SID 67-498

STUDY OF APOLLO WATER IMPACT

FINAL REPORT

VOLUME 5

USER'S MANUAL - NO INTERACTION

(Contract NAS9-4552, G.O. 5264)

May 1967

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FOREWORD

This report was prepared by North American Aviation, Inc., Space Division, under NASA Contract NAS9-4552, for the National Aeronautics and Space Administration, Manned Space Flight Center, Houston, Texas, with Dr. F.C. Hung, Program Manager and Mr. P.P. Radkowski, Assistant Program Manager. This work was administered under the direction of Structural Mechanics Division, MSC, Houston, Texas with Dr. F. Stebbins as the technical monitor.

This report is presented in eleven volumes for convenience in handling and distribution. All volumes are unclassified.

The objective of the study was to develop methods and Fortran IV computer programs to determine by the techniques described below, the hydro-elastic response of representation of the structure of the Apollo Command Module immediately following impact on the water. The development of theory, methods and computer programs is presented as Task I Hydrodynamic Pressures, Task II Structural Response and Task III Hydroelastic Response Analysis.

Under Task I - Computing program to extend flexible sphere using the Spencer and Shiffman approach has been developed. Analytical formulation by Dr. Li using nonlinear hydrodynamic theory on structural portion is formulated. In order to cover a wide range of impact conditions, future extensions are necessary in the following items:

a. Using linear hydrodynamic theory to include horizontal velocity and rotation.

b. Nonlinear hydrodynamic theory to develop computing program on spherical portion and to develop nonlinear theory on toroidal and conic sections.

Under Task II - Computing program and User's Manual were developed for nonsymmetrical loading on unsymmetrical elastic shells. To fully develop the theory and methods to cover realistic Apollo configuration the following extensions are recommended:

a. Modes of vibration and modal analysis.

b. Extension to nonsymmetric short time impulses.

c. Linear buckling and elasto-plastic analysis

These technical extensions will not only be useful for Apollo and future Apollo growth configurations, but they will also be of value to other aeronautical and spacecraft programs.

The hydroelastic response of the flexible shell is obtained by the numerical solution of the combined hydrodynamic and shell equations. The results obtained herein are compared numerically with those derived by neglecting the interaction and applying rigid body pressures to the same elastic shell. The numerical results show that for an axially symmetric impact of the particular shell studied, the interaction between the shell and the fluid produces appreciable differences in the overall acceleration of the center of gravity of the shell, and in the distribution of the pressures and responses. However the maximum responses are within 15% of those produced when the interaction between the fluid and the shell is neglected. A brief summary of results is shown in the abstracts of individual volumes.

The volume number and authors are listed on the following page.

The contractor's designation for this report is SID 67-498.

INDEX FOR FINAL REPORT

"Apollo Water Impact"

ABSTRACT

This volume is a user's manual for a computer program which determines the dynamic response of a shell of revolution during a vertical axially symmetric impact into an incompressible fluid. The program uses the theory developed in Volume 2 of this report where no interaction between the fluid and the flexible shell is accounted for. The hydrodynamic pressures are determined on the basis of a rigid-body theory, and are applied to the shell as a forcing function. The results are intended for comparison with similar calculations derived from Volume 3 and the User's Manual of Volume 6 where the hydroelastic interaction is accounted for.

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1.1 INTRODUCTION

The computer program for the calculation of the dynamic response of shells of revolution during vertical impact into water when no interaction is present is written entirely in FORTRAN IV and makes use of the overlay feature of that language. The program has been checked out in NAASYS, the NAA adaptation of the IBM 7090/7094 IBSYS/IBJOB system; and uses the NAASYS library routines shown in the load map, pages 4 to 8, inclusive, of Section 1.2.

The NAASYS input tape is Unit 5, the output tape is Unit 6. In addition to these files, the program uses Units 8, 9, 10, and 11 as scratch tapes, and Unit 7 as the overlay tape. NAASYS itself is stored on Unit 1.

The program is made up of an executive program and eight links, all of which are called by the executive program. A brief description of each link is shown in Table I below.

Table 1. Description of Links

Link No.	Name	Purpose
0	Executive	Reads general data, DA, and controls flow of execution of other links
1	GEOM	Reads geometric parameters. Prints all geometric input and calculated values
2	CDAFIT	Sets up stiffness parameters
3	ACCN	Computes hydrodynamic pressures on the shell
4	DEFLTN	Calculates the deflections due to the pressures
5	PATH	Controls flow after computation of deflections. Computes velocities and accelerations
6	INTLDS	Computes internal loads
7	PSUMS	Outputs all computed quantities
8	PIX	A dummy subroutine for a CRT Plotter

