP)        FACIN019
     5,(A(26),KR)                                                      FACIN020
      DIMENSION XX(17,17,17),YY(17,17,17),ZZ(17,17,17),DC(3,3),R(3,3)   FACIN021
     1,CO(3),SQ(3),CT(3),CB(3,3),IJK(6),Q(24,3),QQ(3,4,3)               FACIN022
      EQUIVALENCE (A(7401),XX),(A(12314),YY),(A(17227),ZZ)              FACIN023
      EQUIVALENCE (A(31),DC),(A(40),R),(A(49),CO),(A(52),SQ)            FACIN024
     1,(A(58),IP),(A(59),IB),(A(60),IV,IS),(A(61),I),(A(62),J),(A(63),K)FACIN025
     2,(A(64),IM),(A(65),JM),(A(66),KM),(A(67),IIM),(A(68),JJM)         FACIN026
     3,(A(69),KKM),(A(70),AX),(A(71),AY),(A(72),AZ),(A(73),BX)          FACIN027
     4,(A(74),BY),(A(75),BZ),(A(76),CT,CX),(A(77),CY),(A(78),CZ)        FACIN028
     5,(A(79),ACI),(A(80),ACJ),(A(81),ACK),(A(82),C2),(A(83),DIS)       FACIN029
     6,(A(84),CFL),(A(85),I1),(A(86),J1),(A(87),K1),(A(88),IC)          FACIN030
     7,(A(89),JC),(A(90),KC),(A(91),II),(A(92),JJ),(A(93),KK)           FACIN031
     8,(A(94),XCOA),(A(95),XCOB),(A(96),YCOA),(A(97),YCOB),(A(98),ZCOA) FACIN032
     9,(A(99),ZCOB),(A(100),CI),(A(101),CJ),(A(102),CK),(A(103),CB)     FACIN033
      DIMENSION XN(500),YN(500),ZN(500),NCN(500),NX(50),NY(50),NZ(50)   FACIN034
      EQUIVALENCE (AN(1),XN),(AN(501),YN),(AN(1001),ZN),(AN(1501),NCN)  FACIN035
     1,(A(112),IJK),(A(118),Q),(A(190),QQ),(A(226),NXP),(A(227),NYP)    FACIN036
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     2,(A(228),NZP),(A(301),NX),(A(351),NY),(A(401),NZ)                 FACIN037
      IV=IV                                                             FACIN038
      IS=IS                                                             FACIN039
      IB=1                                                              FACIN040
      IP=IP+1                                                           FACIN041
      ISDE=ISDE+1                                                       FACIN042
      NCN(ISDE)=IP+NC                                                   FACIN043
      I2=I1-1                                                           FACIN044
      J2=J1-1                                                           FACIN045
      K2=K1-1                                                           FACIN046
      L=0                                                               FACIN047
      DO 200 IJKD=1,3                                                   FACIN048
      DO 150 ID=1,2                                                     FACIN049
      DO 150 JD=1,2                                                     FACIN050
      DO 150 KD=1,2                                                     FACIN051
      GO TO (110,120,130),IJKD                                          FACIN052
  110 IU=I2+KD                                                          FACIN053
      JU=J2+ID                                                          FACIN054
      KU=K2+JD                                                          FACIN055
      GO TO 140                                                         FACIN056
  120 IU=I2+JD                                                          FACIN057
      JU=J2+KD                                                          FACIN058
      KU=K2+ID                                                          FACIN059
      GO TO 140                                                         FACIN060
  130 IU=I2+ID                                                          FACIN061
      JU=J2+JD                                                          FACIN062
      KU=K2+KD                                                          FACIN063
  140 L=L+1                                                             FACIN064
      Q(L,1)=XX(IU,JU,KU)                                               FACIN065
      Q(L,2)=YY(IU,JU,KU)                                               FACIN066
      Q(L,3)=ZZ(IU,JU,KU)                                               FACIN067
  150 CONTINUE                                                          FACIN068
  200 CONTINUE                                                          FACIN069
      L=0                                                               FACIN070
      DO 300 IJKD=1,3                                                   FACIN071
      DO 300 M=1,4                                                      FACIN072
      L=L+1                                                             FACIN073
      LC=2*L                                                            FACIN074
      LT=LC-1                                                           FACIN075
      DO 250 N=1,3                                                      FACIN076
      QQ(IJKD,M,N)=Q(LT,N)+CT(IJKD)*(Q(LC,N)-Q(LT,N))                   FACIN077
  250 CONTINUE                                                          FACIN078
  300 CONTINUE                                                          FACIN079
      DO 500 IJKD=1,3                                                   FACIN080
      LC=2*IJKD                                                         FACIN081
      LT=LC-1                                                           FACIN082
      LU=IJKD+1                                                         FACIN083
      LV=IJKD+2                                                         FACIN084
      IF (LU-3) 320,320,310                                             FACIN085
  310 LU=LU-3                                                           FACIN086
  320 IF (LV-3) 340,340,330                                             FACIN087
  330 LV=LV-3                                                           FACIN088
  340 DO 400 M=1,3                                                      FACIN089
      Q(LT,M)=.5*(QQ(LV,1,M)+CT(LU)*(QQ(LV,2,M)-QQ(LV,1,M))+QQ(LU,1,M)+C FACIN090
     1T(LV)*(QQ(LU,3,M)-QQ(LU,1,M)))                                    FACIN091
      Q(LC,M)=.5*(QQ(LV,3,M)+CT(LU)*(QQ(LV,4,M)-QQ(LV,3,M))+QQ(LU,2,M)+C FACIN092
     1T(LV)*(QQ(LU,4,M)-QQ(LU,2,M)))                                    FACIN093
  400 CONTINUE                                                          FACIN094
      SQ(IJKD)=0.                                                       FACIN095
  500 CONTINUE                                                          FACIN096
      DO 600 M=1,3                                                      FACIN097
      LC=2*M                                                            FACIN098
      LT=LC-1                                                           FACIN099
      DO 550 N=1,3                                                      FACIN100
      SQ(N)=SQ(N)+Q(LT,N)+CT(M)*(Q(LC,N)-Q(LT,N))                       FACIN101
  550 CONTINUE                                                          FACIN102
  600 CONTINUE                                                          FACIN103
      XN(IP)=SQ(1)/3.                                                   FACIN104
      YN(IP)=SQ(2)/3.                                                   FACIN105
      ZN(IP)=SQ(3)/3.                                                   FACIN106
      IF (NVOL) 610,610,620                                             FACIN107
  610 LNG=MELMA(IS)                                                     FACIN108
      GO TO 625                                                         FACIN109
  620 LNG=NMATE(IV)                                                     FACIN110
  625 IF ((II-1)*(II-NXP)) 630,650,660                                  FACIN111
  630 IF ((JJ-1)*(JJ-NYP)) 640,650,660                                  FACIN112
  640 IF (NVOL) 660,660,645                                             FACIN113
  645 IF ((KK-1)*(KK-NZP)) 660,650,660                                  FACIN114
  650 CALL DIBO                                                         FACIN115
  660 IF (IB*LNG) 670,670,680                                           FACIN116
  670 IP=IP-1                                                           FACIN117
      NCN(ISDE)=0                                                       FACIN118
  680 IF (IP-500) 700,690,690                                           FACIN119
  690 CALL PUNC                                                         FACIN120
      IP=0                                                              FACIN121
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      NC=NC+500                                                          FACIN122
  700 CONTINUE                                                           FACIN123
      RETURN                                                             FACIN124
      END                                                                FACIN125
CFACJI                                                                   FACJI000
      SUBROUTINE COJI                                                    FACJI001
      DIMENSION A(22140),IA(22140),XO(50),YO(50),ZO(50),NMATE(50)        FACJI002
     1,NFL(50,6),MDM(100),MELMA(100),MPRTI(100),MTETG(100),MBOVR(100)    FACJI003
     2,ML(100,4),IDM(200),IELMA(200),IPRTE(200),IGYGZ(200),IARMX(200)    FACJI004
     3,IMYMZ(200),IMFBO(200),IDTNR(200),IFL(200,3),AN(2000),IBON(50,4)   FACJI005
     4,BORC(50,8),NCL(200)                                               FACJI006
      COMMON A                                                           FACJI007
      EQUIVALENCE (A,IA),(A(1001),XO),(A(1051),YO),(A(1101),ZO)          FACJI008
     1,(A(1151),NMATE),(A(1201),NFL),(A(1501),MDM),(A(1601),MELMA)       FACJI009
     2,(A(1701),MPRTI),(A(1801),MTETG),(A(1901),MBOVR),(A(2001),ML)      FACJI010
     3,(A(2401),IDM),(A(2601),IELMA),(A(2801),IPRTE),(A(3001),IGYGZ)     FACJI011
     4,(A(3201),IARMX),(A(3401),IMYMZ),(A(3601),IMFBO),(A(3801),IDTNR)   FACJI012
     5,(A(4001),IFL),(A(4601),AN),(A(6601),IBON),(A(6801),BORC)          FACJI013
     6,(A(7201),NCL)                                                     FACJI014
      EQUIVALENCE (A(1),NE),(A(2),NVOL),(A(3),NSUR),(A(4),NLIN)          FACJI015
     1,(A(5),LNG),(A(6),ISDE),(A(7),NC),(A(8),IO),(A(9),CF),(A(10),XMI)  FACJI016
     2,(A(11),YMI),(A(12),ZMI),(A(13),XMX),(A(14),YMX),(A(15),ZMX)       FACJI017
     3,(A(16),IBOT),(A(17),SCX),(A(18),SCY),(A(19),SCZ),(A(20),DER)      FACJI018
     4,(A(21),ER),(A(22),TER),(A(23),NN),(A(24),XNN),(A(25),NNP)         FACJI019
     5,(A(26),KR)                                                       FACJI020
      DIMENSION XX(17,17,17),YY(17,17,17),ZZ(17,17,17),DC(3,3),R(3,3)    FACJI021
     1,CO(3),SQ(3),CT(3)                                                 FACJI022
      EQUIVALENCE (A(7401),XX),(A(12314),YY),(A(17227),ZZ)               FACJI023
      EQUIVALENCE (A(31),DC),(A(40),R),(A(49),CO),(A(52),SQ)             FACJI024
     1,(A(58),IP),(A(59),IB),(A(60),IV,IS),(A(61),I),(A(62),J),(A(63),K) FACJI025
     2,(A(64),IM),(A(65),JM),(A(66),KM),(A(67),IIM),(A(68),JJM)          FACJI026
     3,(A(69),KKM),(A(70),AX),(A(71),AY),(A(72),AZ),(A(73),BX)           FACJI027
     4,(A(74),BY),(A(75),BZ),(A(76),CT,CX),(A(77),CY),(A(78),CZ)         FACJI028
     5,(A(79),ACI),(A(80),ACJ),(A(81),ACK),(A(82),C2),(A(83),DIS)        FACJI029
     6,(A(84),CFL),(A(85),II),(A(86),J1),(A(87),K1),(A(88),IC)           FACJI030
     7,(A(89),JC),(A(90),KC),(A(91),II),(A(92),JJ),(A(93),KK)            FACJI031
     8,(A(94),XCOA),(A(95),XCOB),(A(96),YCOA),(A(97),YCOB),(A(98),ZCOA)  FACJI032
     9,(A(99),ZCOB),(A(100),CI),(A(101),CJ),(A(102),CK)                  FACJI033
      DIMENSION XN(500),YN(500),ZN(500),NCN(500),NX(50),NY(50),NZ(50)    FACJI034
      EQUIVALENCE (AN(1),XN),(AN(501),YN),(AN(1001),ZN),(AN(1501),NCN)   FACJI035
     1,(A(112),IJK),(A(118),Q),(A(190),QQ),(A(226),NXP),(A(227),NYP)     FACJI036
     2,(A(228),NZP),(A(301),NX),(A(351),NY),(A(401),NZ)                  FACJI037
      YCO=0.                                                             FACJI038
      JJ=0                                                               FACJI039
      DO 200 J=1,JM                                                      FACJI040
      JJ=JJ+1                                                            FACJI041
      JCO=JM-J                                                           FACJI042
      IF (JCO) 110,110,120                                               FACJI043
  110 CY=CJ                                                              FACJI044
      YCO=ACJ                                                            FACJI045
      J1=JC                                                              FACJI046
      GO TO 150                                                          FACJI047
  120 IF (J-1) 130,130,140                                               FACJI048
  130 CY=0.                                                              FACJI049
      J1=1                                                               FACJI050
      GO TO 150                                                          FACJI051
  140 YCO=YCO+AY*CF**JCO                                                 FACJI052
      J1=YCO                                                             FACJI053
      YJJ=J1                                                             FACJI054
      J1=J1+1                                                            FACJI055
      CY=YCO-YJJ                                                         FACJI056
  150 CALL COKI                                                          FACJI057
  200 CONTINUE                                                           FACJI058
      IF (JJM-1) 400,205,205                                             FACJI059
  205 DO 300 J=1,JJM                                                     FACJI060
      JJ=JJ+1                                                            FACJI061
      IF (J-JJM) 220,210,210                                             FACJI062
  210 CY=0.                                                              FACJI063
      J1=NNP                                                             FACJI064
      GO TO 250                                                          FACJI065
  220 YCO=YCO+BY*CF**(J-1.                                               FACJI066
      J1=YCO                                                             FACJI067
      YJJ=J1                                                             FACJI068
      J1=J1+1                                                            FACJI069
      CY=YCO-YJJ                                                         FACJI070
  250 CALL COKI                                                          FACJI071
  300 CONTINUE                                                           FACJI072
  400 RETURN                                                             FACJI073
      END                                                                FACJI074
CFACKI                                                                   FACKI000
      SUBROUTINE COKI                                                    FACKI001
      DIMENSION A(22140),IA(22140),XO(50),YO(50),ZO(50),NMATE(50)        FACKI002
     1,NFL(50,6),MDM(100),MELMA(100),MPRTI(100),MTETG(100),MBOVR(100)    FACKI003
     2,ML(100,4),IDM(200),IELMA(200),IPRTE(200),IGYGZ(200),IARMX(200)    FACKI004
     3,IMYMZ(200),IMFBO(200),IDTNR(200),IFL(200,3),AN(2000),IBON(50,4)   FACKI005
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     4,BORC(50,8),NCL(200)                                                  FACKI006
      COMMON A                                                              FACKI007
      EQUIVALENCE (A,IA),(A(1001),XO),(A(1051),YO),(A(1101),ZO)             FACKI008
     1,(A(1151),NMATE),(A(1201),NFL),(A(1501),MDM),(A(1601),MELMA)          FACKI009
     2,(A(1701),MPRTI),(A(1801),MTETG),(A(1901),MBOVR),(A(2001),ML)         FACKI010
     3,(A(2401),IDM),(A(2601),IELMA),(A(2801),IPRTE),(A(3001),IGYGZ)        FACKI011
     4,(A(3201),IARMX),(A(3401),IMYMZ),(A(3601),IMFBO),(A(3801),IDTNR)      FACKI012
     5,(A(4001),IFL),(A(4601),AN),(A(6601),IBON),(A(6801),BORC)             FACKI013
     6,(A(7201),NCL)                                                        FACKI014
      EQUIVALENCE (A(1),NE),(A(2),NVOL),(A(3),NSUR),(A(4),NLIN)             FACKI015
     1,(A(5),LNG),(A(6),ISDE),(A(7),NC),(A(8),IO),(A(9),CF),(A(10),XMI)     FACKI016
     2,(A(11),YMI),(A(12),ZMI),(A(13),XMX),(A(14),YMX),(A(15),ZMX)          FACKI017
     3,(A(16),IBOT),(A(17),SCX),(A(18),SCY),(A(19),SCZ),(A(20),DER)         FACKI018
     4,(A(21),ER),(A(22),TER),(A(23),NN),(A(24),XNN),(A(25),NNP)            FACKI019
     5,(A(26),KR)                                                          FACKI020
      DIMENSION XX(17,17,17),YY(17,17,17),ZZ(17,17,17),DC(3,3),R(3,3)       FACKI021
     1,CO(3),SQ(3),CT(3)                                                    FACKI022
      EQUIVALENCE (A(7401),XX),(A(12314),YY),(A(17227),ZZ)                  FACKI023
      EQUIVALENCE (A(31),DC),(A(40),R),(A(49),CO),(A(52),SQ)                FACKI024
     1,(A(58),IP),(A(59),IB),(A(60),IV,IS),(A(61),I),(A(62),J),(A(63),K)    FACKI025
     2,(A(64),IM),(A(65),JM),(A(66),KM),(A(67),IIM),(A(68),JJM)             FACKI026
     3,(A(69),KKM),(A(70),AX),(A(71),AY),(A(72),AZ),(A(73),BX)              FACKI027
     4,(A(74),BY),(A(75),BZ),(A(76),CT,CX),(A(77),CY),(A(78),CZ)            FACKI028
     5,(A(79),ACI),(A(80),ACJ),(A(81),ACK),(A(82),C2),(A(83),DIS)           FACKI029
     6,(A(84),CFL),(A(85),I1),(A(86),J1),(A(87),K1),(A(88),IC)              FACKI030
     7,(A(89),JC),(A(90),KC),(A(91),II),(A(92),JJ),(A(93),KK)               FACKI031
     8,(A(94),XCOA),(A(95),XCOB),(A(96),YCOA),(A(97),YCOB),(A(98),ZCOA)     FACKI032
     9,(A(99),ZCOB),(A(100),CI),(A(101),CJ),(A(102),CK)                     FACKI033
      DIMENSION XN(500),YN(500),ZN(500),NCN(500),NX(50),NY(50),NZ(50)       FACKI034
      EQUIVALENCE (AN(1),XN),(AN(501),YN),(AN(1001),ZN),(AN(1501),NCN)      FACKI035
     1,(A(112),IJK),(A(118),Q),(A(190),QQ),(A(226),NXP),(A(227),NYP)        FACKI036
     2,(A(228),NZP),(A(301),NX),(A(351),NY),(A(401),NZ)                     FACKI037
      ZCO=0.                                                                FACKI038
      KK=0                                                                  FACKI039
      DO 200 K=1,KM                                                         FACKI040
      KK=KK+1                                                               FACKI041
      KCO=KM-K                                                              FACKI042
      IF (KCO) 110,110,120                                                  FACKI043
  110 CZ=CK                                                                 FACKI044
      ZCO=ACK                                                               FACKI045
      K1=KC                                                                 FACKI046
      GO TO 150                                                             FACKI047
  120 IF (K-1) 130,130,140                                                  FACKI048
  130 CZ=0.                                                                 FACKI049
      K1=1                                                                  FACKI050
      GO TO 150                                                             FACKI051
  140 ZCO=ZCO+AZ*CF**KCO                                                    FACKI052
      K1=ZCO                                                                FACKI053
      ZKK=K1                                                                FACKI054
      K1=K1+1                                                               FACKI055
      CZ=ZCO-ZKK                                                            FACKI056
  150 CONTINUE                                                              FACKI057
      CALL COIN                                                             FACKI058
  200 CONTINUE                                                              FACKI059
      IF (KKM-1) 400,205,205                                                FACKI060
  205 DO 300 K=1,KKM                                                        FACKI061
      KK=KK+1                                                               FACKI062
      IF (K-KKM) 220,210,210                                                FACKI063
  210 CZ=0.                                                                 FACKI064
      K1=NNP                                                                FACKI065
      GO TO 250                                                             FACKI066
  220 ZCO=ZCO+BZ*CF**(K-1)                                                  FACKI067
      K1=ZCO                                                                FACKI068
      ZKK=K1                                                                FACKI069
      K1=K1+1                                                               FACKI070
      CZ=ZCO-ZKK                                                            FACKI071
  250 CONTINUE                                                              FACKI072
      CALL COIN                                                             FACKI073
  300 CONTINUE                                                              FACKI074
  400 CONTINUE                                                              FACKI075
      WRITE TAPE 4,(NCN(L),L=1,NZP)                                         FACKI076
      DO 500 L=1,50                                                         FACKI077
  500 NCN(L)=0                                                              FACKI078
      ISDE=0                                                                FACKI079
      RETURN                                                                FACKI080