1.2 Load Map

OVERLAY ORIGIN CARDS AND ASSIGNED LINK NUMBERS

```
$ORIGIN    CHAIN                IS LINK   1, PARENT LINK IS   0
$ORIGIN    CHAIN                IS LINK   2, PARENT LINK IS   0
$ORIGIN    CHAIN                IS LINK   3, PARENT LINK IS   0
$ORIGIN    CHAIN                IS LINK   4, PARENT LINK IS   0
$ORIGIN    CHAIN                IS LINK   5, PARENT LINK IS   0
$ORIGIN    CHAIN                IS LINK   6, PARENT LINK IS   0
$ORIGIN    CHAIN                IS LINK   7, PARENT LINK IS   0
$ORIGIN    CHAIN,SYSUT2,REW     IS LINK   8, PARENT LINK IS   0
```

```
                    * MEMORY MAP *

SYSTEM                                  00000 THRU  03765
FILE BLOCK ORIGIN                       03766
FILES        1.     UNIT01
             2.     UNIT02
             3.     UNIT03
             4.     UNIT04
             5.     UNIT05
             6.     UNIT06
             7.     UNIT07
             8.     UNIT08
             9.     UNIT09
            10.     UNIT10
            11.     UNIT11
            12.     UNIT12
            13.     UNIT13
            14.     UNIT14
            15.     UNIT15
            16.     UNIT16
FILE LIST ORIGIN                        04266
PRE-EXECUTION INITIALIZATION            04326
CALL ON OBJECT PROGRAM                  04373
OBJECT PROGRAM                          04400 THRU  37107

LINK  DECK  ORIGIN      CONTROL SECTIONS  (/NAME/=NON 0 LENGTH, (LOC)=DELETED, *=NOT REFERENCED)

  0  157DR   04400      ///     /(51110)    EVEN    04401     ......  05221 *
     MADD    05242      EVEN    05243       MAD     05310
     MMPY    05351      MMY     05445
     .LINK   05515     /.LDT  / 05515      /.LRECT/ 05526    /.LVEC / 05546
     .LXCON  05566      .LXSTR  05566       .LXSTP  05573      .LXOUT  05670     .LXERR  05702
                        IBEXIT  05706 *     .LXRTN  05706      .LXCAL  05712 *   .DBCLS  06100 *
                        .LXARG  06221       .LO     06240     /TDUMPQ/ 06242 *   .CLSE   06246
                        .LFBL   06247 *     .LUNB   06250      .DFOUT  06251     CTES..  06253 *
                        SC.SWT  06254      /SMR1.V/ 06255      .OPNFQ  06274     .CLSFQ  06275
                        .WRTFQ  06276       .REDFQ  06277      CNTL..  06300
```

.IODEF	06303	.DEFIN	06303		.ATTAC	06307 *	.CLOSE	06311		.OPEN	06313
		.READ	06315		.WRITE	06317	.BSR	06327 *		.READR	06337 *
		.RELES	06341 *		.LAREA	06352 *	.LFBLK	06370		.LTSX	06373 *
		.AREA1	06405		.LUNBL	06413 *	.ENTRY	06417		.GOA	06452
		.GO	06456		.DERR	06472	.NOPXI	06476		.COMXI	06500
		.EX34	06522		..FPUN	06527	..PLOT	06527			
.IOCSF	06530										
.LOVRY	12052	.LOVRY	(12052)		.LDT	(05515)	.LRECT	(05526)		.LVEC	(05546)
.LXSL	12624	.LXSEL	12624		.LXSCL	12625	.LXTST	12630 *		.LXOVL	12676 *
		.LXRCT	12707 *		.LXIND	13046	.LXDIS	13054		.LXFLG	13055
		.LTCH	13062								
.FPTRP	13102	.FFPT.	13102 *		.FPOUT	13236	.FPARG	13246		/.COUNT/	13250 *
		OVFLOW	13321 *								
.ERAS.	13326	E.1	13326		E.2	13327	E.3	13330		E.4	13331
.XCC.	13332	CC.1	13332		CC.2	13333	CC.3	13334		CC.4	13335
XIT	13336	EXIT	13336		.EXIT.	13336					
FXEM	13337	.FXEM.	13337		.FXOUT	13672	.FXARG	13700		/.OPTN./	13754
OPXP.Q	13766	RDOPXQ	13766 *		OPEXQ	13770					
FOUT	14034	.FOUT.	14034								
FCNV	14375	.FOON.	14375		/HWDSQ /	14425 *	/NOMSHQ/	14427 *		.FCNV.	14431
		.ENDFS	14450		.CNVSW	14452	.FDX1	14456		.FDX2	14457
		.DBC	14461		.DBC10	14617	.DBC20	14645		.DDSW	14655
		.DDFIX	14664		.FIXSW	14672	.DDBC	14747		.DDRS1	15212
		.DDRS2	15214 *		.D1	15217	.D2	15221		.FERR2	15306 *
		.ANPT	15342		.ONPT	15357	.LNTP	15442		.AOUT	15511
		.DFLT	15530		.FLT	15665	.DEXPN	15756		.FXD	15757
		.HOUT	16110		.INTG	16161	.LOUT	16301		.DOUT	16322
		.XCF	16354		.TEST	17062	.KOUNT	17065		.LIST	17070
		.DONE	17101		.OUTBF	17146	EVEN	17145		.BUF	17176
		.QSTO	17177		.WIDTH	17200	.GAIN	17201		.GAIN1	17202
		.FBDBF	17212		EVEN	17223	.DDDFL	17237		.DDFLG	17240
		.MQD	17241		.PEX	17242	.FEXP	17243		.DIG	17244
FIOB	17262	.FIOB.	17262		.FCNT	17365	.FBLT.	17463		.FBDT.	17503
		.FRLR.	17527		.FRLR.	(17527)	.FWLR.	17573		.FWLR.	(17573)
		.FBIBF	17633		.FRITE	17725					
FIOS	17733	.FIOS.	17733		.FSEL.	20122	.FILR.	20126 *		.FRTB.	20135
		.FRTD.	20142		.FILL.	20150	.FCLS	20175 *		.FOPN	20201 *