      END                                                                   FACKI081
CFACBU                                                                      FACBU000
      SUBROUTINE CRBU                                                       FACBU001
      DIMENSION A(22140),IA(22140),XO(50),YO(50),ZO(50),NMATE(50)           FACBU002
     1,NFL(50,6),MDM(100),MELMA(100),MPRTI(100),MTETG(100),MBOVR(100)       FACBU003
     2,ML(100,4),IDM(200),IELMA(200),IPRTE(200),IGYGZ(200),IARMX(200)       FACBU004
     3,IMYMZ(200),IMFBO(200),IDTNR(200),IFL(200,3),AN(2000),IBON(50,4)      FACBU005
     4,BORC(50,8),NCL(200)                                                  FACBU006
      COMMON A                                                              FACBU007
      EQUIVALENCE (A,IA),(A(1001),XO),(A(1051),YO),(A(1101),ZO)             FACBU008
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     1,(A(1151),NMATE),(A(1201),NFL),(A(1501),MDM),(A(1601),MELMA)        FACRU009
     2,(A(1701),MPRTI),(A(1801),MTETG),(A(1901),MBOVR),(A(2001),ML)       FACRU010
     3,(A(2401),IDM),(A(2601),IELMA),(A(2801),IPRTE),(A(3001),IGYGZ)      FACRU011
     4,(A(3201),IARMX),(A(3401),IMYMZ),(A(3601),IMFBO),(A(3801),IDTNR)    FACRU012
     5,(A(4001),IFL),(A(4601),AN),(A(6601),IBON),(A(6801),BORC)           FACRU013
     6,(A(7201),NCL)                                                      FACRU014
      EQUIVALENCE (A(1),NE),(A(2),NVOL),(A(3),NSUR),(A(4),NLIN)           FACRU015
     1,(A(5),LNG),(A(6),ISDE),(A(7),NC),(A(8),IO),(A(9),CF),(A(10),XMI)   FACRU016
     2,(A(11),YMI),(A(12),ZMI),(A(13),XMX),(A(14),YMX),(A(15),ZMX)        FACRU017
     3,(A(16),IBOT),(A(17),SCX),(A(18),SCY),(A(19),SCZ),(A(20),DER)       FACRU018
     4,(A(21),ER),(A(22),TER),(A(23),NN),(A(24),XNN),(A(25),NNP)          FACRU019
     5,(A(26),KR)                                                        FACRU020
      DIMENSION XX(17,17,17),YY(17,17,17),ZZ(17,17,17),DC(3,3),R(3,3)     FACRU021
     1,CO(3),SQ(3),CT(3),CB(3,3),IJK(6)                                   FACRU022
      EQUIVALENCE (A(7401),XX),(A(12314),YY),(A(17227),ZZ)                FACRU023
      EQUIVALENCE (A(31),DC),(A(40),R),(A(49),CO),(A(52),SQ)              FACRU024
     1,(A(58),IP),(A(59),IB),(A(60),IV,IS),(A(61),I),(A(62),J),(A(63),K)  FACRU025
     2,(A(64),IM),(A(65),JM),(A(66),KM),(A(67),IIM),(A(68),JJM)           FACRU026
     3,(A(69),KKM),(A(70),AX),(A(71),AY),(A(72),AZ),(A(73),BX)            FACRU027
     4,(A(74),BY),(A(75),BZ),(A(76),CT,CX),(A(77),CY),(A(78),CZ)          FACRU028
     5,(A(79),ACI),(A(80),ACJ),(A(81),ACK),(A(82),C2),(A(83),DIS)         FACRU029
     6,(A(84),CFL),(A(85),I1),(A(86),J1),(A(87),K1),(A(88),IC)            FACRU030
     7,(A(89),JC),(A(90),KC),(A(91),II),(A(92),JJ),(A(93),KK)             FACRU031
     8,(A(94),XCOA),(A(95),XCOB),(A(96),YCOA),(A(97),YCOB),(A(98),ZCOA)   FACRU032
     9,(A(99),ZCOB),(A(100),CI),(A(101),CJ),(A(102),CK),(A(103),CB)       FACRU033
      DIMENSION XN(500),YN(500),ZN(500),NCN(500),NX(50),NY(50),NZ(50)     FACRU034
      EQUIVALENCE (AN(1),XN),(AN(501),YN),(AN(1001),ZN),(AN(1501),NCN)    FACRU035
     1,(A(112),IJK),(A(118),Q),(A(190),QQ),(A(226),NXP),(A(227),NYP)      FACRU036
     2,(A(228),NZP),(A(301),NX),(A(351),NY),(A(401),NZ)                   FACRU037
      DIVF(DU,ID)=DU*(1.-CF)/(1.-CF**ID)                                  FACRU038
      IO=IV                                                               FACRU039
      NXP=NX(IO)+1                                                        FACRU040
      NYP=NY(IO)+1                                                        FACRU041
      NZP=NZ(IO)+1                                                        FACRU042
      TDIS=(XO(IO)-XX(1,1,1))**2+(YO(IO)-YY(1,1,1))**2+(ZO(IO)-ZZ(1,1,1)FACRU043
     1)**2                                                                FACRU044
      IC=1                                                                FACRU045
      JC=1                                                                FACRU046
      KC=I                                                                FACRU047
      NS=NNP                                                              FACRU048
      IF (NVOL) 100,100,110                                               FACRU049
  100 NS=1                                                                FACRU050
  110 CONTINUE                                                            FACRU051
      DO 400 I=1,NNP                                                      FACRU052
      DO 350 J=1,NNP                                                      FACRU053
      DO 300 K=1,NS                                                       FACRU054
      XDIS=(XO(IO)-XX(I,J,K))**2+(YO(IO)-YY(I,J,K))**2+(ZO(IO)-ZZ(I,J,K)FACRU055
     1)**2                                                                FACRU056
      IF (XDIS-TDIS) 260,260,300                                          FACRU057
  260 TDIS=XDIS                                                           FACRU058
      IC=I                                                                FACRU059
      JC=J                                                                FACRU060
      KC=K                                                                FACRU061
  300 CONTINUE                                                            FACRU062
  350 CONTINUE                                                            FACRU063
  400 CONTINUE                                                            FACRU064
      CO(1)=XO(IO)-XX(IC,JC,KC)                                           FACRU065
      CO(2)=YO(IO)-YY(IC,JC,KC)                                           FACRU066
      CO(3)=ZO(IO)-ZZ(IC,JC,KC)                                           FACRU067
      DO 410 I=1,6                                                        FACRU068
  410 IJK(I)=1                                                            FACRU069
      IF (IC-1) 412,411,412                                               FACRU070
  411 IJK(1)=0                                                            FACRU071
  412 IF (IC-NNP) 416,415,416                                             FACRU072
  415 IJK(2)=0                                                            FACRU073
  416 IF (JC-1) 420,419,420                                               FACRU074
  419 IJK(3)=0                                                            FACRU075
  420 IF (JC-NNP) 426,425,426                                             FACRU076
  425 IJK(4)=0                                                            FACRU077
  426 IF (KC-1) 430,429,430                                               FACRU078
  429 IJK(5)=0                                                            FACRU079
  430 IF (KC-NNP) 440,435,440                                             FACRU080
  435 IJK(6)=0                                                            FACRU081
  440 NK=1                                                                FACRU082
  450 CALL ROTA (IC,JC,KC)                                                FACRU083
      CALL TTRA                                                           FACRU084
      GO TO (455,510),NK                                                  FACRU085
  455 CIP=CI                                                              FACRU086
      CJP=CJ                                                              FACRU087
      CKP=CK                                                              FACRU088
      IF (CI) 460,465,465                                                 FACRU089
  460 IJK(2)=0                                                            FACRU090
      GO TO 470                                                           FACRU091
  465 IJK(1)=0                                                            FACRU092
  470 IF (CJ) 475,480,480                                                 FACRU093
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475 IJK(4)=0                                                    FACRU094
    GO TO 485                                                   FACRU095
480 IJK(3)=0                                                    FACRU096
485 IF (CK) 490,495,495                                         FACRU097
490 IJK(6)=0                                                    FACRU098
    GO TO 500                                                   FACRU099
495 IJK(5)=0                                                    FACRU100
500 NK=2                                                        FACRU101
    GO TO 450                                                   FACRU102
510 IF (CI*CIP) 520,530,530                                     FACRU103
520 CI=0.                                                       FACRU104
530 IF (CJ*CJP) 540,550,550                                     FACRU105
540 CJ=0.                                                       FACRU106
550 IF (CK*CKP) 560,570,570                                     FACRU107
560 CK=0.                                                       FACRU108
570 XNN=NN                                                      FACRU109
    XNX=NX(IO)                                                  FACRU110
    YNY=NY(IO)                                                  FACRU111
    ACI=IC-1                                                    FACRU112
    ACI=ACI+CI                                                  FACRU113
    BCI=XNN-ACI                                                 FACRU114
    ACJ=JC-1                                                    FACRU115
    ACJ=ACJ+CJ                                                  FACRU116
    BCJ=XNN-ACJ                                                 FACRU117
    C2=CF*CF                                                    FACRU118
    CFL=LOGF(C2)                                                FACRU119
    NXM=NX(IO)                                                  FACRU120
    NYM=NY(IO)                                                  FACRU121
    DISX=DIVF(XNN,NXM)                                          FACRU122
    DISY=DIVF(XNN,NYM)                                          FACRU123
    IF (ACI-BCI) 610,610,620                                    FACRU124
610 AAI=LOGF(1.-ACI*(1.-C2)/DISX)/CFL                           FACRU125
    GO TO 630                                                   FACRU126
620 AAI=LOGF(1.-BCI*(1.-C2)/DISX)/CFL                           FACRU127
    AAI=XNX-AAI                                                 FACRU128
630 IF (ACJ-BCJ) 640,640,650                                    FACRU129
640 AAJ=LOGF(1.-ACJ*(1.-C2)/DISY)/CFL                           FACRU130
    GO TO 660                                                   FACRU131
650 AAJ=LOGF(1.-BCJ*(1.-C2)/DISY)/CFL                           FACRU132
    AAJ=YNY-AAJ                                                 FACRU133
660 IM=AAI                                                      FACRU134
    XACI=IM                                                     FACRU135
    IF (AAI-XACI-.5) 680,680,670                                FACRU136
670 XACI=XACI+1.                                                FACRU137
    IM=IM+1                                                     FACRU138
680 XBCI=XNX-XACI                                               FACRU139
    IIM=NX(IO)-IM                                               FACRU140
    JM=AAJ                                                      FACRU141
    YACJ=JM                                                     FACRU142
    IF (AAJ-YACJ-.5) 690,690,685                                FACRU143
685 YACJ=YACJ+1.                                                FACRU144
    JM=JM+1                                                     FACRU145
690 YBCJ=YNY-YACJ                                               FACRU146
    JJM=NY(IO)-JM                                               FACRU147
    AX=DIVF(ACI,IM)                                             FACRU148
    BX=DIVF(BCI,IIM)                                            FACRU149
    AY=DIVF(ACJ,JM)                                             FACRU150
    BY=DIVF(BCJ,JJM)                                            FACRU151
    XCOA=AX*CF**(IM-1)                                          FACRU152
    XCOB=BX*CF**(IIM-1)                                         FACRU153
    IF (IM-1) 691,692,692                                       FACRU154
691 XCOA=BX                                                     FACRU155
692 IF (IIM-1) 693,694,694                                      FACRU156
693 XCOB=AX                                                     FACRU157
694 YCOA=AY*CF**(JM-1)                                          FACRU158
    YCOB=BY*CF**(JJM-1)                                         FACRU159
    IF (JM-1) 696,697,697                                       FACRU160
696 YCOA=BY                                                     FACRU161
697 IF (JJM-1) 698,699,699                                      FACRU162
698 YCOB=AY                                                     FACRU163
699 XCO=0.                                                      FACRU164
    NIJ=0                                                       FACRU165
    KM=1                                                        FACRU166
    KKM=0                                                       FACRU167
    IF (NVOL) 800,800,700                                       FACRU168
700 ZNZ=NZ(IO)                                                  FACRU169
    ACK=KC-1                                                    FACRU170
    ACK=ACK+CK                                                  FACRU171
    BCK=XNN-ACK                                                 FACRU172
    NZM=NZ(IO)                                                  FACRU173
    DISZ=DIVF(XNN,NZM)                                          FACRU174
    IF (ACK-BCK) 710,710,720                                    FACRU175
710 AAK=LOGF(1.-ACK*(1.-C2)/DISZ)/CFL                           FACRU176
    GO TO 730                                                   FACRU177
720 AAK=LOGF(1.-BCK*(1.-C2)/DISZ)/CFL                           FACRU178
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      AAK=ZNZ-AAK                                                       FACRU179
  730 KM=AAK                                                            FACRU180
      ZACK=KM                                                           FACRU181
      IF (AAK-ZACK-.5) 750,750,740                                      FACRU182
  740 ZACK=ZACK+1.                                                      FACRU183
      KM=KM+1                                                           FACRU184
  750 ZBCK=ZNZ-ZACK                                                     FACRU185
      KKM=NZ(IO)-KM                                                     FACRU186
      AZ=DIVF(ACK,KM)                                                   FACRU187
      BZ=DIVF(BCK,KKM)                                                  FACRU188
      ZCOA=AZ*CF**(KM-1)                                                FACRU189
      ZCOB=BZ*CF**(KKM-1)                                               FACRU190
      IF (KM-1) 760,770,770                                             FACRU191
  760 ZCOA=BZ                                                           FACRU192
  770 IF (KKM-1) 780,790,790                                            FACRU193
  780 ZCOB=AZ                                                           FACRU194
  790 KM=KM+1                                                           FACRU195
  800 CONTINUE                                                          FACRU196
      II=0                                                              FACRU197
      IM=IM+1                                                           FACRU198
      JM=JM+1                                                           FACRU199
      DO 900 I=1,IM                                                     FACRU200
      II=II+1                                                           FACRU201
      ICO=IM-I                                                          FACRU202
      IF (ICO) 810,810,820                                              FACRU203
  810 CX=CI                                                             FACRU204
      XCO=ACI                                                           FACRU205
      I1=IC                                                             FACRU206
      GO TO 850                                                         FACRU207
  820 IF (I-1) 830,830,840                                              FACRU208
  830 CX=0.                                                             FACRU209
      I1=1                                                              FACRU210
      GO TO 850                                                         FACRU211
  840 XCO=XCO+AX*CF**ICO                                                FACRU212
      I1=XCO                                                            FACRU213
      XII=I1                                                            FACRU214
      I1=I1+1                                                           FACRU215
      CX=XCO-XII                                                        FACRU216
  850 CONTINUE                                                          FACRU217
      CALL COJI                                                         FACRU218
  900 CONTINUE                                                          FACRU219
      IF (IIM-1) 1010,910,910                                           FACRU220
  910 DO 1000 I=1,IIM                                                   FACRU221
      II=II+1                                                           FACRU222
      IF (I-IIM) 930,920,920                                            FACRU223
  920 CX=0.                                                             FACRU224
      I1=NNP                                                            FACRU225
      GO TO 960                                                         FACRU226
  930 XCO=XCO+BX*CF**(I-1)                                              FACRU227
      I1=XCO                                                            FACRU228
      XII=I1                                                            FACRU229
      I1=I1+1                                                           FACRU230
      CX=XCO-XII                                                        FACRU231
  960 CONTINUE                                                          FACRU232
      CALL COJI                                                         FACRU233
 1000 CONTINUE                                                          FACRU234
      IM=IM-1                                                           FACRU235
      JM=JM-1                                                           FACRU236
      KM=KM-1                                                           FACRU237
 1010 CONTINUE                                                          FACRU238
      RETURN                                                            FACRU239
      END                                                               FACRU240
CFADBO                                                                  FADB0000
      SUBROUTINE DIBO                                                   FADB0001
      DIMENSION A(22140),IA(22140),XO(50),YO(50),ZO(50),NMATE(50)       FADB0002
     1,NFL(50,6),MDM(100),MELMA(100),MPRTI(100),MTETG(100),MBOVR(100)   FADB0003
     2,ML(100,4),IDM(200),IELMA(200),IPRTE(200),IGYGZ(200),IARMX(200)   FADB0004
     3,IMYMZ(200),IMFBO(200),IDTNR(200),IFL(200,3),AN(2000),IBON(50,4)  FADB0005
     4,BORC(50,8),NCL(200)                                              FADB0006
      COMMON A                                                          FADB0007
      EQUIVALENCE (A,IA),(A(1001),XO),(A(1051),YO),(A(1101),ZO)         FADB0008
     1,(A(1151),NMATE),(A(1201),NFL),(A(1501),MDM),(A(1601),MELMA)      FADB0009
     2,(A(1701),MPRTI),(A(1801),MTETG),(A(1901),MBOVR),(A(2001),ML)     FADB0010
     3,(A(2401),IDM),(A(2601),IELMA),(A(2801),IPRTE),(A(3001),IGYGZ)    FADB0011
     4,(A(3201),IARMX),(A(3401),IMYMZ),(A(3601),IMFBO),(A(3801),IDTNR)  FADB0012
     5,(A(4001),IFL),(A(4601),AN),(A(6601),IBON),(A(6801),BORC)         FADB0013
     6,(A(7201),NCL)                                                    FADB0014
      EQUIVALENCE (A(1),NE),(A(2),NVOL),(A(3),NSUR),(A(4),NLIN)         FADB0015
     1,(A(5),LNG),(A(6),ISDE),(A(7),NC),(A(8),IO),(A(9),CF),(A(10),XMI) FADB0016
     2,(A(11),YMI),(A(12),ZMI),(A(13),XMX),(A(14),YMX),(A(15),ZMX)      FADB0017
     3,(A(16),IBOT),(A(17),SCX),(A(18),SCY),(A(19),SCZ),(A(20),DER)     FADB0018
     4,(A(21),ER),(A(22),TER),(A(23),NN),(A(24),XNN),(A(25),NNP)        FADB0019
     5,(A(26),KR)                                                      FADB0020
      DIMENSION XX(17,17,17),YY(17,17,17),ZZ(17,17,17),DC(3,3),R(3,3)   FADB0021
     1,CO(3),SQ(3),CT(3)                                                FADB0022
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      EQUIVALENCE (A(7401),XX),(A(12314),YY),(A(17227),ZZ)                FADB0023
      EQUIVALENCE (A(31),DC),(A(40),R),(A(49),CO),(A(52),SQ)              FADB0024
     1,(A(58),IP),(A(59),IB),(A(60),IV,IS),(A(61),I),(A(62),J),(A(63),K)FADB0025
     2,(A(64),IM),(A(65),JM),(A(66),KM),(A(67),IIM),(A(68),JJM)          FADB0026
     3,(A(69),KKM),(A(70),AX),(A(71),AY),(A(72),AZ),(A(73),BX)           FADB0027
     4,(A(74),BY),(A(75),BZ),(A(76),CT,CX),(A(77),CY),(A(78),CZ)         FADB0028
     5,(A(79),ACI),(A(80),ACJ),(A(81),ACK),(A(82),C2),(A(83),DIS)        FADB0029