		REOF	20205 *	REOF.Q	20214 *	.TOUT.	20350	.REED	20360 *		
		.BIN	20361 *	.FCT	20362	.FCKSZ	20364	SEOF.Q	20405 *		
FIOH	20463	.FIOH.	20463	.FFIL.	21250	.FRTN.	21275				
FWRD	21473	.FWRD.	21473								
FWRB	21517	.FWRB.	21517								
FRDD	21543	.FRDD.	21543								
FRDB	21571	.FRDB.	21571								
FPUN	21615	/..FPUN/	(06527)	/.FPUN./	(21615)	/.FPUN./	21615				
UN01	21754	.UN01.	21754								
UN02	21755	.UN02.	21755								
UN03	21756	.UN03.	21756								
UN04	21757	.UN04.	21757								
UN05	21760	.UN05.	21760								
UN06	21761	.UN06.	21761	.BUFSZ	21762						
UN07	21765	.UN07.	21765								
UN08	21766	.UN08.	21766								
UN09	21767	.UN09.	21767								
UN10	21770	.UN10.	21770								
UN11	21771	.UN11.	21771								
UN12	21772	.UN12.	21772								
UN13	21773	.UN13.	21773								
UN14	21774	.UN14.	21774								
UN15	21775	.UN15.	21775								
UN16	21776	.UN16.	21776								
FSCD	21777	COSD	21777	SIND	22001						
FSCN	22030	COS	22030	SIN	22031						
FSQR	22224	SQRT	22224								
FRWT	22277	.FRWT.	22277								
FSLDI	22416	.FSLI.	22434	.FSDI.	22442 *						
FSLI	22453	.SLI.	22453	.SLI1.	22460	.SDI.	22466	.SDI1.	22474		
FSLDO	22507	.FSLO.	22525	.FSDO.	22533 *						
FSLO	22544	.SLO.	22544	.SLO2.	22552	.SDO.	22557	.SDO2.	22566		
DECRD	22600	DECRD	(22600)								
FASC	22716	ARCOS	22716 *	ARSIN	22717						
FVIO	23047	.FVIO.	23047								
BCDCBI	23163	/BC.CB./	23163	/CDSEQ /	23263						
//	51110										

1	GMTRY	23264	///	/(51110)	EVEN	23265	GEOM	33357
	CF3P	33400	EVEN	33401	CODIMA	34414		
2	CDAFIT	23264	///	/(51110)	EVEN	23265	CRVFIT	30021
	CODS	30037	CODIM4	31052				
	ENTP	31200	EVEN	31201	ENTERP	31367		
3	ACCN1	23264	///	/(51110)	EVEN	23265	ACCN	23634
	PMAXX	23676	EVEN	23677	PMAXL	23755		
4	157DR1	23264	///	/(51110)	EVEN	23265	DEFLTN	36203
	MSUB	36232	EVEN	36233	MSU	36300		
	INVRS	36341	INV	37033				
5	WHERE	23264	///	/(51110)	EVEN	23265	PATH	24164
6	157DR2	23264	///	/(51110)	EVEN	23265	INTLDS	25421
7	FSUMS	23264	///	/(51110)	EVEN	23265	SUMS	32107
8	LNK6	23264	EVEN	23265	PIX	23300		

I/O BUFFERS 37110 THRU 51060

UNUSED CORE 51061 THRU 51107

BEGIN EXECUTION 32 00-02-29

2.1 PROGRAM FLOW DESCRIPTION

An overall flow diagram of the executive program 157DR is shown in Figure 1. A listing of the complete program is shown in Section 7.1.