     6,(A(84),CFL),(A(85),I1),(A(86),J1),(A(87),K1),(A(88),IC)           FADB0030
     7,(A(89),JC),(A(90),KC),(A(91),II),(A(92),JJ),(A(93),KK)            FADB0031
     8,(A(94),XCOA),(A(95),XCOB),(A(96),YCOA),(A(97),YCOB),(A(98),ZCOA) FADB0032
     9,(A(99),ZCOB),(A(100),CI),(A(101),CJ),(A(102),CK)                  FADB0033
      DIMENSION XN(500),YN(500),ZN(500),NCN(500),NX(50),NY(50),NZ(50)    FADB0034
      EQUIVALENCE (AN(1),XN),(AN(501),YN),(AN(1001),ZN),(AN(1501),NCN)   FADB0035
     1,(A(112),IJK),(A(118),Q),(A(190),QQ),(A(226),NXP),(A(227),NYP)     FADB0036
     2,(A(228),NZP),(A(301),NX),(A(351),NY),(A(401),NZ)                  FADB0037
      IS=IS                                                              FADB0038
      IV=IV                                                              FADB0039
      MAQ=3                                                              FADB0040
      MBQ=4                                                              FADB0041
      NAQ=5                                                              FADB0042
      NBQ=6                                                              FADB0043
      MDUM=JJ                                                            FADB0044
      NDUM=KK                                                            FADB0045
      MQP=NYP                                                            FADB0046
      NQP=NZP                                                            FADB0047
      IF (II-1) 150,110,150                                              FADB0048
  110 IR=1                                                               FADB0049
      IQ=2                                                               FADB0050
      CALL DSPL (IR,IQ,MAQ,MBQ,NAQ,NBQ,MDUM,NDUM,MQP,NQP)                FADB0051
      IF (JJ-JM) 200,120,200                                             FADB0052
  120 IF (KK-KM) 200,130,200                                             FADB0053
  130 CALL DICO (IR)                                                     FADB0054
      GO TO 200                                                          FADB0055
  150 IF (II-NXP) 200,160,200                                            FADB0056
  160 IR=2                                                               FADB0057
      IQ=1                                                               FADB0058
      CALL DSPL (IR,IQ,MAQ,MBQ,NAQ,NBQ,MDUM,NDUM,MQP,NQP)                FADB0059
      IF (JJ-JM) 200,170,200                                             FADB0060
  170 IF (KK-KM) 200,130,200                                             FADB0061
  200 MAQ=5                                                              FADB0062
      MBQ=6                                                              FADB0063
      NAQ=1                                                              FADB0064
      NBQ=2                                                              FADB0065
      MDUM=KK                                                            FADB0066
      NDUM=II                                                            FADB0067
      MQP=NZP                                                            FADB0068
      NQP=NXP                                                            FADB0069
      IF (JJ-1) 250,210,250                                              FADB0070
  210 IR=3                                                               FADB0071
      IQ=4                                                               FADB0072
      CALL DSPL (IR,IQ,MAQ,MBQ,NAQ,NBQ,MDUM,NDUM,MQP,NQP)                FADB0073
      IF (KK-KM) 300,220,300                                             FADB0074
  220 IF (II-IM) 300,230,300                                             FADB0075
  230 CALL DICO (IR)                                                     FADB0076
      GO TO 300                                                          FADB0077
  250 IF (JJ-NYP) 300,260,300                                            FADB0078
  260 IR=4                                                               FADB0079
      IQ=3                                                               FADB0080
      CALL DSPL (IR,IQ,MAQ,MBQ,NAQ,NBQ,MDUM,NDUM,MQP,NQP)                FADB0081
      IF (KK-KM) 300,270,300                                             FADB0082
  270 IF (II-IM) 300,230,300                                             FADB0083
  300 IF (NVOL) 400,400,305                                              FADB0084
  305 MAQ=1                                                              FADB0085
      MBQ=2                                                              FADB0086
      NAQ=3                                                              FADB0087
      NBQ=4                                                              FADB0088
      MDUM=II                                                            FADB0089
      NDUM=JJ                                                            FADB0090
      MQP=NXP                                                            FADB0091
      NQP=NYP                                                            FADB0092
      IF (KK-1) 350,310,350                                              FADB0093
  310 IR=5                                                               FADB0094
      IQ=6                                                               FADB0095
      CALL DSPL (IR,IQ,MAQ,MBQ,NAQ,NBQ,MDUM,NDUM,MQP,NQP)                FADB0096
      IF (II-IM) 400,320,400                                             FADB0097
  320 IF (JJ-JM) 400,330,400                                             FADB0098
  330 CALL DICO (IR)                                                     FADB0099
      GO TO 400                                                          FADB0100
  350 IF (KK-NZP) 400,360,400                                            FADB0101
  360 IR=6                                                               FADB0102
      IQ=5                                                               FADB0103
      CALL DSPL (IR,IQ,MAQ,MBQ,NAQ,NBQ,MDUM,NDUM,MQP,NQP)                FADB0104
      IF (II-IM) 400,370,400                                             FADB0105
  370 IF (JJ-JM) 400,330,400                                             FADB0106
  400 CONTINUE                                                           FADB0107
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      RETURN                                                                FADB0108
      END                                                                   FADB0109
CFADCO                                                                      FADC0000
      SUBROUTINE  DICO (M)                                                  FADC0001
      DIMENSION A(22140),IA(22140),XO(50),YO(50),ZO(50),NMATE(50)           FADC0002
     1,NFL(50,6),MDM(100),MELMA(100),MPRTI(100),MTETG(100),MBOVR(100)       FADC0003
     2,ML(100,4),IDM(200),IELMA(200),IPRTE(200),IGYGZ(200),IARMX(200)       FADC0004
     3,IMYMZ(200),IMFBO(200),IDTNR(200),IFL(200,3),AN(2000),IBON(50,4)      FADC0005
     4,BORC(50,8),NCL(200)                                                  FADC0006
      COMMON A                                                              FADC0007
      EQUIVALENCE (A,IA),(A(1001),XO),(A(1051),YO),(A(1101),ZO)             FADC0008
     1,(A(1151),NMATE),(A(1201),NFL),(A(1501),MDM),(A(1601),MELMA)          FADC0009
     2,(A(1701),MPRTI),(A(1801),MTETG),(A(1901),MBOVR),(A(2001),ML)         FADC0010
     3,(A(2401),IDM),(A(2601),IELMA),(A(2801),IPRTE),(A(3001),IGYGZ)        FADC0011
     4,(A(3201),IARMX),(A(3401),IMYMZ),(A(3601),IMFBO),(A(3801),IDTNR)      FADC0012
     5,(A(4001),IFL),(A(4601),AN),(A(6601),IBON),(A(6801),BORC)             FADC0013
     6,(A(7201),NCL)                                                        FADC0014
      EQUIVALENCE (A(1),NE),(A(2),NVOL),(A(3),NSUR),(A(4),NLIN)             FADC0015
     1,(A(5),LNG),(A(6),ISDE),(A(7),NC),(A(8),IO),(A(9),CF),(A(10),XMI)     FADC0016
     2,(A(11),YMI),(A(12),ZMI),(A(13),XMX),(A(14),YMX),(A(15),ZMX)          FADC0017
     3,(A(16),IBOT),(A(17),SCX),(A(18),SCY),(A(19),SCZ),(A(20),DER)         FADC0018
     4,(A(21),ER),(A(22),TER),(A(23),NN),(A(24),XNN),(A(25),NNP)            FADC0019
     5,(A(26),KR)                                                          FADC0020
      DIMENSION XX(17,17,17),YY(17,17,17),ZZ(17,17,17),DC(3,3),R(3,3)       FADC0021
     1,CO(3),SQ(3),CT(3)                                                    FADC0022
      EQUIVALENCE (A(7401),XX),(A(12314),YY),(A(17227),ZZ)                  FADC0023
      EQUIVALENCE (A(31),DC),(A(40),R),(A(49),CO),(A(52),SQ)                FADC0024
     1,(A(58),IP),(A(59),IB),(A(60),IV,IS),(A(61),I),(A(62),J),(A(63),K)    FADC0025
     2,(A(64),IM),(A(65),JM),(A(66),KM),(A(67),IIM),(A(68),JJM)             FADC0026
     3,(A(69),KKM),(A(70),AX),(A(71),AY),(A(72),AZ),(A(73),BX)              FADC0027
     4,(A(74),BY),(A(75),BZ),(A(76),CT,CX),(A(77),CY),(A(78),CZ)            FADC0028
     5,(A(79),ACI),(A(80),ACJ),(A(81),ACK),(A(82),C2),(A(83),DIS)           FADC0029
     6,(A(84),CFL),(A(85),I1),(A(86),J1),(A(87),K1),(A(88),IC)              FADC0030
     7,(A(89),JC),(A(90),KC),(A(91),II),(A(92),JJ),(A(93),KK)               FADC0031
     8,(A(94),XCOA),(A(95),XCOB),(A(96),YCOA),(A(97),YCOB),(A(98),ZCOA)     FADC0032
     9,(A(99),ZCOB),(A(100),CI),(A(101),CJ),(A(102),CK)                     FADC0033
      DIMENSION XN(500),YN(500),ZN(500),NCN(500),NX(50),NY(50),NZ(50)       FADC0034
      EQUIVALENCE (AN(1),XN),(AN(501),YN),(AN(1001),ZN),(AN(1501),NCN)      FADC0035
     2,(A(301),NX),(A(351),NY),(A(401),NZ)                                  FADC0036
      M=M                                                                   FADC0037
      IP=IP                                                                 FADC0038
      IS=IS                                                                 FADC0039
      IV=IV                                                                 FADC0040
      IF (NVOL) 90,90,490                                                   FADC0041
   90 DO 450 N=1,NSUR                                                       FADC0042
      GO TO (100,200,300,400),M                                             FADC0043
  100 IF (ML(IS,1)-ML(N,2)) 450,110,450                                     FADC0044
  110 CALL DISO (XCOA,MM)                                                   FADC0045
  120 IF (NX(N)-1) 130,140,140                                              FADC0046
  130 NX(N)=MM                                                              FADC0047
  140 IF (NX(N)-MM) 9000,150,9000                                           FADC0048
  150 IF (NY(N)-1) 160,180,180                                              FADC0049
  160 NY(N)=NY(IS)                                                          FADC0050
  170 XO(N)=XN(IP)                                                          FADC0051
      YO(N)=YN(IP)                                                          FADC0052
      GO TO 9000                                                            FADC0053
  180 IF (NY(IS)-NY(N)) 9000,170,9000                                       FADC0054
  200 IF (ML(IS,2)-ML(N,1)) 450,210,450                                     FADC0055
  210 CALL DISO (XCOB,MM)                                                   FADC0056
      GO TO 120                                                             FADC0057
  300 IF (ML(IS,3)-ML(N,4)) 450,310,450                                     FADC0058
  310 CALL DISO (YCOA,MM)                                                   FADC0059
  320 IF (NY(N)-1) 330,340,340                                              FADC0060
  330 NY(N)=MM                                                              FADC0061
  340 IF (NY(N)-MM) 9000,350,9000                                           FADC0062
  350 IF (NX(N)-1) 360,380,380                                              FADC0063
  360 NX(N)=NX(IS)                                                          FADC0064
      GO TO 170                                                             FADC0065
  380 IF (NX(IS)-NX(N)) 9000,170,9000                                       FADC0066
  400 IF (ML(IS,4)-ML(N,3)) 450,410,450                                     FADC0067
  410 CALL DISO (YCOB,MM)                                                   FADC0068
      GO TO 320                                                             FADC0069
  450 CONTINUE                                                              FADC0070
      GO TO 9000                                                            FADC0071
  490 DO 1050 N=1,NVOL                                                      FADC0072
      GO TO (500,600,700,800,900,1000),M                                    FADC0073
  500 IF (NFL(IS,1)-NFL(N,2)) 1050,510,1050                                 FADC0074
  510 CALL DISO (XCOA,MM)                                                   FADC0075
  520 IF (NX(N)-1) 530,540,540                                              FADC0076
  530 NX(M)=MM                                                              FADC0077
  540 IF (NX(N)-MM) 9000,550,9000                                           FADC0078
  550 IF (NY(N)-1) 560,570,570                                              FADC0079
  560 NY(N)=NY(IS)                                                          FADC0080
  570 IF (NY(N)-NY(IS)) 9000,580,9000                                       FADC0081
  580 IF (NZ(N)-1) 590,595,595                                              FADC0082
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  590 NZ(N)=NZ(IS)                                                      FADC0083
  591 XO(N)=XN(IP)                                                      FADC0084
      YO(N)=YN(IP)                                                      FADC0085
      ZO(N)=ZN(IP)                                                      FADC0086
      GO TO 9000                                                        FADC0087
  595 IF (NZ(IS)-NZ(N)) 9000,591,9000                                   FADC0088
  600 IF (NFL(IS,2)-NFL(N,1)) 1050,610,1050                             FADC0089
  610 CALL DISO (XCOB,MM)                                               FADC0090
      GO TO 520                                                         FADC0091
  700 IF (NFL(IS,3)-NFL(N,4)) 1050,710,1050                             FADC0092
  710 CALL DISO (YCOA,MM)                                               FADC0093
  720 IF (NY(N)-1) 730,740,740                                          FADC0094
  730 NY(N)=MM                                                          FADC0095
  740 IF (NY(N)-MM) 9000,750,9000                                       FADC0096
  750 IF (NZ(N)-1) 760,770,770                                          FADC0097
  760 NZ(N)=NZ(IS)                                                      FADC0098
  770 IF (NZ(N)-NZ(IS)) 9000,780,9000                                   FADC0099
  780 IF (NX(N)-1) 790,795,795                                          FADC0100
  790 NX(N)=NX(IS)                                                      FADC0101
      GO TO 591                                                         FADC0102
  795 IF (NX(IS)-NX(N)) 9000,591,9000                                   FADC0103
  800 IF (NFL(IS,4)-NFL(N,3)) 1050,810,1050                             FADC0104
  810 CALL DISO (YCOB,MM)                                               FADC0105
      GO TO 720                                                         FADC0106
  900 IF (NFL(IS,5)-NFL(N,6)) 1050,910,1050                             FADC0107
  910 CALL DISO (ZCOA,MM)                                               FADC0108
  920 IF (NZ(N)-1) 930,940,940                                          FADC0109
  930 NZ(N)=MM                                                          FADC0110
  940 IF (NZ(N)-MM) 9000,950,9000                                       FADC0111
  950 IF (NX(N)-1) 960,970,970                                          FADC0112
  960 NX(N)=NX(IS)                                                      FADC0113
  970 IF (NX(N)-NX(IS)) 9000,980,9000                                   FADC0114
  980 IF (NY(N)-1) 990,995,995                                          FADC0115
  990 NY(N)=NY(IS)                                                      FADC0116
  995 IF (NY(IS)-NY(N)) 9000,591,9000                                   FADC0117
 1000 IF (NFL(IS,6)-NFL(N,5)) 1050,1010,1050                            FADC0118
 1010 CALL DISO (ZCOB,MM)                                               FADC0119
      GO TO 920                                                         FADC0120
 1050 CONTINUE                                                          FADC0121
 9000 RETURN                                                            FADC0122
      END                                                               FADC0123
CFADSO                                                                  FADS0000
      SUBROUTINE DISO (DIS,MM)                                          FADS0001
      DIMENSION A(22140)                                                FADS0002
      COMMON A                                                          FADS0003
      EQUIVALENCE (A(24),XNN),(A(9),CF)                                 FADS0004
      AA=LOGF (1.-XNN*(1.-CF)/DIS)/LOGF(CF)                             FADS0005
      MM=AA                                                             FADS0006
      AC=MM                                                             FADS0007
      IF (AA-AC-.5) 200,110,110                                         FADS0008
  110 MM=MM+1                                                           FADS0009
  200 CONTINUE                                                          FADS0010
      RETURN                                                            FADS0011
      END                                                               FADS0012
CFADPL                                                                  FADPL000
      SUBROUTINE DSPL (IR,IQ,MAQ,MBQ,NAQ,NBQ,MDUM,NDUM,MQP,NQP)        FADPL001
      DIMENSION A(22140),IA(22140),XO(50),YO(50),ZO(50),NMATE(50)       FADPL002
     1,NFL(50,6),MDM(100),MELMA(100),MPRTI(100),MTETG(100),MBOVR(100)   FADPL003
     2,ML(100,4),IDM(200),IELMA(200),IPRTE(200),IGYGZ(200),IARMX(200)   FADPL004
     3,IMYMZ(200),IMFBO(200),IDTNR(200),IFL(200,3),AN(2000),IBON(50,4)  FADPL005
     4,BORC(50,8),NCL(200)                                              FADPL006
      COMMON A                                                          FADPL007
      EQUIVALENCE (A,IA),(A(1001),XO),(A(1051),YO),(A(1101),ZO)         FADPL008
     1,(A(1151),NMATE),(A(1201),NFL),(A(1501),MDM),(A(1601),MELMA)      FADPL009
     2,(A(1701),MPRTI),(A(1801),MTETG),(A(1901),MBOVR),(A(2001),ML)     FADPL010
     3,(A(2401),IDM),(A(2601),IELMA),(A(2801),IPRTE),(A(3001),IGYGZ)    FADPL011
     4,(A(3201),IARMX),(A(3401),IMYMZ),(A(3601),IMFBO),(A(3801),IDTNR)  FADPL012
     5,(A(4001),IFL),(A(4601),AN),(A(6601),IBON),(A(6801),BORC)         FADPL013
     6,(A(7201),NCL)                                                    FADPL014
      EQUIVALENCE (A(1),NE),(A(2),NVOL),(A(3),NSUR),(A(4),NLIN)         FADPL015
     1,(A(5),LNG),(A(6),ISDE),(A(7),NC),(A(8),IO),(A(9),CF),(A(10),XMI) FADPL016
     2,(A(11),YMI),(A(12),ZMI),(A(13),XMX),(A(14),YMX),(A(15),ZMX)      FADPL017
     3,(A(16),IBOT),(A(17),SCX),(A(18),SCY),(A(19),SCZ),(A(20),DER)     FADPL018
     4,(A(21),ER),(A(22),TER),(A(23),NN),(A(24),XNN),(A(25),NNP)        FADPL019
     5,(A(26),KR),(A(59),IB),(A(60),IV,IS),(A(451),NDU)                 FADPL020
      MAQ=MAQ                                                           FADPL021
      MBQ=MBQ                                                           FADPL022
      NAQ=NAQ                                                           FADPL023
      NBQ=NBQ                                                           FADPL024
      IV=IV                                                             FADPL025
      IS=IS                                                             FADPL026
      IR=IR                                                             FADPL027
      IQ=IQ                                                             FADPL028
      IF (NVOL) 100,100,230                                             FADPL029
  100 LGD=ML(IS,IR)                                                     FADPL030
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      CALL ENFI (IDM,NLIN,LGD)                                          FADPL031
      LNG=IELMA(LGD)+MELMA(IS)+LNG                                      FADPL032
      DO 200 I=1,NSUR                                                   FADPL033
      IF (ML(IS,IR)-ML(I,IQ)) 200,210,200                               FADPL034
  200 CONTINUE                                                          FADPL035
      GO TO 400                                                         FADPL036
  210 IF (NCL(I)) 400,400,220                                           FADPL037
  220 IF (MELMA(I)) 222,222,221                                         FADPL038
  221 IB=0                                                              FADPL039
      GO TO 400                                                         FADPL040
  222 IF (MDUM-1) 224,223,224                                           FADPL041
  223 LGD=ML(I,MAQ)                                                     FADPL042
      CALL ENFI (IDM,NLIN,LGD)                                          FADPL043
      IF (IELMA(LGD)) 400,400,221                                       FADPL044
  224 IF (MDUM-MQP) 400,225,400                                         FADPL045
  225 LGD=ML(I,MBQ)                                                     FADPL046
      CALL ENFI (IDM,NLIN,LGD)                                          FADPL047
      IF (IELMA(LGD)) 400,400,221                                       FADPL048
  230 LGD=NFL(IV,IR)                                                    FADPL049
      CALL ENFI (MDM,NSUR,LGD)                                          FADPL050
      LNG=MELMA(LGD)+NMATE(IV)+LNG                                      FADPL051
      DO 300 I=1,NVOL                                                   FADPL052
      IF (NFL(IV,IR)-NFL(I,IQ)) 300,310,300                             FADPL053
  300 CONTINUE                                                          FADPL054
      GO TO 400                                                         FADPL055
  310 IF (NCL(I)) 400,400,311                                           FADPL056
  311 IF (NMATE(I)) 313,313,312                                         FADPL057
  312 IB=0                                                              FADPL058
      GO TO 400                                                         FADPL059
  313 LGD=NFL(I,IQ)                                                     FADPL060
      CALL ENFI (MDM,NSUR,LGD)                                          FADPL061
      IF (MELMA(LGD)) 322,322,312                                       FADPL062
  322 IF (MDUM-1) 324,323,324                                           FADPL063
  323 LGD=NFL(I,MAQ)                                                    FADPL064
      CALL ENFI (MDM,NSUR,LGD)                                          FADPL065
      IF (MELMA(LGD)) 326,326,312                                       FADPL066
  324 IF (MDUM-MQP) 326,325,326                                         FADPL067
  325 LGD=NFL(I,MBQ)                                                    FADPL068
      CALL ENFI (MDM,NSUR,LGD)                                          FADPL069
      IF (MELMA(LGD)) 326,326,312                                       FADPL070
  326 IF (NDUM-1) 328,327,328                                           FADPL071
  327 LGD=NFL(I,NAQ)                                                    FADPL072
      CALL ENFI (MDM,NSUR,LGD)                                          FADPL073
      IF (MELMA(LGD)) 400,400,312                                       FADPL074
  328 IF (NDUM-NQP) 400,329,400                                         FADPL075
  329 LGD=NFL(I,NBQ)                                                    FADPL076
      CALL ENFI (MDM,NSUR,LGD)                                          FADPL077
      IF (MELMA(LGD)) 400,400,312                                       FADPL078
  400 CONTINUE                                                          FADPL079
      RETURN                                                            FADPL080
      END                                                               FADPL081
CFAEFI                                                                  FAEFI000
      SUBROUTINE ENFI(MDD,LISU,LGD)                                     FAEFI001
      DIMENSION A(22140),IA(22140),XO(50),YO(50),ZO(50),NMATE(50)       FAEFI002
     1,NFL(50,6),MDM(100),MELMA(100),MPRTI(100),MTETG(100),MBOVR(100)   FAEFI003
     2,ML(100,4),IDM(200),IELMA(200),IPRTE(200),IGYGZ(200),IARMX(200)   FAEFI004
     3,IMYMZ(200),IMFBO(200),IDTNR(200),IFL(200,3),AN(2000),IBON(50,4)  FAEFI005
     4,BORC(50,8)                                                       FAEFI006
      COMMON A                                                          FAEFI007
      EQUIVALENCE (A,IA),(A(1001),XO),(A(1051),YO),(A(1101),ZO)         FAEFI008
     1,(A(1151),NMATE),(A(1201),NFL),(A(1501),MDM),(A(1601),MELMA)      FAEFI009
     2,(A(1701),MPRTI),(A(1801),MTETG),(A(1901),MBOVR),(A(2001),ML)     FAEFI010
     3,(A(2401),IDM),(A(2601),IELMA),(A(2801),IPRTE),(A(3001),IGYGZ)    FAEFI011
     4,(A(3201),IARMX),(A(3401),IMYMZ),(A(3601),IMFBO),(A(3801),IDTNR)  FAEFI012
     5,(A(4001),IFL),(A(4601),AN),(A(6601),IBON),(A(6801),BORC)         FAEFI013
     6,(A(7201),NCL)                                                    FAEFI014
      EQUIVALENCE (A(1),NE),(A(2),NVOL),(A(3),NSUR),(A(4),NLIN)         FAEFI015
     1,(A(5),LNG),(A(6),ISDE),(A(7),NC),(A(8),IO),(A(9),CF),(A(10),XMI) FAEFI016
     2,(A(11),YMI),(A(12),ZMI),(A(13),XMX),(A(14),YMX),(A(15),ZMX)      FAEFI017
     3,(A(16),IBOT),(A(17),SCX),(A(18),SCY),(A(19),SCZ),(A(20),DER)     FAEFI018
     4,(A(21),ER),(A(22),TER),(A(23),NN),(A(24),XNN),(A(25),NNP)        FAEFI019
     5,(A(26),KR),(A(59),IB),(A(60),IV,IS),(A(451),NDU)                 FAEFI020
      DIMENSION MDD(1)                                                  FAEFI021
      DO 200 I=1,LISU                                                   FAEFI022
      I=I                                                               FAEFI023
      IDMM=MDD(I)                                                       FAEFI024
      IF (IDMM) 110,110,120                                             FAEFI025
  110 IDMM=-IDMM                                                        FAEFI026
  120 IF (LGD-IDMM) 200,210,200                                         FAEFI027
  200 CONTINUE                                                          FAEFI028
      GO TO 9000                                                        FAEFI029
  210 LGD=I                                                             FAEFI030
  220 CONTINUE                                                          FAEFI031
      RETURN                                                            FAEFI032
 9000 WRITE OUTPUT TAPE 6,1,IS                                          FAEFI033
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    1 FORMAT (54H1IN LINK 2 ERROR DEDECTED IN  CONNECTIVITY INFORMATION,FAEFI034
     1I6)                                                               FAEFI035
      CALL EXIT                                                         FAEFI036
      END                                                               FAEFI037
CFAPNC                                                                  FAPNC000
      SUBROUTINE PUNC                                                   FAPNC001
      DIMENSION A(22140)                                                FAPNC002
      COMMON A                                                          FAPNC003
      EQUIVALENCE (A(7),NC),(A(58),IP),(A(4601),XN),(A(5101),YN)        FAPNC004
     1,(A(5601),ZN),(A(229),INT),(A(230),INC)                           FAPNC005
      IP=IP                                                             FAPNC006
      DO 200 I=1,IP,2                                                   FAPNC007
      INT=I+NC                                                          FAPNC008
      INC=INT+1                                                         FAPNC009
      IF (INC-NC-IP) 110,110,120                                        FAPNC010
  110 PUNCH 1,INT,XN(I),YN(I),ZN(I),INC,XN(I+1),YN(I+1),ZN(I+1)         FAPNC011
      WRITE OUTPUT TAPE 6,1,INT,XN(I),YN(I),ZN(I),INC,XN(I+1),YN(I+1),ZNFAPNC012
     1(I+1)                                                             FAPNC013
    1 FORMAT (2(I4,3F12.6))                                             FAPNC014
      GO TO 200                                                         FAPNC015
  120 PUNCH 1,INT,XN(I),YN(I),ZN(I)                                     FAPNC016
      WRITE OUTPUT TAPE 6,1,INT,XN(I),YN(I),ZN(I)                       FAPNC017
  200 CONTINUE                                                          FAPNC018
      RETURN                                                            FAPNC019
      END                                                               FAPNC020
CFARTA                                                                  FARTA000
      SUBROUTINE ROTA(IC,JC,KC)                                         FARTA001
      DIMENSION A(22140),IA(22140),XO(50),YO(50),ZO(50),NMATE(50)       FARTA002
     1,NFL(50,6),MDM(100),MELMA(100),MPRTI(100),MTETG(100),MBOVR(100)   FARTA003
     2,ML(100,4),IDM(200),IELMA(200),IPRTE(200),IGYGZ(200),IARMX(200)   FARTA004
     3,IMYMZ(200),IMFBO(200),IDTNR(200),IFL(200,3),AN(2000),IBON(50,4)  FARTA005
     4,BORC(50,8),NCL(200)                                              FARTA006
      COMMON A                                                          FARTA007
      EQUIVALENCE (A,IA),(A(1001),XO),(A(1051),YO),(A(1101),ZO)         FARTA008
     1,(A(1151),NMATE),(A(1201),NFL),(A(1501),MDM),(A(1601),MELMA)      FARTA009
     2,(A(1701),MPRTI),(A(1801),MTETG),(A(1901),MBOVR),(A(2001),ML)     FARTA010
     3,(A(2401),IDM),(A(2601),IELMA),(A(2801),IPRTE),(A(3001),IGYGZ)    FARTA011
     4,(A(3201),IARMX),(A(3401),IMYMZ),(A(3601),IMFBO),(A(3801),IDTNR)  FARTA012
     5,(A(4001),IFL),(A(4601),AN),(A(6601),IBON),(A(6801),BORC)         FARTA013
     6,(A(7201),NCL)                                                    FARTA014
      EQUIVALENCE (A(1),NE),(A(2),NVOL),(A(3),NSUR),(A(4),NLIN)         FARTA015
     1,(A(5),LNG),(A(6),ISDE),(A(7),NC),(A(8),ID),(A(9),CF),(A(10),XMI) FARTA016
     2,(A(11),YMI),(A(12),ZMI),(A(13),XMX),(A(14),YMX),(A(15),ZMX)      FARTA017
     3,(A(16),IBOT),(A(17),SCX),(A(18),SCY),(A(19),SCZ),(A(20),DER)     FARTA018
     4,(A(21),ER),(A(22),TER),(A(23),NN),(A(24),XNN),(A(25),NNP)        FARTA019
     5,(A(26),KR                                                        FARTA020
      DIMENSION XX(17,17,17),YY(17,17,17),ZZ(17,17,17),DC(3,3),R(3,3)   FARTA021
     1,CO(3),SQ(3),CT(3),CB(3,3),IJK(6)                                 FARTA022
      DIMENSION NX(50),NY(50),NZ(50)                                    FARTA023
      EQUIVALENCE (A(7401),XX),(A(12314),YY),(A(17227),ZZ               FARTA024
      EQUIVALENCE (A(31),DC),(A(40),R),(A(49),CO),(A(52),SQ)            FARTA025
     1,(A(58),IP),(A(59),IB),(A(60),IV,IS),(A(61),I),(A(62),J),(A(63),K)FARTA026
     2,(A(64),IM),(A(65),JM),(A(66),KM),(A(67),IIM),(A(68),JJM)         FARTA027
     3,(A(69),KKM),(A(70),AX),(A(71),AY),(A(72),AZ),(A(73),BX)          FARTA028
     4,(A(74),BY),(A(75),BZ),(A(76),CT,CX),(A(77),CY),(A(78),CZ)        FARTA029
     5,(A(79),ACI),(A(80),ACJ),(A(81),ACK),(A(82),C2),(A(83),DIS)       FARTA030
     6,(A(84),CFL),(A(103),CB),(A(112),IJK)                             FARTA031
     7,(A(301),NX),(A(351),NY),(A(401),NZ)                              FARTA032
      IC=IC                                                             FARTA033
      JC=JC                                                             FARTA034
      KC=KC                                                             FARTA035
      IM=IC-IJK(1)                                                      FARTA036
      IIM=IC+IJK(2)                                                     FARTA037
      JM=JC-IJK(3)                                                      FARTA038
      JJM=JC+IJK(4)                                                     FARTA039
      KM=KC-IJK(5)                                                      FARTA040
      KKM=KC+IJK(6)                                                     FARTA041
      DC(1,1)=XX(IIM,JC,KC)-XX(IM,JC,KC)                                FARTA042
      DC(2,1)=YY(IIM,JC,KC)-YY(IM,JC,KC)                                FARTA043
      DC(3,1)=ZZ(IIM,JC,KC)-ZZ(IM,JC,KC)                                FARTA044
      DC(1,2)=XX(IC,JJM,KC)-XX(IC,JM,KC)                                FARTA045
      DC(2,2)=YY(IC,JJM,KC)-YY(IC,JM,KC)                                FARTA046
      DC(3,2)=ZZ(IC,JJM,KC)-ZZ(IC,JM,KC)                                FARTA047
      DC(1,3)=XX(IC,JC,KKM)-XX(IC,JC,KM)                                FARTA048
      DC(2,3)=YY(IC,JC,KKM)-YY(IC,JC,KM)                                FARTA049
      DC(3,3)=ZZ(IC,JC,KKM)-ZZ(IC,JC,KM)                                FARTA050
      IF (NVOL) 410,410,420                                             FARTA051
  410 DC(3,3)=1.                                                        FARTA052
      DC(2,3)=0.                                                        FARTA053
      DC(1,3)=0.                                                        FARTA054
  420 DO 500 L=1,3                                                      FARTA055
      SQ(L)=0.                                                          FARTA056
      DO 450 M=1,3                                                      FARTA057
      SQ(L)=SQ(L)+DC(M,L)**2                                            FARTA058
  450 CONTINUE                                                          FARTA059
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      SQ(L)=SQRTF(SQ(L))                                                FATRA060
      DO 460 M=1,3                                                      FATRA061
      DC(M,L)=DC(M,L)/SQ(L)                                             FATRA062
  460 CONTINUE                                                          FATRA063
  500 CONTINUE                                                          FATRA064
      DO 700 I=1,3                                                      FATRA065
      DO 600 J=1,3                                                      FATRA066
  600 R(I,J)=0.                                                         FATRA067
      R(I,I)=1.                                                         FATRA068
  700 CONTINUE                                                          FATRA069
      RETURN                                                            FATRA070
      END                                                               FATRA071
*     FAP                                                               FATCK000
      COUNT   25                                                        FATCK001
      LBL     TICK                                                      FATCK002
      ENTRY   TICK                                                      FATCK003
TICK  NZT     ONCE                                                      FATCK004
      TRA     FIRST                                                     FATCK005
      CAL     5                                                         FATCK006
      SUB     INITL                                                     FATCK007
      ALS     18                                                        FATCK008
      SLW*    1,4                                                       FATCK009
      TRA     2,4                                                       FATCK010
FIRST STL     ONCE                                                      FATCK011
      CAL     5                                                         FATCK012
      SLW     INITL                                                     FATCK013
      STZ*    1,4                                                       FATCK014
      TRA     2,4                                                       FATCK015
ONCE  PZE                                                               FATCK016
INITL PZE                                                               FATCK017
      END                                                               FATCK018
CFATRA                                                                  FATRA000
      SUBROUTINE TTRA                                                   FATRA001
      DIMENSION A(22140),IA(22140),XO(50),YO(50),ZO(50),NMATE(50)       FATRA002
     1,NFL(50,6),MDM(100),MELMA(100),MPRTI(100),MTETG(100),MBOVR(100)   FATRA003
     2,ML(100,4),IDM(200),IELMA(200),IPRTE(200),IGYGZ(200),IARMX(200)   FATRA004
     3,IMYMZ(200),IMFBO(200),IDTNR(200),IFL(200,3),AN(2000),IBON(50,4)  FATRA005
     4,BORC(50,8),NCL(200)                                              FATRA006
      COMMON A                                                          FATRA007
      EQUIVALENCE (A,IA),(A(1001),XO),(A(1051),YO),(A(1101),ZO)         FATRA008
     1,(A(1151),NMATE),(A(1201),NFL),(A(1501),MDM),(A(1601),MELMA)      FATRA009
     2,(A(1701),MPRTI),(A(1801),MTETG),(A(1901),MBOVR),(A(2001),ML)     FATRA010
     3,(A(2401),IDM),(A(2601),IELMA),(A(2801),IPRTE),(A(3001),IGYGZ)    FATRA011
     4,(A(3201),IARMX),(A(3401),IMYMZ),(A(3601),IMFBO),(A(3801),IDTNR)  FATRA012
     5,(A(4001),IFL),(A(4601),AN),(A(6601),IBON),(A(6801),BORC)         FATRA013
     6,(A(7201),NCL)                                                    FATRA014
      EQUIVALENCE (A(1),NE),(A(2),NVOL),(A(3),NSUR),(A(4),NLIN)         FATRA015
     1,(A(5),LNG),(A(6),ISDE),(A(7),NC),(A(8),IO),(A(9),CF),(A(10),XMI) FATRA016
     2,(A(11),YMI),(A(12),ZMI),(A(13),XMX),(A(14),YMX),(A(15),ZMX)      FATRA017
     3,(A(16),IBOT),(A(17),SCX),(A(18),SCY),(A(19),SCZ),(A(20),DER)     FATRA018
     4,(A(21),ER),(A(22),TER),(A(23),NN),(A(24),XNN),(A(25),NNP)        FATRA019
     5,(A(26),KR)                                                      FATRA020
      DIMENSION XX(17,17,17),YY(17,17,17),ZZ(17,17,17),DC(3,3),R(3,3)   FATRA021
     1,CO(3),SQ(3),CT(3),CB(3,3),IJK(6)                                 FATRA022
      EQUIVALENCE (A(7401),XX),(A(12314),YY),(A(17227),ZZ)              FATRA023
      EQUIVALENCE (A(31),DC),(A(40),R),(A(49),CO),(A(52),SQ)            FATRA024
     1,(A(58),IP),(A(59),IB),(A(60),IV,IS),(A(61),I),(A(62),J),(A(63),K)FATRA025
     2,(A(64),IM),(A(65),JM),(A(66),KM),(A(67),IIM),(A(68),JJM)         FATRA026
     3,(A(69),KKM),(A(70),AX),(A(71),AY),(A(72),AZ),(A(73),BX)          FATRA027
     4,(A(74),BY),(A(75),BZ),(A(76),CT,CX),(A(77),CY),(A(78),CZ)        FATRA028
     5,(A(79),ACI),(A(80),ACJ),(A(81),ACK),(A(82),C2),(A(83),DIS)       FATRA029
     6,(A(84),CFL),(A(85),II),(A(86),J1),(A(87),K1),(A(88),IC)          FATRA030
     7,(A(89),JC),(A(90),KC),(A(91),II),(A(92),JJ),(A(93),KK)           FATRA031
     8,(A(94),XCOA),(A(95),XCOB),(A(96),YCOA),(A(97),YCOB),(A(98),ZCOA) FATRA032
     9,(A(99),ZCOB),(A(100),CI),(A(101),CJ),(A(102),CK),(A(103),CB)     FATRA033
      DIMENSION XN(500),YN(500),ZN(500),NCN(500),NX(50),NY(50),NZ(50)   FATRA034
      EQUIVALENCE (AN(1),XN),(AN(501),YN),(AN(1001),ZN),(AN(1501),NCN)  FATRA035
     1,(A(112),IJK),(A(301),NX),(A(351),NY),(A(401),NZ)                 FATRA036
      DET=DC(1,1)*(DC(2,2)*DC(3,3)-DC(2,3)*DC(3,2))-DC(2,1)*(DC(1,2)*DC(FATRA037
     13,3)-DC(1,3)*DC(3,2))+DC(3,1)*(DC(1,2)*DC(2,3)-DC(1,3)*DC(2,2))   FATRA038
      DETI=1./DET                                                       FATRA039
      CB(1,1)=DETI*(DC(2,2)*DC(3,3)-DC(2,3)*DC(3,2))                    FATRA040
      CB(2,1)=-DETI*(DC(1,2)*DC(3,3)-DC(1,3)*DC(3,2))                   FATRA041
      CB(3,1)=DETI*(DC(1,2)*DC(2,3)-DC(1,3)*DC(2,2))                    FATRA042
      CB(1,2)=DETI*(DC(2,3)*DC(3,1)-DC(2,1)*DC(3,3))                    FATRA043
      CB(2,2)=-DETI*(DC(1,3)*DC(3,1)-DC(1,1)*DC(3,3))                   FATRA044
      CB(3,2)=DETI*(DC(1,3)*DC(2,1)-DC(1,1)*DC(2,3))                    FATRA045
      CB(1,3)=DETI*(DC(2,1)*DC(3,2)-DC(2,2)*DC(3,1))                    FATRA046
      CB(2,3)=-DETI*(DC(1,1)*DC(3,2)-DC(1,2)*DC(3,1))                   FATRA047
      CB(3,3)=DETI*(DC(1,1)*DC(2,2)-DC(1,2)*DC(2,1))                    FATRA048
      DO 100 I=1,3                                                      FATRA049
      DO 100 J=1,3                                                      FATRA050
      DC(I,J)=CB(I,J)                                                   FATRA051
  100 CONTINUE                                                          FATRA052
      DO 200 I=1,3                                                      FATRA053
```

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      DO 200 J=1,3                                                      FATRA054
      CB(I,J)=DC(1,I)*R(1,J)+DC(2,I)*R(2,J)+DC(3,I)*R(3,J)              FATRA055
  200 CONTINUE                                                          FATRA056
      CI=0.                                                             FATRA057
      CJ=0.                                                             FATRA058
      CK=0.                                                             FATRA059
      DO 300 I=1,3                                                      FATRA060
      CI=CI+CB(1,I)*CO(I)                                               FATRA061
      CJ=CJ+CB(2,I)*CO(I)                                               FATRA062
      CK=CK+CB(3,I)*CO(I)                                               FATRA063
  300 CONTINUE                                                          FATRA064
      CI=CI/SQ(1)                                                       FATRA065
      CJ=CJ/SQ(2)                                                       FATRA066
      CK=CK/SQ(3)                                                       FATRA067
      IF (ABSF(CI)-.01) 310,320,320                                     FATRA068
  310 CI=0.                                                             FATRA069
  320 IF (ABSF(CJ)-.01) 330,340,340                                     FATRA070
  330 CJ=0.                                                             FATRA071
  340 IF (ABSF(CK)-.01) 350,360,360                                     FATRA072
  350 CK=0.                                                             FATRA073
  360 CONTINUE                                                          FATRA074
      RETURN                                                            FATRA075
      END                                                               FATRA076
```

V. Listing of the Programs in Link 3

This section contains a list of programs, their functions, and their decimal word length (Table 5), a flow chart (Fig. 3), and a complete listing of the FORTRAN and FAP programs of link 3.