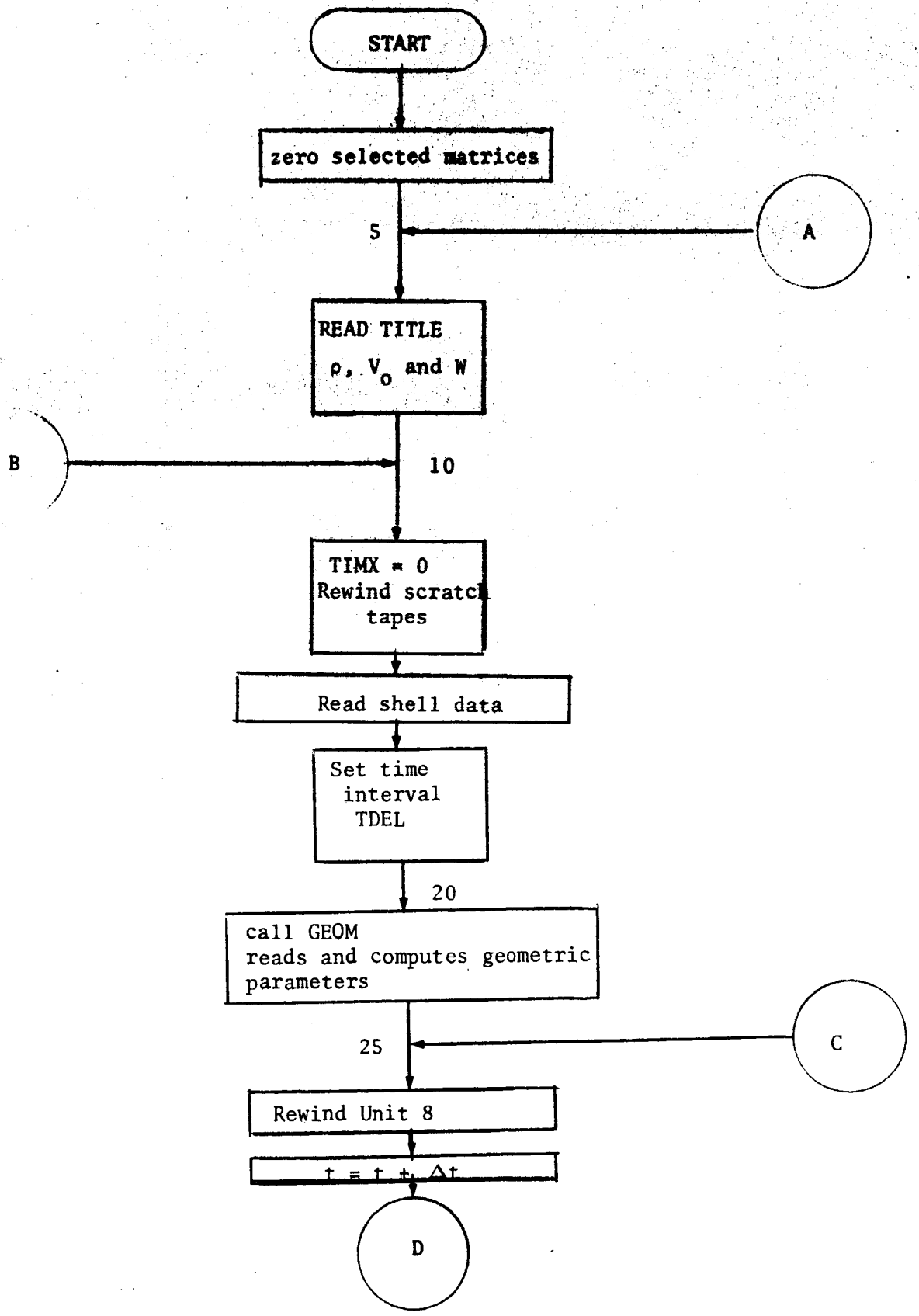


Figure 1. Flow of Executive Program 157 DR (Sheet 1 of 3)

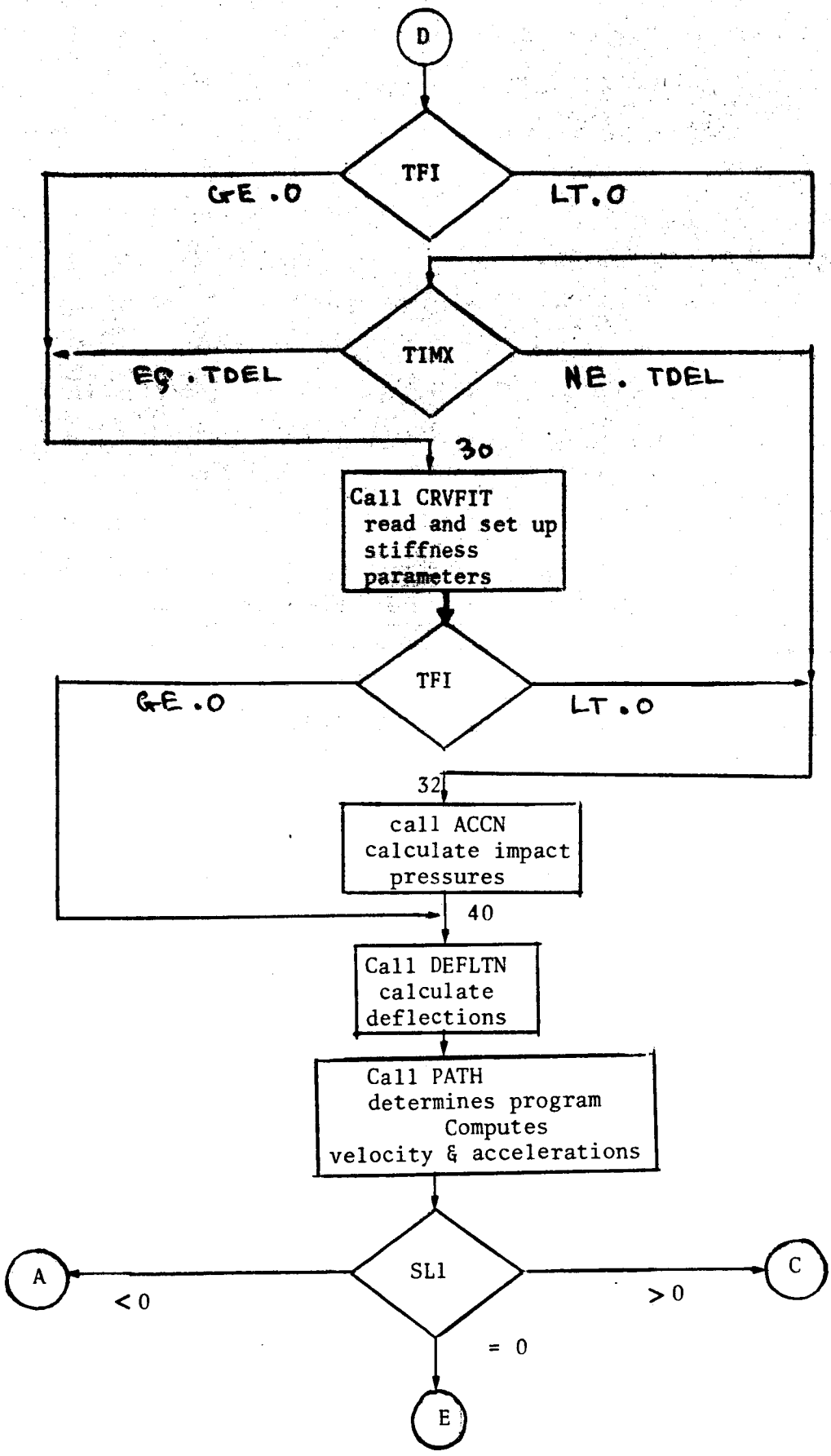


Figure 1. Flow of Executive Program 157 DR (Sheet 2 of 3)