Table 5. Programs in link 3 of FEDGE

Program name	Length in 36-bit words	Label	Function	Program name	Length in 36-bit words	Label	Function
MAIN	744	FAMN3	Governs loops and computes constants for generation of element and boundary condition data	SEBIN[a]	52	FALSN	Stores 1 or 0 to the prescribed binary bit
ARBU	471	FAABU	Computes constants and governs loops for correct labelling of all points on a subdomain	LEKI	684	FALKI	Computes boundary conditions of the nodes and the property types and labels of the line elements in two-dimensional problems
BOUN	122	FABUN	Computes constants for boundary condition	SECE	120	FASCE	Copies labels of nodal points in the proper arrays
KEBU	104	FAKBU	Checks label of the subdomain faces against the labels of other subdomain faces	SEVE	655	FASVE	Computes boundary conditions of the nodes and the property types and labels of the surface elements
KOSU	102	FAKSU	Reads labels of the nodes from tape in the proper order	TEVE	226	FATVE	Computes property types and labels of the volume elements
LEBIN[a]	12	FALSN	Checks to determine whether a binary bit is 0 or 1	TICK[a]	15	FATCK	Measures time

[a]In FAP language.

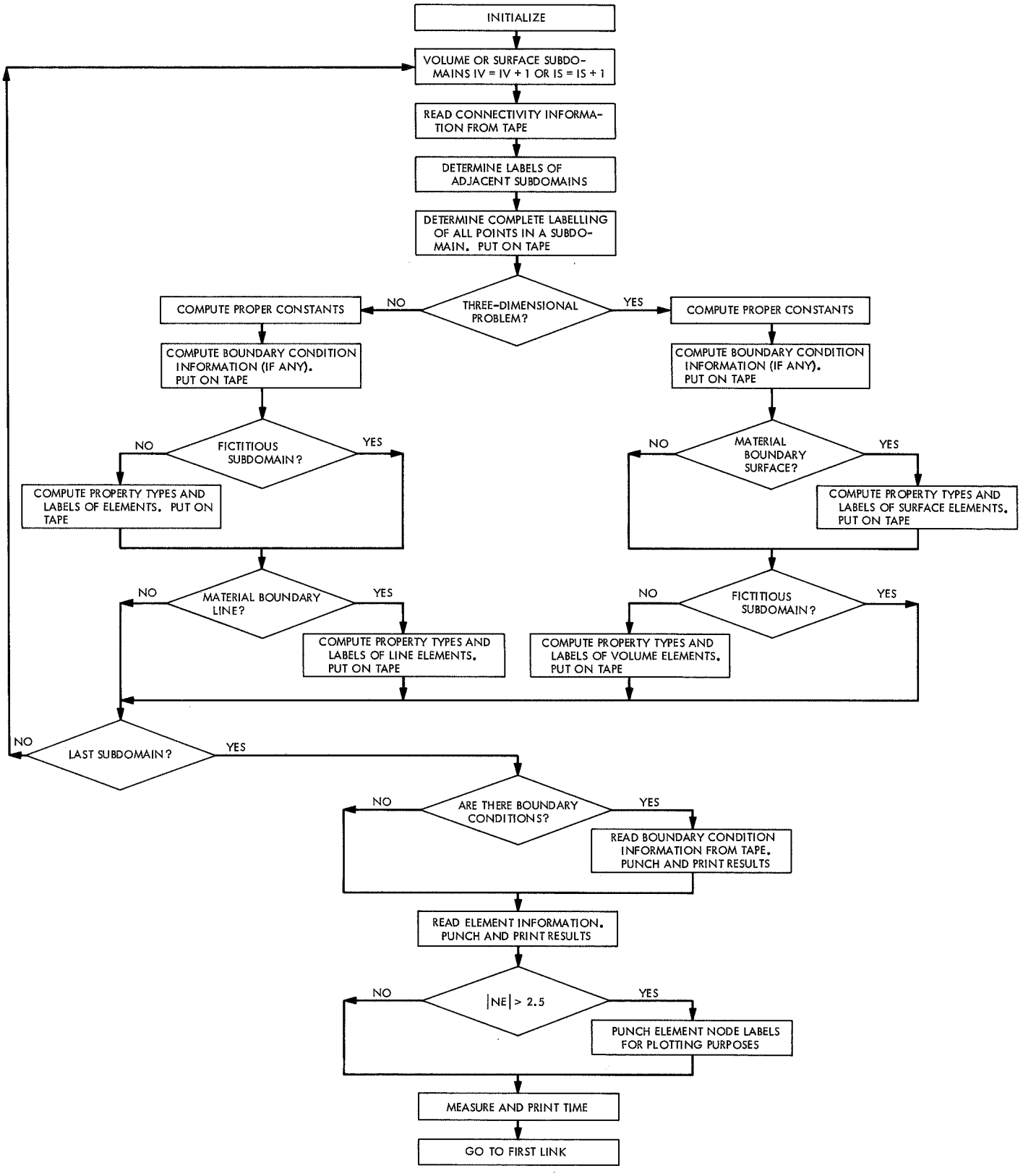

Fig. 3. Flow chart for link 3

FORTRAN and FAP Programs—Link 3

```
CFAMN3                                                                  FAMN3000
      DIMENSION A(23850),IA(23850),XO(50),YO(50),ZO(50),NMATE(50)       FAMN3001
     1,NFL(50,6),MDM(100),MELMA(100),MPRTI(100),MTETG(100),MBOVR(100)   FAMN3002
     2,ML(100,4),IDM(200),IELMA(200),IPRTE(200),IGYGZ(200),IARMX(200)   FAMN3003
     3,IMYMZ(200),IMFBO(200),IDTNR(200),IFL(200,3),AN(2000),IBON(50,4)  FAMN3004
     4,BORC(50,8),NCL(200),XIR(100),YIR(100),ZIR(100),NX(50),NY(50)     FAMN3005
     5,NZ(50)                                                           FAMN3006
      COMMON A                                                          FAMN3007
      EQUIVALENCE (A,IA),(A(1001),XO),(A(1051),YO),(A(1101),ZO)         FAMN3008
     1,(A(1151),NMATE),(A(1201),NFL),(A(1501),MDM),(A(1601),MELMA)      FAMN3009
     2,(A(1701),MPRTI),(A(1801),MTETG),(A(1901),MBOVR),(A(2001),ML)     FAMN3010
     3,(A(2401),IDM),(A(2601),IELMA),(A(2801),IPRTE),(A(3001),IGYGZ)    FAMN3011
     4,(A(3201),IARMX),(A(3401),IMYMZ),(A(3601),IMFBO),(A(3801),IDTNR)  FAMN3012
     5,(A(4001),IFL),(A(4601),AN),(A(6601),IBON),(A(6801),BORC)         FAMN3013
     6,(A(7201),NCL),(A(7401),XIR),(A(7501),YIR),(A(7601),ZIR)          FAMN3014
     7,(A(7701),NX),(A(7751),NY),(A(7801),NZ)                           FAMN3015
      EQUIVALENCE (A(1),NE),(A(2),NVOL),(A(3),NSUR),(A(4),NLIN)         FAMN3016
     1,(A(5),LNG),(A(6),ISDE),(A(7),NC),(A(8),IO),(A(9),CF),(A(10),XMI) FAMN3017
     2,(A(11),YMI),(A(12),ZMI),(A(13),XMX),(A(14),YMX),(A(15),ZMX)      FAMN3018
     3,(A(16),IBOT),(A(17),SCX),(A(18),SCY),(A(19),SCZ),(A(20),DER)     FAMN3019
     4,(A(21),ER),(A(22),TER),(A(23),NN),(A(24),XNN),(A(25),NNP)        FAMN3020
     5,(A(26),KR)                                                       FAMN3021
      DIMENSION NCN(8000),MCM(8000),NCC(1000),MCC(1000),IBT(16)         FAMN3022
      EQUIVALENCE (A(7851),NCN),(A(15851),MCM),(AN(1),NCC)              FAMN3023
     1,(AN(1001),MCC)                                                   FAMN3024
      EQUIVALENCE (A(30),IV,IS),(A(31),NB),(A(32),NS),(A(33),NCB)       FAMN3025
     1,(A(34),NCS),(A(35),NTP),(A(36),IR),(A(37),IARR),(A(38),NXR)      FAMN3026
     2,(A(39),NYR),(A(40),NZR),(A(41),NXQ),(A(42),NYQ),(A(43),NZQ)      FAMN3027
     3,(A(58),IP),(A(59),IBT),(A(75),NCT),(A(76),NEX),(A(77),NEY)       FAMN3028
     4,(A(78),NEZ),(A(79),NEZP),(A(80),ISON),(A(81),NBAS),(A(82),NSON)  FAMN3029
     5,(A(83),NFRK),(A(84),NFRZ),(A(85),NBZ),(A(86),IELT),(A(87),IMAT)  FAMN3030
     6,(A(88),IPRS),(A(89),ITEM),(A(90),ITGY),(A(91),ITGZ),(A(92),IARE) FAMN3031
     7,(A(93),IMMX),(A(94),IMMY),(A(95),IMMZ),(A(96),IMFI),(A(97),JBON) FAMN3032
     8,(A(98),NONX),(A(99),NON1),(A(100),NON2),(A(101),NON3)            FAMN3033
     9,(A(102),NON4),(A(103),NCDI),(A(104),KPL),(A(105),NBO)            FAMN3034
      CALL TICK (ITM)                                                   FAMN3035
      REWIND 3                                                          FAMN3036
      REWIND 4                                                          FAMN3037
      REWIND 8                                                          FAMN3038
      REWIND 9                                                          FAMN3039
      DO 50 I=1,50                                                      FAMN3040
      NX(I)=IA(I+300)                                                   FAMN3041
      NY(I)=IA(I+350)                                                   FAMN3042
      NZ(I)=IA(I+400)                                                   FAMN3043
   50 CONTINUE                                                          FAMN3044
      DO 100 I=151,1150                                                 FAMN3045
  100 A(I)=0.                                                           FAMN3046
      IP=IP+NC                                                          FAMN3047
      NBO=0                                                             FAMN3048
      NC=1                                                              FAMN3049
      NB=1                                                              FAMN3050
      NVSU=NVOL                                                         FAMN3051
      IRSO=6                                                            FAMN3052
      IF (NVSU) 110,110,120                                             FAMN3053
  110 NVSU=NSUR                                                         FAMN3054
      IRSO=4                                                            FAMN3055
  120 DO 300 IS=1,NVSU                                                  FAMN3056
      IS=IS                                                             FAMN3057
      NXR=NX(IS)+1                                                      FAMN3058
      NYR=NY(IS)+1                                                      FAMN3059
      DO 200 II=1,NXR                                                   FAMN3060
      DO 200 JJ=1,NYR                                                   FAMN3061
      NS=NB+NZ(IS)                                                      FAMN3062
      READ TAPE 4,(NCN(I),I=NB,NS)                                      FAMN3063
      WRITE TAPE 3,(NCN(I),I=NB,NS)                                     FAMN3064
      NB=NS+1                                                           FAMN3065
  200 CONTINUE                                                          FAMN3066
  300 CONTINUE                                                          FAMN3067
      REWIND 3                                                          FAMN3068
      REWIND 4                                                          FAMN3069
      NCT=0                                                             FAMN3070
      DO 305 I=1,250                                                    FAMN3071
  305 XIR(I)=0.                                                         FAMN3072
      DO 2000 IS=1,NVSU                                                 FAMN3073
      NTP=4                                                             FAMN3074
      CALL KOSU (IS,IS,NCN)                                             FAMN3075
      NTP=3                                                             FAMN3076
      DO 400 IR=1,IRSO                                                  FAMN3077
      IF (NVOL) 310,310,320                                             FAMN3078
  310 IARR=100                                                          FAMN3079
      CALL ARBU (IS,IR,ML)                                              FAMN3080
      GO TO 400                                                         FAMN3081
  320 IARR=50                                                           FAMN3082
      CALL ARBU (IS,IR,NFL)                                             FAMN3083
  400 CONTINUE                                                          FAMN3084
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      NEX=NX(IS)                                                        FAMN3085
      NEY=NY(IS)                                                        FAMN3086
      NEZ=NZ(IS)                                                        FAMN3087
      IF (NVOL) 410,410,1010                                            FAMN3088
  410 CALL LEKI                                                         FAMN3089
      GO TO 2000                                                        FAMN3090
 1010 CALL SEVE                                                         FAMN3091
      IF (NMATE(IS)) 2000,2000,1020                                     FAMN3092
 1020 CALL TEVE                                                         FAMN3093
 2000 CONTINUE                                                          FAMN3094
      REWIND 9                                                          FAMN3095
      IE=NCT                                                            FAMN3096
      IF(NBO) 2120,2120,2010                                            FAMN3097
 2010 NBAS=10001                                                        FAMN3098
      NCT=9996                                                          FAMN3099
      REWIND 8                                                          FAMN3100
      DO 2100 I=1,NBO                                                   FAMN3101
      NCT=NCT+5                                                         FAMN3102
      READ TAPE 8,IA(NCT),IA(NCT+1),IA(NCT+2),IA(NCT+3),A(NCT+4)        FAMN3103
      IF (NCT-19996) 2100,2050,2050                                     FAMN3104
 2050 PUNCH 2,(IA(I),IA(I+1),IA(I+2),IA(I+3),A(I+4),I=10001,20000,5)    FAMN3105
      NCT=9996                                                          FAMN3106
 2100 CONTINUE                                                          FAMN3107
      NSON=NBAS+NCT-9997                                                FAMN3108
      IF (NSON-NBAS) 2120,2120,2110                                     FAMN3109
 2110 PUNCH 2,(IA(I),IA(I+1),IA(I+2),IA(I+3),A(I+4),I=NBAS,NSON,5)      FAMN3110
      WRITE OUTPUT TAPE 6,2,(IA(I),IA(I+1),IA(I+2),IA(I+3),A(I+4),I=NBASFAMN3111
     1,NSON,5)                                                          FAMN3112
 2120 NBAS=10001                                                        FAMN3113
      NCT=10000                                                         FAMN3114
      DO 4000 I=1,IE                                                    FAMN3115
      READ TAPE 9,NCDI,KPL                                              FAMN3116
      READ TAPE 9,(IBT(J),J=1,NCDI)                                     FAMN3117
      DO 3100 J=1,NCDI                                                  FAMN3118
      NCT=NCT+1                                                         FAMN3119
      IA(NCT)=IBT(J)                                                    FAMN3120
      IF (NCT-20000) 3100,3050,3050                                     FAMN3121
 3050 PUNCH 3,(IA(K),K=10001,20000)                                     FAMN3122
      NCT=10000                                                         FAMN3123
 3100 CONTINUE                                                          FAMN3124
 4000 CONTINUE                                                          FAMN3125
      NSON=NCT+NBAS-10001                                               FAMN3126
      IF (NSON-NBAS) 4020,4020,4010                                     FAMN3127
 4010 PUNCH 3,(IA(K),K=NBAS,NSON)                                       FAMN3128
      WRITE OUTPUT TAPE 6,7,(IA(K),K=NBAS,NSON)                         FAMN3129
    7 FORMAT (1X,20I4)                                                  FAMN3130
    2 FORMAT (5(I4,I1,I4,I1,F6.3))                                      FAMN3131
    3 FORMAT (20I4)                                                     FAMN3132
 4020 CONTINUE                                                          FAMN3133
      PUNCH 4,IP,NBO,IE                                                 FAMN3134
      WRITE OUTPUT TAPE 6,4,IP,NBO,IE                                   FAMN3135
    4 FORMAT (13HONO. OF NODES,I5,11H  NO. OF BC,I5,13H  NO. OF ELTS,I5,FAMN3136
     125X,3HEND//)                                                      FAMN3137
 4030 NBAS=10001                                                        FAMN3138
      XNE=NE                                                            FAMN3139
      IF (ABSF(XNE)-2.5) 5000,5000,4040                                 FAMN3140
 4040 REWIND 9                                                          FAMN3141
      NCT=10000                                                         FAMN3142
      DO 4300 I=1,IE                                                    FAMN3143
      DO 4100 J=1,16                                                    FAMN3144
 4100 IBT(J)=0                                                          FAMN3145
      READ TAPE 9,NCDI,KPL                                              FAMN3146
      READ TAPE 9,(IBT(J),J=1,NCDI)                                     FAMN3147
      DO 4200 J=1,5                                                     FAMN3148
      NCT=NCT+1                                                         FAMN3149
      GO TO (4110,4120,4130,4140,4150),KPL                              FAMN3150
 4110 JD=0                                                              FAMN3151
      GO TO (4155,4155,4155,4155,4190),J                                FAMN3152
 4120 JD=1                                                              FAMN3153
      GO TO (4155,4155,4155,4190,4155),J                                FAMN3154
 4130 JD=0                                                              FAMN3155
      GO TO 4155                                                        FAMN3156
 4140 JD=1                                                              FAMN3157
      GO TO 4155                                                        FAMN3158
 4150 JB=NCDI+J-2                                                       FAMN3159
      GO TO 4160                                                        FAMN3160
 4155 JB=NCDI+J+JD-4                                                    FAMN3161
 4160 IA(NCT)=IBT(JB)                                                   FAMN3162
      GO TO 4200                                                        FAMN3163
 4190 IA(NCT)=IBT(NCDI-3)                                               FAMN3164
 4200 CONTINUE                                                          FAMN3165
      IF (NCT-20000) 4300,4210,4210                                     FAMN3166
 4210 PUNCH 3,(IA(K),K=10001,20000)                                     FAMN3167
      NBAS=NBAS+NCT                                                     FAMN3168
      NCT=10000                                                         FAMN3169
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 4300 CONTINUE                                                          FAMN3170
      NSON=NBAS+NCT-10001                                               FAMN3171
      IF (NSON-NBAS) 5000,5000,4310                                     FAMN3172
 4310 PUNCH 3,(IA(K),K=NBAS,NSON)                                       FAMN3173
      WRITE OUTPUT TAPE 6,7,(IA(K),K=NBAS,NSON)                         FAMN3174
 5000 CONTINUE                                                          FAMN3175
      CALL TICK (ITM)                                                   FAMN3176
      XTM=ITM                                                           FAMN3177
      XTM=XTM/60.                                                       FAMN3178
      WRITE OUTPUT TAPE 6,5,XTM                                         FAMN3179
    5 FORMAT (32HOGENERATION OF ELEMENT DATA TOOK,8X,F8.2,9H SECONDS.//)FAMN3180
      CALL CHAIN (1,2)                                                  FAMN3181
      END                                                               FAMN3182
CFAABU                                                                  FAABU000
      SUBROUTINE ARBU (IS,IR,LDM)                                       FAABU001
      DIMENSION A(23850),IA(23850),XO(50),YO(50),ZO(50),NMATE(50)       FAABU002
     1,NFL(50,6),MDM(100),MELMA(100),MPRTI(100),MTETG(100),MBOVR(100)   FAABU003
     2,ML(100,4),IDM(200),IELMA(200),IPRTE(200),IGYGZ(200),IARMX(200)   FAABU004
     3,IMYMZ(200),IMFBO(200),IDTNR(200),IFL(200,3),AN(2000),IBON(50,4)  FAABU005
     4,BORC(50,8),NCL(200),XIR(100),YIR(100),ZIR(100),NX(50),NY(50)     FAABU006
     5,NZ(50)                                                           FAABU007
      COMMON A                                                          FAABU008
      EQUIVALENCE (A,IA),(A(1001),XO),(A(1051),YO),(A(1101),ZO)         FAABU009
     1,(A(1151),NMATE),(A(1201),NFL),(A(1501),MDM),(A(1601),MELMA)      FAABU010
     2,(A(1701),MPRTI),(A(1801),MTETG),(A(1901),MBOVR),(A(2001),ML)     FAABU011
     3,(A(2401),IDM),(A(2601),IELMA),(A(2801),IPRTE),(A(3001),IGYGZ)    FAABU012
     4,(A(3201),IARMX),(A(3401),IMYMZ),(A(3601),IMFBO),(A(3801),IDTNR)  FAABU013
     5,(A(4001),IFL),(A(4601),AN),(A(6601),IBON),(A(6801),BORC)         FAABU014
     6,(A(7201),NCL),(A(7401),XIR),(A(7501),YIR),(A(7601),ZIR)          FAABU015
     7,(A(7701),NX),(A(7751),NY),(A(7801),NZ)                           FAABU016
      EQUIVALENCE (A(1),NE),(A(2),NVOL),(A(3),NSUR),(A(4),NLIN)         FAABU017
     1,(A(5),LNG),(A(6),ISDE),(A(7),NC),(A(8),IO),(A(9),CF),(A(10),XMI) FAABU018
     2,(A(11),YMI),(A(12),ZMI),(A(13),XMX),(A(14),YMX),(A(15),ZMX)      FAABU019
     3,(A(16),IBOT),(A(17),SCX),(A(18),SCY),(A(19),SCZ),(A(20),DER)     FAABU020
     4,(A(21),ER),(A(22),TER),(A(23),NN),(A(24),XNN),(A(25),NNP)        FAABU021
     5,(A(26),KR)                                                       FAABU022
      DIMENSION NCN(8000),MCM(8000),NCC(1000),MCC(1000)                 FAABU023
      EQUIVALENCE (A(7851),NCN),(A(15851),MCM),(AN(1),NCC)              FAABU024
     1,(AN(1001),MCC)                                                   FAABU025
      EQUIVALENCE                (A(31),NB),(A(32),NS),(A(33),NCB)      FAABU026
     1,(A(34),NCS),(A(35),NTP)           ,(A(37),IARR),(A(38),NXR)      FAABU027
     2,(A(39),NYR),(A(40),NZR),(A(41),NXQ),(A(42),NYQ),(A(43),NZQ)      FAABU028
     3,(A(44),IBT),(A(58),IP)                                           FAABU029
      DIMENSION LDM(1)                                                  FAABU030
      IS=IS                                                             FAABU031
      IR=IR                                                             FAABU032
      NXR=NX(IS)+1                                                      FAABU033
      NYR=NY(IS)+1                                                      FAABU034
      NZR=NZ(IS)+1                                                      FAABU035
      GO TO (110,120,130,140,150,160),IR                                FAABU036
  110 IQ=2                                                              FAABU037
      NBR=1                                                             FAABU038
      NSR=NYR*NZR                                                       FAABU039
      NDR=1                                                             FAABU040
      CALL KEBU (IS,IR,IQ,LDM)                                          FAABU041
      NBQ=(NXQ-1)*NYQ*NZQ+1                                             FAABU042
      NSQ=NBQ+NYQ*NZQ-1                                                 FAABU043
      NDQ=1                                                             FAABU044
      GO TO 190                                                         FAABU045
  120 IQ=1                                                              FAABU046
      NBR=(NXR-1)*NYR*NZR+1                                             FAABU047
      NSR=NBR+NYR*NZR-1                                                 FAABU048
      CALL KEBU (IS,IR,IQ,LDM)                                          FAABU049
      NBQ=1                                                             FAABU050
      NSQ=NYQ*NZQ                                                       FAABU051
      GO TO 190                                                         FAABU052
  130 IQ=4                                                              FAABU053
      NBR=1                                                             FAABU054
      NSR=NXR*NYR*NZR                                                   FAABU055
      NDR=NYR*NZR                                                       FAABU056
      CALL KEBU (IS,IR,IQ,LDM)                                          FAABU057
      NBQ=(NYQ-1)*NZQ+1                                                 FAABU058
      NSQ=NXQ*NYQ*NZQ                                                   FAABU059
      NDQ=NYQ*NZQ                                                       FAABU060
      GO TO 190                                                         FAABU061
  140 IQ=3                                                              FAABU062
      NBR=(NYR-1)*NZR+1                                                 FAABU063
      CALL KEBU (IS,IR,IQ,LDM)                                          FAABU064
      NBQ=1                                                             FAABU065
      NSQ=NXQ*NYQ*NZQ                                                   FAABU066
      NDQ=NYQ*NZQ                                                       FAABU067
      GO TO 190                                                         FAABU068
  150 IQ=6                                                              FAABU069
      NBR=1                                                             FAABU070
      NDR=NZR                                                           FAABU071
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      CALL KEBU (IS,IR,IQ,LDM)                                          FAABU072
      NBQ=NZQ                                                           FAABU073
      NSQ=NXQ*NYQ*NZQ                                                   FAABU074
      NDQ=NZQ                                                           FAABU075
      GO TO 190                                                         FAABU076
  160 IQ=5                                                              FAABU077
      NBR=NZR                                                           FAABU078
      CALL KEBU (IS,IR,IQ,LDM)                                          FAABU079
      NBQ=1                                                             FAABU080
      NSQ=NXQ*NYQ*NZQ                                                   FAABU081
      NDQ=NZQ                                                           FAABU082
  190 IF (LNG) 510,510,200                                              FAABU083
  200 CALL SECE (IR,NZR,NBR,NSR,NDR,NCN,NCC,NCR)                        FAABU084
      CALL SECE (IR,NZQ,NBQ,NSQ,NDQ,MCM,MCC,MCQ)                        FAABU085
      IF (NCR-MCQ) 9000,210,9000                                        FAABU086
  210 DO 300 I=1,NCR                                                    FAABU087
      IF (NCC(I)*MCC(I)) 9000,220,9000                                  FAABU088
  220 IF (NCC(I)) 9000,230,300                                          FAABU089
  230 NCC(I)=MCC(I)                                                     FAABU090
  300 CONTINUE                                                          FAABU091
      L=0                                                               FAABU092
      DO 500 I=NBR,NSR,NDR                                              FAABU093
      IF ((IR-3)*(IR-4)) 410,310,410                                    FAABU094
  310 NSI=I+NZR-1                                                       FAABU095
      DO 400 J=I,NSI                                                    FAABU096
      L=L+1                                                             FAABU097
      NCN(J)=NCC(L)                                                     FAABU098
  400 CONTINUE                                                          FAABU099
      GO TO 500                                                         FAABU100
  410 L=L+1                                                             FAABU101
      NCN(I)=NCC(L)                                                     FAABU102
  500 CONTINUE                                                          FAABU103
  510 RETURN                                                            FAABU104
 9000 WRITE OUTPUT TAPE 6,2,IS                                          FAABU105
    2 FORMAT (51H ERROR PROBABLY IN THE CONNECTIVITY INFORMATIONS OF,I6,FAABU106
     112HTH SUBDOMAIN)                                                  FAABU107
      GO TO 510                                                         FAABU108
      END                                                               FAABU109
CFABUN                                                                  FABUN000
      SUBROUTINE BOUN                                                   FABUN001
      DIMENSION A(23850),IA(23850),XO(50),YO(50),ZO(50),NMATE(50)       FABUN002
     1,NFL(50,6),MDM(100),MELMA(100),MPRTI(100),MTETG(100),MBOVR(100)   FABUN003
     2,ML(100,4),IDM(200),IELMA(200),IPRTE(200),IGYGZ(200),IARMX(200)   FABUN004
     3,IMYMZ(200),IMFBO(200),IDTNR(200),IFL(200,3),AN(2000),IBON(50,4)  FABUN005
     4,BORC(50,8),NCL(200),XIR(100),YIR(100),ZIR(100),NX(50),NY(50)     FABUN006
     5,NZ(50)                                                           FABUN007
      COMMON A                                                          FABUN008
      EQUIVALENCE (A,IA),(A(1001),XO),(A(1051),YO),(A(1101),ZO)         FABUN009
     1,(A(1151),NMATE),(A(1201),NFL),(A(1501),MDM),(A(1601),MELMA)      FABUN010
     2,(A(1701),MPRTI),(A(1801),MTETG),(A(1901),MBOVR),(A(2001),ML)     FABUN011
     3,(A(2401),IDM),(A(2601),IELMA),(A(2801),IPRTE),(A(3001),IGYGZ)    FABUN012
     4,(A(3201),IARMX),(A(3401),IMYMZ),(A(3601),IMFBO),(A(3801),IDTNR)  FABUN013
     5,(A(4001),IFL),(A(4601),AN),(A(6601),IBON),(A(6801),BORC)         FABUN014
     6,(A(7201),NCL),(A(7401),XIR),(A(7501),YIR),(A(7601),ZIR)          FABUN015
     7,(A(7701),NX),(A(7751),NY),(A(7801),NZ)                           FABUN016
      EQUIVALENCE (A(1),NE),(A(2),NVOL),(A(3),NSUR),(A(4),NLIN)         FABUN017
     1,(A(5),LNG),(A(6),ISDE),(A(7),NC),(A(8),IO),(A(9),CF),(A(10),XMI) FABUN018
     2,(A(11),YMI),(A(12),ZMI),(A(13),XMX),(A(14),YMX),(A(15),ZMX)      FABUN019
     3,(A(16),IBOT),(A(17),SCX),(A(18),SCY),(A(19),SCZ),(A(20),DER)     FABUN020
     4,(A(21),ER),(A(22),TER),(A(23),NN),(A(24),XNN),(A(25),NNP)        FABUN021
     5,(A(26),KR)                                                      FABUN022
      DIMENSION NCN(8000),MCM(8000),NCC(1000),MCC(1000),IBT(16)         FABUN023
      EQUIVALENCE (A(7851),NCN),(A(15851),MCM),(AN(1),NCC)              FABUN024
     1,(AN(1001),MCC)                                                   FABUN025
      EQUIVALENCE (A(30),IV,IS),(A(31),NB),(A(32),NS),(A(33),NCB)       FABUN026
     1,(A(34),NCS),(A(35),NTP),(A(36),IR),(A(37),IARR),(A(38),NXR)      FABUN027
     2,(A(39),NYR),(A(40),NZR),(A(41),NXQ),(A(42),NYQ),(A(43),NZQ)      FABUN028
     3,(A(58),IP),(A(59),IBT),(A(75),NCT),(A(76),NEX),(A(77),NEY)       FABUN029
     4,(A(78),NEZ),(A(79),NEZP),(A(80),ISON),(A(81),NBAS),(A(82),NSON)  FABUN030
     5,(A(83),NFRK),(A(84),NFRZ),(A(85),NBZ),(A(86),IELT),(A(87),IMAT)  FABUN031
     6,(A(88),IPRS),(A(89),ITEM),(A(90),ITGY),(A(91),ITGZ),(A(92),IARE) FABUN032
     7,(A(93),IMMX),(A(94),IMMY),(A(95),IMMZ),(A(96),IMFI),(A(97),JBON) FABUN033
     8,(A(98),NONX),(A(99),NON1),(A(100),NON2),(A(101),NON3)            FABUN034
     9,(A(102),NON4),(A(103),NCDI),(A(104),KPL)                         FABUN035
      DO 490 J=1,4                                                      FABUN036
      J4=4*J                                                            FABUN037
      IBT(J4-3)=IBON(JBON,J)/1000                                       FABUN038
      IBT(J4-2)=IBON(JBON,J)/100-10*IBT(J4-3)                           FABUN039
      IBT(J4-1)=IBON(JBON,J)/10-10*IBT(J4-2)-100*IBT(J4-3)              FABUN040
      IBT(J4)=IBON(JBON,J)-10*IBT(J4-1)-100*IBT(J4-2)-1000*IBT(J4-3)    FABUN041
  490 CONTINUE                                                          FABUN042
      DO 500 I=1,8                                                      FABUN043
      I=I                                                               FABUN044
      IF (IBT(2*I)) 510,510,500                                         FABUN045
  500 CONTINUE                                                          FABUN046
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  510 ISON=I-1                                                                  FABUN047
      RETURN                                                                    FABUN048
      END                                                                       FABUN049
CFAKBU                                                                          FAKBU000
      SUBROUTINE KEBU (IS,IR,IQ,LDM)                                            FAKBU001
      DIMENSION A(23850),IA(23850),XO(50),YO(50),ZO(50),NMATE(50)               FAKBU002
     1,NFL(50,6),MDM(100),MELMA(100),MPRTI(100),MTETG(100),MBOVR(100)           FAKBU003
     2,ML(100,4),IDM(200),IELMA(200),IPRTE(200),IGYGZ(200),IARMX(200)           FAKBU004
     3,IMYMZ(200),IMFBO(200),IDTNR(200),IFL(200,3),AN(2000),IBON(50,4)          FAKBU005
     4,BORC(50,8),NCL(200),XIR(100),YIR(100),ZIR(100),NX(50),NY(50)             FAKBU006
     5,NZ(50)                                                                   FAKBU007
      COMMON A                                                                  FAKBU008
      EQUIVALENCE (A,IA),(A(1001),XO),(A(1051),YO),(A(1101),ZO)                 FAKBU009
     1,(A(1151),NMATE),(A(1201),NFL),(A(1501),MDM),(A(1601),MELMA)              FAKBU010
     2,(A(1701),MPRTI),(A(1801),MTETG),(A(1901),MBOVR),(A(2001),ML)             FAKBU011
     3,(A(2401),IDM),(A(2601),IELMA),(A(2801),IPRTE),(A(3001),IGYGZ)            FAKBU012
     4,(A(3201),IARMX),(A(3401),IMYMZ),(A(3601),IMFBO),(A(3801),IDTNR)          FAKBU013
     5,(A(4001),IFL),(A(4601),AN),(A(6601),IBON),(A(6801),BORC)                 FAKBU014
     6,(A(7201),NCL),(A(7401),XIR),(A(7501),YIR),(A(7601),ZIR)                  FAKBU015
     7,(A(7701),NX),(A(7751),NY),(A(7801),NZ)                                   FAKBU016
      EQUIVALENCE (A(1),NE),(A(2),NVOL),(A(3),NSUR),(A(4),NLIN)                 FAKBU017
     1,(A(5),LNG),(A(6),ISDE),(A(7),NC),(A(8),IO),(A(9),CF),(A(10),XMI)         FAKBU018
     2,(A(11),YMI),(A(12),ZMI),(A(13),XMX),(A(14),YMX),(A(15),ZMX)              FAKBU019
     3,(A(16),IBOT),(A(17),SCX),(A(18),SCY),(A(19),SCZ),(A(20),DER)             FAKBU020
     4,(A(21),ER),(A(22),TER),(A(23),NN),(A(24),XNN),(A(25),NNP)                FAKBU021
     5,(A(26),KR)                                                              FAKBU022
      DIMENSION NCN(8000),MCM(8000),NCC(1000),MCC(1000)                         FAKBU023
      EQUIVALENCE (A(7851),NCN),(A(15851),MCM),(AN(1),NCC)                      FAKBU024
     1,(AN(1001),MCC)                                                           FAKBU025
      EQUIVALENCE                (A(31),NB),(A(32),NS),(A(33),NCB)              FAKBU026
     1,(A(34),NCS),(A(35),NTP)           ,(A(37),IARR),(A(38),NXR)              FAKBU027
     2,(A(39),NYR),(A(40),NZR),(A(41),NXQ),(A(42),NYQ),(A(43),NZQ)              FAKBU028
     3,(A(44),IBT),(A(58),IP)                                                   FAKBU029
      DIMENSION LDM(1)                                                          FAKBU030
      LNG=0                                                                     FAKBU031
      LNR=(IR-1)*IARR+IS                                                        FAKBU032
      DO 100 II=1,NSUR                                                          FAKBU033
      LNQ=(IQ-1)*IARR+II                                                        FAKBU034
      IF (LDM(LNR)-LDM(LNQ)) 100,110,100                                        FAKBU035
  100 CONTINUE                                                                  FAKBU036
      GO TO 300                                                                 FAKBU037
  110 LNG=1                                                                     FAKBU038
      NXQ=NX(II)+1                                                              FAKBU039
      NYQ=NY(II)+1                                                              FAKBU040
      NZQ=NZ(II)+1                                                              FAKBU041
      CALL KOSU (LNG,II,MCM)                                                    FAKBU042
      REWIND NTP                                                                FAKBU043
  300 RETURN                                                                    FAKBU044
      END                                                                       FAKBU045
CFAKSU                                                                          FAKSU000
      SUBROUTINE KOSU (NCB,NCS,NDM)                                             FAKSU001
      DIMENSION A(23850),IA(23850),XO(50),YO(50),ZO(50),NMATE(50)               FAKSU002
     1,NFL(50,6),MDM(100),MELMA(100),MPRTI(100),MTETG(100),MBOVR(100)           FAKSU003
     2,ML(100,4),IDM(200),IELMA(200),IPRTE(200),IGYGZ(200),IARMX(200)           FAKSU004
     3,IMYMZ(200),IMFBO(200),IDTNR(200),IFL(200,3),AN(2000),IBON(50,4)          FAKSU005
     4,BORC(50,8),NCL(200),XIR(100),YIR(100),ZIR(100),NX(50),NY(50)             FAKSU006
     5,NZ(50)                                                                   FAKSU007
      COMMON A                                                                  FAKSU008
      EQUIVALENCE (A,IA),(A(1001),XO),(A(1051),YO),(A(1101),ZO)                 FAKSU009
     1,(A(1151),NMATE),(A(1201),NFL),(A(1501),MDM),(A(1601),MELMA)              FAKSU010
     2,(A(1701),MPRTI),(A(1801),MTETG),(A(1901),MBOVR),(A(2001),ML)             FAKSU011
     3,(A(2401),IDM),(A(2601),IELMA),(A(2801),IPRTE),(A(3001),IGYGZ)            FAKSU012
     4,(A(3201),IARMX),(A(3401),IMYMZ),(A(3601),IMFBO),(A(3801),IDTNR)          FAKSU013
     5,(A(4001),IFL),(A(4601),AN),(A(6601),IBON),(A(6801),BORC)                 FAKSU014
     6,(A(7201),NCL),(A(7401),XIR),(A(7501),YIR),(A(7601),ZIR)                  FAKSU015
     7,(A(7701),NX),(A(7751),NY),(A(7801),NZ)                                   FAKSU016
      EQUIVALENCE (A(1),NE),(A(2),NVOL),(A(3),NSUR),(A(4),NLIN)                 FAKSU017
     1,(A(5),LNG),(A(6),ISDE),(A(7),NC),(A(8),IO),(A(9),CF),(A(10),XMI)         FAKSU018
     2,(A(11),YMI),(A(12),ZMI),(A(13),XMX),(A(14),YMX),(A(15),ZMX)              FAKSU019
     3,(A(16),IBOT),(A(17),SCX),(A(18),SCY),(A(19),SCZ),(A(20),DER)             FAKSU020
     4,(A(21),ER),(A(22),TER),(A(23),NN),(A(24),XNN),(A(25),NNP)                FAKSU021
     5,(A(26),KR)                                                              FAKSU022
      DIMENSION NDM(8000)                                                       FAKSU023
      EQUIVALENCE (A(30),IV,IS)                                                 FAKSU024
     1           ,(A(35),NTP),(A(36),IR)                                        FAKSU025
      NCB=NCB                                                                   FAKSU026
      NCS=NCS                                                                   FAKSU027
      DO 300 ISB=NCB,NCS                                                        FAKSU028
      NXP=NX(ISB)+1                                                             FAKSU029
      NYP=NY(ISB)+1                                                             FAKSU030
      NB=1                                                                      FAKSU031
      L=0                                                                       FAKSU032
      DO 100 I=1,NS                                                             FAKSU033
  100 NDM(I)=0                                                                  FAKSU034
      DO 200 II=1,NXP                                                           FAKSU035
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      DO 200 JJ=1,NYP                                                    FAKSU036
      NS=NB+NZ(ISB)                                                      FAKSU037
      READ TAPE NTP,(NDM(I),I=NB,NS)                                     FAKSU038
      NB=NS+1                                                            FAKSU039
  200 CONTINUE                                                           FAKSU040
  300 CONTINUE                                                           FAKSU041
      RETURN                                                             FAKSU042
      END                                                                FAKSU043
*      FAP                                                             FALSN000
       COUNT   100                                                       FALSN001
       LBL     E1LEDE                                                    FALSN002
       REM                                                               FALSN003
*      THIS SUBPROGRAM IS CALLED USING FORTRAN 'SUBROUTINE' CONVENTIONS.FALSN004
*      CALLING SEQUENCE IS...                                          FALSN005
*            CALL SEBIN(A,I,N)                                         FALSN006
*      WHERE  'A' IS THE NAME OF A WORD (VARIABLE).                    FALSN007
*             'I' IS FTN INTEGER SPECIFYING DESIRED BIT (1-36) IN 'A'. FALSN008
*             'N' IS A FORTRAN INTEGER ONE OR ZERO INDICATING THE NEW  FALSN009
*                 VALUE OF THE I'TH BIT OF 'A'.                        FALSN010
       REM                                                              FALSN011
       ENTRY   SEBIN                                                    FALSN012
       ENTRY   LEBIN                                                    FALSN013
       REM                                                              FALSN014
       EVEN                                                             FALSN015
       NAC                                                              FALSN016
SEBIN  EQU     *                                                        FALSN017
       STI     INDKTR          SAVE INDICATORS                          FALSN018
       SXA     SAVX1,1         AND XR1                                  FALSN019
       LDI*    1,4             RESET                                    FALSN020
       CLA*    2,4                                                      FALSN021
       PDC     ,1                                                       FALSN022
       ZET*    3,4             DO WE SET OR RESET                       FALSN023
       TRA     SET             SET                                      FALSN024
       RIS     TABLE,1         RESET                                    FALSN025
       TRA     EXIT                                                     FALSN026
       EVEN                                                             FALSN027
SET    OSI     TABLE,1                                                  FALSN028
EXIT   STI*    1,4                                                      FALSN029
SAVX1  AXT     **,1                                                     FALSN030
       LDI     INDKTR                                                   FALSN031
       TRA     4,4                                                      FALSN032
       REM                                                              FALSN033