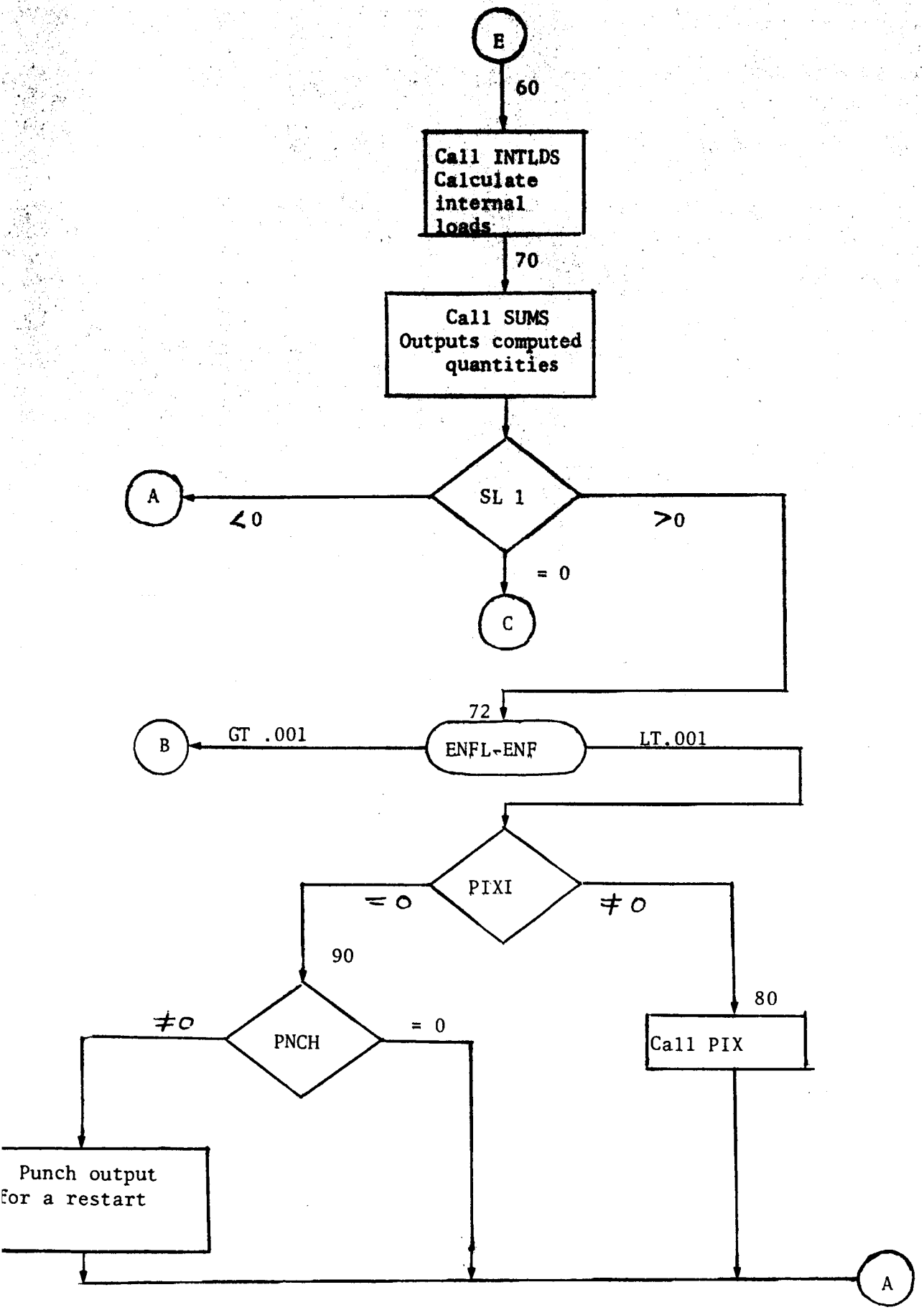


Figure 1. Flow of Executive Program 157 DR (Sheet 3 of 3)

2.2 Program Deck Setup

As explained in Section 1.1, the deck is set up in overlay regions. Each region is denoted by a $ORIGIN control card. A list of the setup is shown below. It includes the control cards and deck names. The order of these decks must be kept in the given sequence.

Control Cards		Subroutines
$IBJOB		
$IBFTC	157 DR	Main program
$IBFTC	MMPY	MMY
$IBFTC	MADD	ADD
$ORIGIN	CHAIN	
$IBFTC	GMTRY	GEOM
$IBFTC	CF3P	CODIMA
$ORIGIN	CHAIN	
$IBFTC	CDAFIT	CRVFIT
$IBFTC	CODS	CODIMA
$IBFTC	ENTP	ENTERP
$ORIGIN	CHAIN	
$IBFTC	ACCN2	ACCN
$IBFTC	PMAXX	PMAXL
$ORIGIN	CHAIN	
$IBFTC	157DRI	DEFLTN
$IBFTC	MSUB	MSU
$IBFTC	INVRS	INV
$ORIGIN	CHAIN	
$IBFTC	WHERE	PATH
$ORIGIN	CHAIN	
$IBFTC	157DR2	INTLDS
$ORIGIN	CHAIN	
$OBFTC	FSUMS	SUMS
$ORIGIN	CHAIN, SYSUT2, REW	
$IBFTC	LNK6	PIX
$DATA		

3.1 RESTART

In many calculations, it may be desired to restart the program at some time t_s without recalculating all the response quantities from zero to t_s. In addition, if it is desired to calculate the response at more than about 120 time intervals, it is necessary to make a restart (see Section 6.1.2).

For a run from zero, the following indicators are set:

RESTRT = 0.0
PNCH = 1.0

Here, the condition RESTRT = 0.0 means that it is a start from zero. The condition PNCH = 1.0 means that at the end of the job certain quantities will be punched on cards to be used as data in a future restart. Thus, part of the output from this job will be some cards containing the arrays

TIMX
ZP(K, L)
Z2P(K, L)
Z3P(K, L)
OMG2(L)

This punching is done by the executive program 157DR.

In order to restart the job, the following indicators are set in the input data:

RESTRT = 1.0
PNCH = 1.0

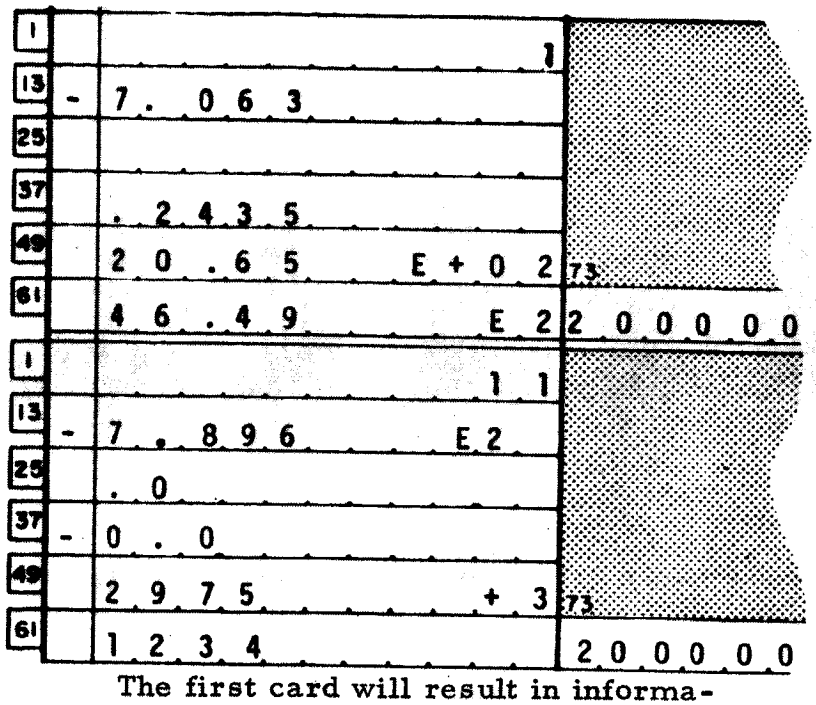
Here, the condition RESTRT = 1.0 means that the punched output data of the previous job is to be read as input data. The indicator PNCH = 1.0 means that there will also be punched output at the end of this job. If PNCH = 0.0, no data will be punched and no future restart will be possible. The punched cards are put at the end of the data deck. They are read by subroutine CRVFIT.

4.1 INPUT DATA FORMAT

Data are entered into the program by three subroutines. The executive program 157DR reads the hydrodynamic data, and the DA region of the shell data. Subroutine GEOM reads the GDA region of shell data, and subroutine CDAFIT reads the CDA region of the shell data. The regions DA, GDA, and CDA are read by means of the DECRD subroutine.

4.2 DECRD Subroutine

The data in regions DA, GDA, and CDA is read by means of the DECRD subroutine. A description of the subroutine follows, together with a listing in FORTRAN IV.



DECRD Decimal Read

1. Description. When a minus sign is encountered in column 1 of a DECRD data card, that card will be read and then reading will be terminated.

   The index of a DECRD card must be written to the extreme right of the first 12-column field.

2. Extent: 78 locations.

3. Call Statement:

   CALL DECRD (ARRAY)

   where ARRAY is the name of the read array to be read. This argument may be subscripted.

4. Error indication: If the index field is zero or blank, the comment "BAD DATA CARD" and the contents of columns 73-80 of the defective card will be printed. The job will be terminated.

5. Example: Assume a CALL DECRD (ARR) statement and the following data cards:

The first card will result in information being stored as follows:

ARR(1)	-0.7063E 01
ARR(2)	Unchanged
ARR(3)	0.2435E-00
ARR(4)	0.2065E 04
ARR(5)	0.4649E 04

The - sign in column 1 of the second card signals that this is the last card to be read under control of this CALL DECRD statement. This card has been written to illustrate some types of errors (or possible errors) in writing the data. The information will be stored as follows:

ARR(11)	0.7896E 21 (Exponent mislocated or incomplete.)
ARR(12)	Unchanged (Treated as a blank.)
ARR(13)	Unchanged (Treated as a blank.)
ARR(14)	0.2975E 04
ARR(15)	0.1234E 03

When no decimal point is written, as in the last two items, the data is read by the E12.8 format: the number of decimal places is counted from the beginning of the exponent field, if any, or from the extreme right of the field.

```
$IBFTC DECRD                                                                    DECRD000
      SUBROUTINE DECRD(D)                                                       DECRD005
      DIMENSION  FLT(5), ID(2), D(1)                                            DECRD010
   10 READ (5,100) LOC, FLT, ID                                                 DECRD015
  100 FORMAT (I12, 5E12.0, 1A6, 1A2)                                            DECRD020
      IF (LOC .EQ. 0)   GO TO 500                                               DECRD025
   15 K = IABS(LOC) - 1                                                         DECRD030
      DO 20 I = 1,5                                                             DECRD035
      IF (SIGN(1.0,FLT(I)).LT.0.0 .AND. FLT(I) .EQ. 0.0)  GO TO 20              DECRD040
      J = K + I                                                                 DECRD045
      D(J) = FLT(I)                                                             DECRD050
   20 CONTINUE                                                                  DECRD055
      IF (LOC .LT. 0)  GO TO 1000                                               DECRD060
      GO TO 10                                                                  DECRD065
  500 WRITE (6,200) ID                                                          DECRD070
  200  FORMAT(10HOBAD DATA 1A6,1A2)                                             DECRD075
      CALL EXIT                                                                 DECRD080
 1000 RETURN                                                                    DECRD085
      END                                                                       DECRD090
```

4.3 Data Deck Setup

Data decks should be stacked as follows:

1. Three title cards (which may be blank, if necessary).
2. A card with VIN, RHO, WT.
3. DA, general shell data, read by executive program.
4. GDA, geometry data, read by GEOM subroutine.
5. CDA, section properties data, read by CDAFIT subroutine.