INDKTR PZE     **                                                       FALSN034
TABLE  PZE     0                                                        FALSN035
       MZE                                                              FALSN036
       DEC     1B1,1B2,1B3,1B4,1B5,1B6,1B7,1B8,1B9,1B10,1B11,1B12       FALSN037
       DEC     1B13,1B14,1B15,1B16,1B17,1B18,1B19,1B20,1B21,1B22        FALSN038
       DEC     1B23,1B24,1B25,1B26,1B27,1B28,1B29,1B30,1B31,1B32        FALSN039
       DEC     1B33,1B34,1B35                                           FALSN040
       SPACE   4                                                        FALSN041
*      A FUNCTION SUBPROGRAM...                                        FALSN042
*      CALLING SEQUENCE 'X=LEBIN(A,I)'                                 FALSN043
*      WHERE  'A' IS THE NAME OF A VARIABLE                            FALSN044
*             'I' IS A FTN INTEGER SPECIFYING THE DESIRED BIT IN 'A'.  FALSN045
*                 ON RETURN TO CALLER THE AC CONTAINS A FORTRAN INTEGER FALSN046
*                 ONE OR ZERO DEPENDING ON WHETHER I'TH BIT OF 'A' IS  FALSN047
*                 ONE OR ZERO.                                         FALSN048
       REM                                                              FALSN049
LEBIN  EQU     *                                                        FALSN050
       SXA     LEBX1,1                                                  FALSN051
       CAL*    2,4             THIS BIT                                 FALSN052
       PDC     ,1                                                       FALSN053
       CAL*    1,4                                                      FALSN054
       ANA     TABLE,1                                                  FALSN055
       TZE     LEBX1                                                    FALSN056
       CAL     ONE                                                      FALSN057
LEBX1  AXT     **,1                                                     FALSN058
       TRA     3,4                                                      FALSN059
       REM                                                              FALSN060
ONE    PZE     ,,1             A FORTRAN II 1                           FALSN061
       END                                                              FALSN062
CFALKI                                                                  FALKI000
      SUBROUTINE LEKI                                                   FALKI001
      DIMENSION A(23850),IA(23850),XO(50),YO(50),ZO(50),NMATE(50)       FALKI002
     1,NFL(50,6),MDM(100),MELMA(100),MPRTI(100),MTETG(100),MBOVR(100)   FALKI003
     2,ML(100,4),IDM(200),IELMA(200),IPRTE(200),IGYGZ(200),IARMX(200)   FALKI004
     3,IMYMZ(200),IMFRO(200),IDTNR(200),IFL(200,3),AN(2000),IBON(50,4)  FALKI005
     4,BORC(50,8),NCL(200),XIR(100),YIR(100),ZIR(100),NX(50),NY(50)     FALKI006
     5,NZ(50)                                                           FALKI007
      COMMON A                                                          FALKI008
      EQUIVALENCE (A,IA),(A(1001),XO),(A(1051),YO),(A(1101),ZO)         FALKI009
     1,(A(1151),NMATE),(A(1201),NFL),(A(1501),MDM),(A(1601),MELMA)      FALKI010
     2,(A(1701),MPRTI),(A(1801),MTETG),(A(1901),MBOVR),(A(2001),ML)     FALKI011
     3,(A(2401),IDM),(A(2601),IELMA),(A(2801),IPRTE),(A(3001),IGYGZ)    FALKI012
     4,(A(3201),IARMX),(A(3401),IMYMZ),(A(3601),IMFRO),(A(3801),IDTNR)  FALKI013
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     5,(A(4001),IFL),(A(4601),AN),(A(6601),IBON),(A(6801),BORC)          FALKI014
     6,(A(7201),NCL),(A(7401),XIR),(A(7501),YIR),(A(7601),ZIR)          FALKI015
     7,(A(7701),NX),(A(7751),NY),(A(7801),NZ)                           FALKI016
      EQUIVALENCE (A(1),NE),(A(2),NVOL),(A(3),NSUR),(A(4),NLIN)         FALKI017
     1,(A(5),LNG),(A(6),ISDE),(A(7),NC),(A(8),IO),(A(9),CF),(A(10),XMI) FALKI018
     2,(A(11),YMI),(A(12),ZMI),(A(13),XMX),(A(14),YMX),(A(15),ZMX)      FALKI019
     3,(A(16),IBOT),(A(17),SCX),(A(18),SCY),(A(19),SCZ),(A(20),DER)     FALKI020
     4,(A(21),ER),(A(22),TER),(A(23),NN),(A(24),XNN),(A(25),NNP)        FALKI021
     5,(A(26),KR)                                                       FALKI022
      DIMENSION NCN(8000),MCM(8000),NCC(1000),MCC(1000),IBT(16)         FALKI023
      EQUIVALENCE (A(7851),NCN),(A(15851),MCM),(AN(1),NCC)              FALKI024
     1,(AN(1001),MCC)                                                   FALKI025
      EQUIVALENCE (A(30),IV,IS),(A(31),NB),(A(32),NS),(A(33),NCB)       FALKI026
     1,(A(34),NCS),(A(35),NTP),(A(36),IR),(A(37),IARR),(A(38),NXR)      FALKI027
     2,(A(39),NYR),(A(40),NZR),(A(41),NXQ),(A(42),NYQ),(A(43),NZQ)      FALKI028
     3,(A(58),IP),(A(59),IBT),(A(75),NCT),(A(76),NEX),(A(77),NEY)       FALKI029
     4,(A(78),NEZ),(A(79),NEZP),(A(80),ISON),(A(81),NBAS),(A(82),NSON)  FALKI030
     5,(A(83),NFRK),(A(84),NFRZ),(A(85),NRZ),(A(86),IELT),(A(87),IMAT)  FALKI031
     6,(A(88),IPRS),(A(89),ITEM),(A(90),ITGY),(A(91),ITGZ),(A(92),IARE) FALKI032
     7,(A(93),IMMX),(A(94),IMMY),(A(95),IMMZ),(A(96),IMFI),(A(97),JBON) FALKI033
     8,(A(98),NONX),(A(99),NON1),(A(100),NON2),(A(101),NON3)            FALKI034
     9,(A(102),NON4),(A(103),NCDI),(A(104),KPL),(A(105),NBO)            FALKI035
      IS=IS                                                             FALKI036
      DO 800 IJ=1,4                                                     FALKI037
      DO 418 I=1,NLIN                                                   FALKI038
      IDMI=IDM(I)                                                       FALKI039
      IF (IDMI) 416,2000,417                                            FALKI040
  416 IDMI=-IDMI                                                        FALKI041
  417 IF (IDMI-ML(IS,IJ)) 418,419,418                                   FALKI042
  418 CONTINUE                                                          FALKI043
  419 IL=I                                                              FALKI044
      IELT=IELMA(IL)/100                                                FALKI045
      IMAT=IELMA(IL)-100*IELT                                           FALKI046
      IPRS=IPRTE(IL)/100                                                FALKI047
      ITEM=IPRTE(IL)-100*IPRS                                           FALKI048
      ITGY=IGYGZ(IL)/100                                                FALKI049
      ITGZ=IGYGZ(IL)-100*ITGY                                           FALKI050
      IARE=IARMX(IL)/100                                                FALKI051
      IMMX=IARMX(IL)-100*IARE                                           FALKI052
      IMMY=IMYMZ(IL)/100                                                FALKI053
      IMMZ=IMYMZ(IL)-100*IMMY                                           FALKI054
      IMFI=IMFBO(IL)/100                                                FALKI055
      JBON=IMFBO(IL)-100*IMFI                                           FALKI056
      GO TO (430,440,450,460),IJ                                        FALKI057
  430 NBAS=1                                                            FALKI058
      NSON=NEY+1                                                        FALKI059
      NFRK=1                                                            FALKI060
      GO TO 470                                                         FALKI061
  440 NBAS=NEX*(NEY+1)+1                                                FALKI062
      NSON=NBAS+NEY                                                     FALKI063
      NFRK=1                                                            FALKI064
      GO TO 470                                                         FALKI065
  450 NSON=NEX*(NEY+1)+1                                                FALKI066
      NBAS=1                                                            FALKI067
      NFRK=NEY+1                                                        FALKI068
      GO TO 470                                                         FALKI069
  460 NSON=(NEX+1)*(NEY+1)                                              FALKI070
      NBAS=NEY+1                                                        FALKI071
      NFRK=NEY+1                                                        FALKI072
  470 IF (JBON) 610,610,480                                             FALKI073
  480 CALL BOUN                                                         FALKI074
      IF (ISON) 2000,2000,520                                           FALKI075
  520 DO 600 I=NBAS,NSON,NFRK                                           FALKI076
      NND=NCN(I)                                                        FALKI077
      JW=(6*NND-1)/36+1                                                 FALKI078
      JB=6*(NND-1)-36*(JW-1)                                            FALKI079
      AW=A(JW+150)                                                      FALKI080
  530 DO 550 J=1,ISON                                                   FALKI081
      JBB=JB+IBT(2*J)                                                   FALKI082
      IF (LEBIN(AW,JBB)) 535,535,550                                    FALKI083
  535 NBO=NBO+1                                                         FALKI084
      WRITE TAPE 8,NCN(I),IBT(2*J-1),NCN(I),IBT(2*J),BORC(JBON,J)       FALKI085
      CALL SEBIN (AW,JBB,1)                                             FALKI086
      A(JW+150)=AW                                                      FALKI087
  550 CONTINUE                                                          FALKI088
  600 CONTINUE                                                          FALKI089
  610 NSON=NSON-1                                                       FALKI090
      IF (IELT) 800,800,620                                             FALKI091
  620 DO 700 IEL=NBAS,NSON,NFRK                                         FALKI092
      KPL=5                                                             FALKI093
      DO 650 I=1,16                                                     FALKI094
  650 IBT(I)=0                                                          FALKI095
      NCT=NCT+1                                                         FALKI096
      NCDI=6                                                            FALKI097
      IBT(1)=-(NCT-(NCT/1000)*1000)                                     FALKI098
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      IBT(2)=IELMA(IL)                                                  FALKI099
      IBT(3)=100*IARE+ITEM                                              FALKI100
      IBT(4)=100*ITGZ+IPRS                                              FALKI101
      IF (IELT-2) 675,680,685                                           FALKI102
  675 IBT(5)=NCN(IEL)                                                   FALKI103
      NONX=IEL+NFRK                                                     FALKI104
      IBT(6)=NCN(NONX)                                                  FALKI105
      GO TO 699                                                         FALKI106
  680 IBT(5)=100*IMMZ+ITGY                                              FALKI107
      NONX=IEL+NFRK                                                     FALKI108
      IBT(6)=NCN(IEL)                                                   FALKI109
      IBT(7)=NCN(NONX)                                                  FALKI110
      NCDI=7                                                            FALKI111
      GO TO 699                                                         FALKI112
  685 IF (IELT-4) 690,695,697                                           FALKI113
  690 IBT(4)=100*IMMX+IMMY                                              FALKI114
      GO TO 675                                                         FALKI115
  695 IBT(4)=100*IMMX+IMMY                                              FALKI116
      IBT(5)=100*IMMZ+ITGY                                              FALKI117
      IBT(6)=100*ISDZ+IMFI                                              FALKI118
      IBT(7)=IPRS                                                       FALKI119
      NONX=IEL+NFRK                                                     FALKI120
      IBT(8)=NCN(IEL)                                                   FALKI121
      IBT(9)=NCN(NONX)                                                  FALKI122
      NCDI=9                                                            FALKI123
  697 IBT(3)=100*ITIC                                                   FALKI124
      GO TO 675                                                         FALKI125
  699 WRITE TAPE 9,NCDI,KPL                                             FALKI126
      WRITE TAPE 9,(IBT(I),I=1,NCDI)                                    FALKI127
  700 CONTINUE                                                          FALKI128
      IELMA(IL)=0                                                       FALKI129
  800 CONTINUE                                                          FALKI130
      IF (MELMA(IS)) 2000,2000,820                                      FALKI131
  820 IPRS=MPRTI(IS)/100                                                FALKI132
      ITIC=MPRTI(IS)-100*IPRS                                           FALKI133
      ITEM=MTETG(IS)/100                                                FALKI134
      ITGY=MTETG(IS)-100*ITEM                                           FALKI135
      DO 900 I=1,NEX                                                    FALKI136
      DO 850 J=1,NEY                                                    FALKI137
      IF (I-1) 825,821,825                                              FALKI138
  821 IF (J-1) 823,822,823                                              FALKI139
  822 KPL=1                                                             FALKI140
      GO TO 829                                                         FALKI141
  823 KPL=2                                                             FALKI142
      GO TO 829                                                         FALKI143
  825 IF (J-1) 827,826,827                                              FALKI144
  826 KPL=3                                                             FALKI145
      GO TO 829                                                         FALKI146
  827 KPL=4                                                             FALKI147
  829 CONTINUE                                                          FALKI148
      NCT=NCT+1                                                         FALKI149
      DO 830 K=1,16                                                     FALKI150
  830 IBT(K)=0                                                          FALKI151
      IBT(1)=-(NCT-(NCT/1000)*1000)                                     FALKI152
      IBT(2)=MELMA(IS)                                                  FALKI153
      IBT(3)=100*ITIC+ITEM                                              FALKI154
      IBT(4)=100*ITGY+IPRS                                              FALKI155
      NONX=(I-1)*(NEY+1)+J                                              FALKI156
      IBT(5)=NCN(NONX)                                                  FALKI157
      NONX=NONX+1                                                       FALKI158
      IBT(8)=NCN(NONX)                                                  FALKI159
      NONX=I*(NEY+1)+J                                                  FALKI160
      IBT(6)=NCN(NONX)                                                  FALKI161
      NONX=NONX+1                                                       FALKI162
      IBT(7)=NCN(NONX)                                                  FALKI163
      NCDI=8                                                            FALKI164
      WRITE TAPE 9,NCDI,KPL                                             FALKI165
      WRITE TAPE 9,(IBT(L),L=1,NCDI)                                    FALKI166
  850 CONTINUE                                                          FALKI167
  900 CONTINUE                                                          FALKI168
 2000 RETURN                                                            FALKI169
      END                                                               FALKI170
CFASCE                                                                  FASCE000
      SUBROUTINE SECE (II,NZD,NBD,NSD,NDD,NDM,NMC,L)                    FASCE001
      DIMENSION A(23850),IA(23850),XO(50),YO(50),ZO(50),NMATE(50)       FASCE002
     1,NFL(50,6),MDM(100),MELMA(100),MPRTI(100),MTETG(100),MBOVR(100)   FASCE003
     2,ML(100,4),IDM(200),IELMA(200),IPRTE(200),IGYGZ(200),IARMX(200)   FASCE004
     3,IMYMZ(200),IMFBO(200),IDTNR(200),IFL(200,3),AN(2000),IBON(50,4)  FASCE005
     4,BORC(50,8),NCL(200),XIR(100),YIR(100),ZIR(100),NX(50),NY(50)     FASCE006
     5,NZ(50)                                                           FASCE007
      COMMON A                                                          FASCE008
      EQUIVALENCE (A,IA),(A(1001),XO),(A(1051),YO),(A(1101),ZO)         FASCE009
     1,(A(1151),NMATE),(A(1201),NFL),(A(1501),MDM),(A(1601),MELMA)      FASCE010
     2,(A(1701),MPRTI),(A(1801),MTETG),(A(1901),MBOVR),(A(2001),ML)     FASCE011
     3,(A(2401),IDM),(A(2601),IELMA),(A(2801),IPRTE),(A(3001),IGYGZ)    FASCE012
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     4,(A(3201),IARMX),(A(3401),IMYMZ),(A(3601),IMFBO),(A(3801),IDTNR)  FASCE013
     5,(A(4001),IFL),(A(4601),AN),(A(6601),IBON),(A(6801),BORC)         FASCE014
     6,(A(7201),NCL),(A(7401),XIR),(A(7501),YIR),(A(7601),ZIR)          FASCE015
     7,(A(7701),NX),(A(7751),NY),(A(7801),NZ)                           FASCE016
      EQUIVALENCE (A(1),NE),(A(2),NVOL),(A(3),NSUR),(A(4),NLIN)         FASCE017
     1,(A(5),LNG),(A(6),ISDE),(A(7),NC),(A(8),IO),(A(9),CF),(A(10),XMI) FASCE018
     2,(A(11),YMI),(A(12),ZMI),(A(13),XMX),(A(14),YMX),(A(15),ZMX)      FASCE019
     3,(A(16),IBOT),(A(17),SCX),(A(18),SCY),(A(19),SCZ),(A(20),DER)     FASCE020
     4,(A(21),ER),(A(22),TER),(A(23),NN),(A(24),XNN),(A(25),NNP)        FASCE021
     5,(A(26),KR)                                                       FASCE022
      EQUIVALENCE (A(30),IV,IS),(A(31),NB),(A(32),NS),(A(33),NCB)       FASCE023
     1,(A(34),NCS),(A(35),NTP),(A(36),IR),(A(37),IARR),(A(38),NXR)      FASCE024
     2,(A(39),NYR),(A(40),NZR),(A(41),NXQ),(A(42),NYQ),(A(43),NZQ)      FASCE025
     3,(A(44),IBT),(A(58),IP)                                           FASCE026
      DIMENSION NDM(8000),NMC(1000)                                     FASCE027
      NBD=NBD                                                           FASCE028
      NSD=NSD                                                           FASCE029
      NDD=NDD                                                           FASCE030
      L=0                                                               FASCE031
      DO 300 I=NBD,NSD,NDD                                              FASCE032
      IF ((II-3)*(II-4)) 210,110,210                                    FASCE033
  110 NSI=I+NZD-1                                                       FASCE034
      DO 200 J=I,NSI                                                    FASCE035
      L=L+1                                                             FASCE036
      NMC(L)=NDM(J)                                                     FASCE037
  200 CONTINUE                                                          FASCE038
      GO TO 300                                                         FASCE039
  210 L=L+1                                                             FASCE040
      NMC(L)=NDM(I)                                                     FASCE041
  300 CONTINUE                                                          FASCE042
      RETURN                                                            FASCE043
      END                                                               FASCE044
CFASVE                                                                  FASVE000
      SUBROUTINE SEVE                                                   FASVE001
      DIMENSION A(23850),IA(23850),XO(50),YO(50),ZO(50),NMATE(50)       FASVE002
     1,NFL(50,6),MDM(100),MELMA(100),MPRTI(100),MTETG(100),MBOVR(100)   FASVE003
     2,ML(100,4),IDM(200),IELMA(200),IPRTE(200),IGYGZ(200),IARMX(200)   FASVE004
     3,IMYMZ(200),IMFBO(200),IDTNR(200),IFL(200,3),AN(2000),IBON(50,4)  FASVE005
     4,BORC(50,8),NCL(200),XIR(100),YIR(100),ZIR(100),NX(50),NY(50)     FASVE006
     5,NZ(50)                                                           FASVE007
      COMMON A                                                          FASVE008
      EQUIVALENCE (A,IA),(A(1001),XO),(A(1051),YO),(A(1101),ZO)         FASVE009
     1,(A(1151),NMATE),(A(1201),NFL),(A(1501),MDM),(A(1601),MELMA)      FASVE010
     2,(A(1701),MPRTI),(A(1801),MTETG),(A(1901),MBOVR),(A(2001),ML)     FASVE011
     3,(A(2401),IDM),(A(2601),IELMA),(A(2801),IPRTE),(A(3001),IGYGZ)    FASVE012
     4,(A(3201),IARMX),(A(3401),IMYMZ),(A(3601),IMFBO),(A(3801),IDTNR)  FASVE013
     5,(A(4001),IFL),(A(4601),AN),(A(6601),IBON),(A(6801),BORC)         FASVE014
     6,(A(7201),NCL),(A(7401),XIR),(A(7501),YIR),(A(7601),ZIR)          FASVE015
     7,(A(7701),NX),(A(7751),NY),(A(7801),NZ)                           FASVE016
      EQUIVALENCE (A(1),NE),(A(2),NVOL),(A(3),NSUR),(A(4),NLIN)         FASVE017
     1,(A(5),LNG),(A(6),ISDE),(A(7),NC),(A(8),IO),(A(9),CF),(A(10),XMI) FASVE018
     2,(A(11),YMI),(A(12),ZMI),(A(13),XMX),(A(14),YMX),(A(15),ZMX)      FASVE019
     3,(A(16),IBOT),(A(17),SCX),(A(18),SCY),(A(19),SCZ),(A(20),DER)     FASVE020
     4,(A(21),ER),(A(22),TER),(A(23),NN),(A(24),XNN),(A(25),NNP)        FASVE021
     5,(A(26),KR)                                                       FASVE022
      DIMENSION NCN(8000),MCM(8000),NCC(1000),MCC(1000),IBT(16)         FASVE023
      EQUIVALENCE (A(7851),NCN),(A(15851),MCM),(AN(1),NCC)              FASVE024
     1,(AN(1001),MCC)                                                   FASVE025
      EQUIVALENCE (A(30),IV,IS),(A(31),NB),(A(32),NS),(A(33),NCB)       FASVE026
     1,(A(34),NCS),(A(35),NTP),(A(36),IR),(A(37),IARR),(A(38),NXR)      FASVE027
     2,(A(39),NYR),(A(40),NZR),(A(41),NXQ),(A(42),NYQ),(A(43),NZQ)      FASVE028
     3,(A(58),IP),(A(59),IBT),(A(75),NCT),(A(76),NEX),(A(77),NEY)       FASVE029
     4,(A(78),NEZ),(A(79),NEZP),(A(80),ISON),(A(81),NBAS),(A(82),NSON)  FASVE030
     5,(A(83),NFRK),(A(84),NFRZ),(A(85),NBZ),(A(86),IELT),(A(87),IMAT)  FASVE031
     6,(A(88),IPRS),(A(89),ITEM),(A(90),ITGY),(A(91),ITGZ),(A(92),IARE) FASVE032
     7,(A(93),IMMX),(A(94),IMMY),(A(95),IMMZ),(A(96),IMFI),(A(97),JBON) FASVE033
     8,(A(98),NONX),(A(99),NON1),(A(100),NON2),(A(101),NON3)            FASVE034
     9,(A(102),NON4),(A(103),NCDI),(A(104),KPL),(A(105),NBO)            FASVE035
      IV=IV                                                             FASVE036
      NEZP=NEZ+1                                                        FASVE037
      DO 600 IJ=1,6                                                     FASVE038
      DO 200 I=1,NSUR                                                   FASVE039
      II=I                                                              FASVE040
      MDMM=MDM(I)                                                       FASVE041
      IF (MDMM) 110,110,120                                             FASVE042
  110 MDMM=-MDMM                                                        FASVE043
  120 IF (MDMM-NFL(IV,IJ)) 200,205,200                                  FASVE044
  200 CONTINUE                                                          FASVE045
  205 IVS=II                                                            FASVE046
      IELT=MELMA(IVS)/100                                               FASVE047
      IMAT=MELMA(IVS)-100*IELT                                          FASVE048
      IPRS=MPRTI(IVS)/100                                               FASVE049
      ITIC=MPRTI(IVS)-100*IPRS                                          FASVE050
      ITEM=MTETG(IVS)/100                                               FASVE051
      ITGY=MTETG(IVS)-100*ITEM                                          FASVE052
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      JBON=MBOVR(IVS)/100                                                    FASVE053
      KK=0                                                                   FASVE054
      GO TO (210,220,230,240,250,260),IJ                                     FASVE055
  210 NBAS=1                                                                 FASVE056
      NSON=NEY+1                                                             FASVE057
      NFRK=1                                                                 FASVE058
      NFRZ=1                                                                 FASVE059
      NBZ=1                                                                  FASVE060
      NEA=NY(IV)                                                             FASVE061
      NEB=NZ(IV)                                                             FASVE062
      GO TO 270                                                              FASVE063
  220 NBAS=(NEY+1)*NX(IV)+1                                                  FASVE064
      NSON=(NEY+1)*(NEX+1)                                                   FASVE065
      GO TO 270                                                              FASVE066
  230 NBAS=1                                                                 FASVE067
      NSON=(NEY+1)*NX(IV)+1                                                  FASVE068
      NFRK=NEY+1                                                             FASVE069
      NEA=NX(IV)                                                             FASVE070
      NEB=NZ(IV)                                                             FASVE071
      GO TO 270                                                              FASVE072
  240 NBAS=NEY+1                                                             FASVE073
      NSON=(NEY+1)*(NEX+1)                                                   FASVE074
      GO TO 270                                                              FASVE075
  250 NBAS=1                                                                 FASVE076
      NFRK=1                                                                 FASVE077
      NFRZ=NEZ+1                                                             FASVE078
      NEA=NX(IV)                                                             FASVE079
      NEB=NY(IV)                                                             FASVE080
      GO TO 270                                                              FASVE081
  260 NSON=(NEY+1)*(NEX+1)                                                   FASVE082
      NBZ=NEZP                                                               FASVE083
  270 IF (JBON) 320,320,280                                                  FASVE084
  280 CALL BOUN                                                              FASVE085
      IF (ISON) 410,410,320                                                  FASVE086
  320 DO 400 I=NBAS,NSON,NFRK                                                FASVE087
      II=(I-1)*NEZP                                                          FASVE088
      DO 390 K=NBZ,NEZP,NFRZ                                                 FASVE089
      IK=II+K                                                                FASVE090
      KK=KK+1                                                                FASVE091
      NND=NCN(IK)                                                            FASVE092
      IF (NND) 390,390,321                                                   FASVE093
  321 NCC(KK)=NND                                                            FASVE094
      JW=(6*NND-1)/36+1                                                      FASVE095
      JB=6*(NND-1)-36*(JW-1)                                                 FASVE096
      AW=A(JW+150)                                                           FASVE097
      IF (JBON) 390,390,325                                                  FASVE098
  325 DO 350 J=1,ISON                                                        FASVE099
      JBB=JB+IBT(2*J)                                                        FASVE100
      IF (LEBIN(AW,JBB)) 335,335,350                                         FASVE101
  335 NBO=NBO+1                                                              FASVE102
      WRITE TAPE 8,NCN(IK),IBT(2*J-1),NCN(IK),IBT(2*J),BORC(JBON,J)          FASVE103
      CALL SEBIN (AW,JBB,1)                                                  FASVE104
      A(JW+150)=AW                                                           FASVE105
  350 CONTINUE                                                               FASVE106
  390 CONTINUE                                                               FASVE107
  400 CONTINUE                                                               FASVE108
  410 CONTINUE                                                               FASVE109
      IF (MELMA(IVS)) 600,600,420                                            FASVE110
  420 DO 500 I=1,NEA                                                         FASVE111
      DO 450 J=1,NEB                                                         FASVE112
      NCT=NCT+1                                                              FASVE113
      DO 430 K=1,16                                                          FASVE114
  430 IBT(K)=0                                                               FASVE115
      IBT(1)=-(NCT-(NCT/1000)*1000)                                          FASVE116
      IBT(2)=MELMA(IVS)                                                      FASVE117
      IBT(3)=100*ITIC+ITEM                                                   FASVE118
      IBT(4)=100*ITGY+IPRS                                                   FASVE119
      GO TO (435,436,440,441,435,436),IJ                                     FASVE120
  435 NON1=(I-1)*(NEB+1)+J                                                   FASVE121
      NON2=I*(NEB+1)+J                                                       FASVE122
      NON3=NON2+1                                                            FASVE123
      NON4=NON1+1                                                            FASVE124
      GO TO 445                                                              FASVE125
  436 NON1=(I-1)*(NEB+1)+J                                                   FASVE126
      NON2=NON1+1                                                            FASVE127
      NON4=I*(NEB+1)+J                                                       FASVE128
      NON3=NON4+1                                                            FASVE129
      GO TO 445                                                              FASVE130
  440 NON1=(I-1)*(NEB+1)+J                                                   FASVE131
      NON2=NON1+1                                                            FASVE132
      NON4=I*(NEB+1)+J                                                       FASVE133
      NON3=NON4+1                                                            FASVE134
      GO TO 445                                                              FASVE135
  441 NON1=(I-1)*(NEB+1)+J                                                   FASVE136
      NON2=I*(NEB+1)+J                                                       FASVE137
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      NON3=NON2+1                                                       FASVE138
      NON4=NON1+1                                                       FASVE139
  445 IBT(5)=NCC(NON1)                                                  FASVE140
      IBT(6)=NCC(NON2)                                                  FASVE141
      IBT(7)=NCC(NON3)                                                  FASVE142
      IBT(8)=NCC(NON4)                                                  FASVE143
      NCDI=8                                                            FASVE144
      WRITE TAPE 9,NCDI,KPL                                             FASVE145
      WRITE TAPE 9,(IBT(K),K=1,NCDI)                                    FASVE146
  450 CONTINUE                                                          FASVE147
  500 CONTINUE                                                          FASVE148
      MELMA(IVS)=0                                                      FASVE149
  600 CONTINUE                                                          FASVE150
      RETURN                                                            FASVE151
      END                                                               FASVE152
CFATVE                                                                  FATVE000
      SUBROUTINE TEVE                                                   FATVE001
      DIMENSION A(23850),IA(23850),XO(50),YO(50),ZO(50),NMATE(50)       FATVE002
     1,NFL(50,6),MDM(100),MELMA(100),MPRTI(100),MTETG(100),MBOVR(100)   FATVE003
     2,ML(100,4),IDM(200),IELMA(200),IPRTE(200),IGYGZ(200),IARMX(200)   FATVE004
     3,IMYMZ(200),IMFBO(200),IDTNR(200),IFL(200,3),AN(2000),IBON(50,4)  FATVE005
     4,BORC(50,8),NCL(200),XIR(100),YIR(100),ZIR(100),NX(50),NY(50)     FATVE006
     5,NZ(50)                                                           FATVE007
      COMMON A                                                          FATVE008
      EQUIVALENCE (A,IA),(A(1001),XO),(A(1051),YO),(A(1101),ZO)         FATVE009
     1,(A(1151),NMATE),(A(1201),NFL),(A(1501),MDM),(A(1601),MELMA)      FATVE010
     2,(A(1701),MPRTI),(A(1801),MTETG),(A(1901),MBOVR),(A(2001),ML)     FATVE011
     3,(A(2401),IDM),(A(2601),IELMA),(A(2801),IPRTE),(A(3001),IGYGZ)    FATVE012
     4,(A(3201),IARMX),(A(3401),IMYMZ),(A(3601),IMFBO),(A(3801),IDTNR)  FATVE013
     5,(A(4001),IFL),(A(4601),AN),(A(6601),IBON),(A(6801),BORC)         FATVE014
     6,(A(7201),NCL),(A(7401),XIR),(A(7501),YIR),(A(7601),ZIR)          FATVE015
     7,(A(7701),NX),(A(7751),NY),(A(7801),NZ)                           FATVE016
      EQUIVALENCE (A(1),NE),(A(2),NVOL),(A(3),NSUR),(A(4),NLIN)         FATVE017
     1,(A(5),LNG),(A(6),ISDE),(A(7),NC),(A(8),IO),(A(9),CF),(A(10),XMI) FATVE018
     2,(A(11),YMI),(A(12),ZMI),(A(13),XMX),(A(14),YMX),(A(15),ZMX)      FATVE019
     3,(A(16),IBOT),(A(17),SCX),(A(18),SCY),(A(19),SCZ),(A(20),DER)     FATVE020
     4,(A(21),ER),(A(22),TER),(A(23),NN),(A(24),XNN),(A(25),NNP)        FATVE021
     5,(A(26),KR)                                                      FATVE022
      DIMENSION NCN(8000),MCM(8000),NCC(1000),MCC(1000),IBT(16)         FATVE023
      EQUIVALENCE (A(7851),NCN),(A(15851),MCM),(AN(1),NCC)              FATVE024
     1,(AN(1001),MCC)                                                   FATVE025
      EQUIVALENCE (A(30),IV,IS),(A(31),NB),(A(32),NS),(A(33),NCB)       FATVE026
     1,(A(34),NCS),(A(35),NTP),(A(36),IR),(A(37),IARR),(A(38),NXR)      FATVE027
     2,(A(39),NYR),(A(40),NZR),(A(41),NXQ),(A(42),NYQ),(A(43),NZQ)      FATVE028
     3,(A(58),IP),(A(59),IBT),(A(75),NCT),(A(76),NEX),(A(77),NEY)       FATVE029
     4,(A(78),NEZ),(A(79),NEZP),(A(80),ISON),(A(81),NBAS),(A(82),NSON)  FATVE030
     5,(A(83),NFRK),(A(84),NFRZ),(A(85),NBZ),(A(86),IELT),(A(87),IMAT)  FATVE031
     6,(A(88),IPRS),(A(89),ITEM),(A(90),ITGY),(A(91),ITGZ),(A(92),IARE) FATVE032
     7,(A(93),IMMX),(A(94),IMMY),(A(95),IMMZ),(A(96),IMFI),(A(97),JBON) FATVE033
     8,(A(98),NONX),(A(99),NON1),(A(100),NON2),(A(101),NON3)            FATVE034
     9,(A(102),NON4),(A(103),NCDI),(A(104),KPL)                         FATVE035
      IV=IV                                                             FATVE036
      DO 300 I=1,NEX                                                    FATVE037
      DO 250 J=1,NEY                                                    FATVE038
      DO 200 K=1,NEZ                                                    FATVE039
      NCT=NCT+1                                                         FATVE040
      DO 100 L=1,16                                                     FATVE041
  100 IBT(L)=0                                                          FATVE042
      IBT(1)=-(NCT-(NCT/1000)*1000)                                     FATVE043
      IBT(2)=NMATE(IV)/100+1000                                         FATVE044
      IBT(3)=NMATE(IV)-100*(NMATE(IV)/100)                              FATVE045
      NON1=(I-1)*(NEY+1)*NEZP+(J-1)*NEZP+K                              FATVE046
      IBT(4)=NCN(NON1)                                                  FATVE047
      NON2=I*(NEY+1)*NEZP+(J-1)*NEZP+K                                  FATVE048
      IBT(5)=NCN(NON2)                                                  FATVE049
      NON3=NON2+NEZP                                                    FATVE050
      IBT(6)=NCN(NON3)                                                  FATVE051
      NON4=NON1+NEZP                                                    FATVE052
      IBT(7)=NCN(NON4)                                                  FATVE053
      NONX=NON3+1                                                       FATVE054
      IBT(8)=NCN(NONX)                                                  FATVE055
      NONX=NON2+1                                                       FATVE056
      IBT(9)=NCN(NONX)                                                  FATVE057
      NONX=NON1+1                                                       FATVE058
      IBT(10)=NCN(NONX)                                                 FATVE059
      NONX=NON4+1                                                       FATVE060
      IBT(11)=NCN(NONX)                                                 FATVE061
      NCDI=11                                                           FATVE062
      WRITE TAPE 9,NCDI,KPL                                             FATVE063
      WRITE TAPE 9,(IBT(L),L=1,NCDI)                                    FATVE064
  200 CONTINUE                                                          FATVE065
  250 CONTINUE                                                          FATVE066
  300 CONTINUE                                                          FATVE067
      RETURN                                                            FATVE068
      END                                                               FATVE069
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*       FAP                                                     FATCK000
        COUNT   25                                              FATCK001
        LBL     TICK                                            FATCK002
        ENTRY   TICK                                            FATCK003
TICK    NZT     ONCE                                            FATCK004
        TRA     FIRST                                           FATCK005
        CAL     5                                               FATCK006
        SUB     INITL                                           FATCK007
        ALS     18                                              FATCK008
        SLW*    1,4                                             FATCK009
        TRA     2,4                                             FATCK010
FIRST   STL     ONCE                                            FATCK011
        CAL     5                                               FATCK012
        SLW     INITL                                           FATCK013
        STZ*    1,4                                             FATCK014
        TRA     2,4                                             FATCK015
ONCE    PZE                                                     FATCK016
INITL   PZE                                                     FATCK017
        END                                                     FATCK018
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