The data in groups 3, 4, and 5 should have a minus sign in column 1 of the last card.

The following tables show the nature of the DA, GDA, and CDA decks.

4.4 Call DECRD (DA)

DECRD Index	Name	Description	
1	EN	No. of points along shell meridian	
2	AO	Reference length (in.)	For most cases set to 1.0
3	HO	Reference thickness (in.)	
4	BO	Reference Young's Modulus (psi)	
5	SIGO	Reference stress (psi)	
8	POI	Poisson's ratio	
11	SPRL	Location of spring along meridian	
12	UK	Spring value in ξ direction	
14	WK	Spring value in normal direction	
16	TAU1	Length of total time interval from zero	
17	ENTI	Total no. of time intervals from zero to TAU1	
18	PI1	Print interval (will always print last interval)	
25	MASS	Mass density lbs. sec^2/in^4	
26	CFE	Coefficient of viscous damping at each station in ξdirection	
27	CZ	Coefficient of viscous damping in normal direction.	
28	SKFE	Spring constants of shell under elastic restraint in ξdirection	
29	SKZ	Spring constant at each station in normal direction	
30	SUM	Fourier summing increment (always -1.)	
33	TFI	(Always -1)	
36	RESTRT	0. for start from zero, 1. for restart	
37	PNCH	0. no future restart; 1. restart cards are punched	
4440	EMI	See description of top boundary conditions in Section 4.6.	
4476	EMIN	See description of bottom boundary conditions in Section 4.6.	

Last card must have a - sign in Column 1.

4.5 Boundary Conditions

4.5.1 Top Boundary

When the boundary conditions on the top boundary are of the following kind, a special flag can be used to specify them:

free: $(N_\xi = N_{\xi\theta} = \hat{F}_\xi = M_\xi = 0) = 1.$

roller: $(N_\xi = u_\theta = W = M_\xi = 0) = 2.$

fixed: $(u_\xi = u_\theta = W = \phi_\xi = 0) = 3.$

simply supported: $(u_\xi = u_\theta = W = M_\xi = 0) = 4.$

complete: $(u_\xi = u_\theta = \hat{F}_\xi = \phi_\xi = 0) = 5.$

In these cases, DA(4440) = 1. E10, and DA(4441) is given the value 1., 2., 3., 4., or 5. as shown above. Other special boundary conditions may also be specified. As an example, the full boundary (which is also given above) can be specified as shown in the following data sheets.

FORTRAN FIXED 10 DIGIT DECIMAL DATA

DECK NO. _____ PROGRAMMER _____ DATE _____ PAGE _____ of _____

	NUMBER	IDENTIFICATION	DESCRIPTION DO NOT KEY PUNCH
1	4 4 4 0		Diagonal Boundary Force Matrix
13	1.		EM1(4 X 4), omega at top of shell.
25			
37			e.g. (free boundary) $\begin{bmatrix} 1 & & & \\ & 1 & & \\ & & 1 & \\ & & & 0 \end{bmatrix}$
49		73 80	
61			
1			EXAMPLE,
13	4 4 4 5		EM1 (contd)
25	1.		
37			
49		73 80	
61			
1	4 4 5 0		EXAMPLE
13	1.		EM1 (contd)
25			
37			
49		73 80	
61			

FORTRAN FIXED 10 DIGIT DECIMAL DATA

DECK NO. _____ PROGRAMMER _____ DATE _____ PAGE _____ of _____

	NUMBER	IDENTIFICATION	DESCRIPTION DO NOT KEY PUNCH
1	4456		Diagonal Boundary Displacement Matrix
13	0.		EM3(4 X 4) Lambda at top of shell
25			
37			e.g. (for free boundary) $\begin{bmatrix} 0 & & & \\ & 0 & & \\ & & 0 & \\ & & & 1 \end{bmatrix}$
49		73 80	
61			
1	4471		EXAMPLE
13	1.0		EM3 (cont'd)
25			
37			
49		73 80	
61			
1	4472		Column Boundary Matrix
13	0.0		EM5(4 X 1), L, at top of shell.
25			
37			e.g. L = $\begin{Bmatrix} 0 \\ 0 \\ 0 \\ 0 \end{Bmatrix}$
49		73 80	
61			

4.5.2 Bottom Boundary

The same selection of boundary conditions is available here as for the top boundary. This time, the indicator specifying the free, roller, fixed, simply supported, and complete conditions are set as follows:

```
DA (4476) = 1.E10
DA (4477) = 1., 2., 3., 4., 5.,
```

according to the boundary condition desired. An example of other possible boundary conditions is given in the data sheets below. The example here is the free boundary (the same as in Section 4.5.1).

FORTRAN FIXED 10 DIGIT DECIMAL DATA

DECK NO. _____ PROGRAMMER _____ DATE _____ PAGE _____ of _____

	NUMBER	IDENTIFICATION	DESCRIPTION DO NOT KEY PUNCH
1	4476	73 80	Diagonal Boundary Force Matrix
13	0.0		EM1N(4 X 4) OMEGA at Bottom of shell.
25			
37			e.g. (fixed boundary) 0 0 0 1 4476 15 4491
49			
61			
1	4491	73 80	EXAMPLE
13			EM1N (cont'd)
25	1.0		
37			
49			
61			
1	4492	73 80	Diagonal Boundary Displacement Matrix
13	1.0		EM3N(4 X 4), LAMBDA at Bottom of shell.
25			
37			e.g. (for fixed case), 1 1 1 0
49			
61			

FORTRAN FIXED 10 DIGIT DECIMAL DATA

DECK NO. _____ PROGRAMMER _____ DATE _____ PAGE _____ of _____

	NUMBER	IDENTIFICATION	DESCRIPTION DO NOT KEY PUNCH
1	4497	73 80	EXAMPLE
13	1.		EM3N (cont'd)
25			
37			
49			
61			
1	4502	73 80	EM3N (cont'd)
13	1.		
25			
37			
49			
61			
1	4505	73 80	Column Boundary Matrix
13	0.0		EM5N (4 X 1), L, at Bottom of shell.
25			
37			e.g. L = {0}
49			
61			

4.6 Call DECRD (CDA)

DECRD Index	Name	Description
1	GMI	Geometry indicator: 1. = cone - cylinder 2. = sphere - toroid 3. = general discrete point 4. = arbitrary functions
2	EN	No. of station points
3	PFLAG	Print indicator; ≠ 0., prints all data
4	RA1	For GMI = 1.; radius at station 1
	RC	For GMI = 2.; radius of curvature
5	AXL	For GMI = 1.; axial surface length
	ROFF	For GMI = 2.; off-set distance to center of curvature
6	ANX	For GMI = 1.; angle between generator and axis of revolution
	PHIO	For GMI = 2.; initial opening angle from vertical axis, in degrees.
7	PHIN	For GMI = 2.; final opening angle from vertical axis, in degrees.
8	EM	For GMI = 3.; number of RI points given
9-208	RIPT	For GMI = 3.; discrete radii (200 points maximum)
209-409	XIPT	For GMI = 3.; discrete XI - arc length, (200 points maximum)

The last card must have a - in Column 1.

4.7 Call DECRD (CDA)

The various tables are set up in this region as follows:

TAB (1) = No. of stations given along meridian (i.e., stations at which values change).
TAB (2) = Station No. 1.
TAB (3) = Parameter value at Station No. 1
TAB (4) = Next station no.
TAB (5) = Next parameter value
|
|
|
Stations and parameter values interlaced.

The last station must be the Nth station parameter value because CODIMA interpolation routine will not extrapolate.

If $+1.0 \times 10^{10}$ is placed in TAB (1) the following parameter value is constant (uniform over all stations EN) and its value is placed in TAB (2).

DECRD Index	Name	Description
		Extensional Rigidity
1	DTB	No. of stations given, if = 1. E10, then a constant extensional rigidity is given in 2
2		Station No. 1. if CDA (1) = 1. E10, then this is a constant value of extensional rigidity.
3		Value of extensional rigidity between Station 1 and next station
4		Station No. 2.
5		Value of extensional rigidity
6-41		Follows same pattern to DTB (20), value of last rigidity.

DECRD Index	Name	Description
		Flexural Rigidity
42	EKTB	No. of stations given, if = 1. E10, then a constant flexural rigidity is given in 43
43		Station No. 1 if CDA (42) = 1. E10, then this is the constant value of flexural rigidity
44		Value of flexural rigidity between station 1 and next station
45		Station No. 2
46		Value of flexural rigidity
47-81	Follows same pattern to EKTB (20), value of last ridigity.	
		Continue as above for the following quantities:
83-125	EITB	Young's modulus (E)
124-164	ALFTB	Coefft of thermal expansion (α)
165-205	DNATB	1/2 shell thickness (h/2)
206-246	TTB	Temperature gradient through shell (T)
247-287	ENTB	Membrane thermal load
288-328	EMTB	Bending thermal load
329-369	PNTB	Normal pressure on shell (at reference surface)
370-410	PFBTB	Meridional surface pressure (at reference surface)
452-492	DZOTB	Initial displacement in normal direction.
493-533	VZOTB	Initial velocity in normal direction
534-574	QZOTB	Initial acceleration in normal direction
575-615	DFOTB	Initial displacement in ξ direction
616-565	VFOTB	Initial velocity in ξ direction.
657-691	QFOTB	Initial acceleration in ξ direction.

The last card must have a - sign in Column 1.

5.1 SAMPLE PROBLEM

To demonstrate the use of the computer program, and to illustrate the format of the input and output data, the sample problem shown in Figure 2 has been calculated.

The problem concerns the vertical impact of a flexible body of revolution consisting of a shallow spherical shell to which is rigidly attached a heavier mass so that their combined weight is 10,000 lbs. The radius of curvature of the shell middle surface is 175.6 ins., and the opening angle is 19.53°. The shell extensional and flexural stiffnesses are both set equal to 3.33×10^6 lbs/in., which corresponds to a sandwich shell having 0.05 in. steel facings and 1.95 in. honeycomb core. Other shell properties are as follows: Mass per unit surface area = 9.7×10^{-4} lbs. sec.^{2}/in.^{3}; Poisson's ratio = 0.33, and modulus of elasticity E = 29.7×10^6 psi. The initial impact velocity is 30 fps. The hydrodynamic loads are computed on the basis of the rigid-body theory of Volume 2 of this report, and are then applied as a forcing function to the shell of revolution. A full discussion of the numerical results obtained is given in Volume 2. Sample data sheets follow.

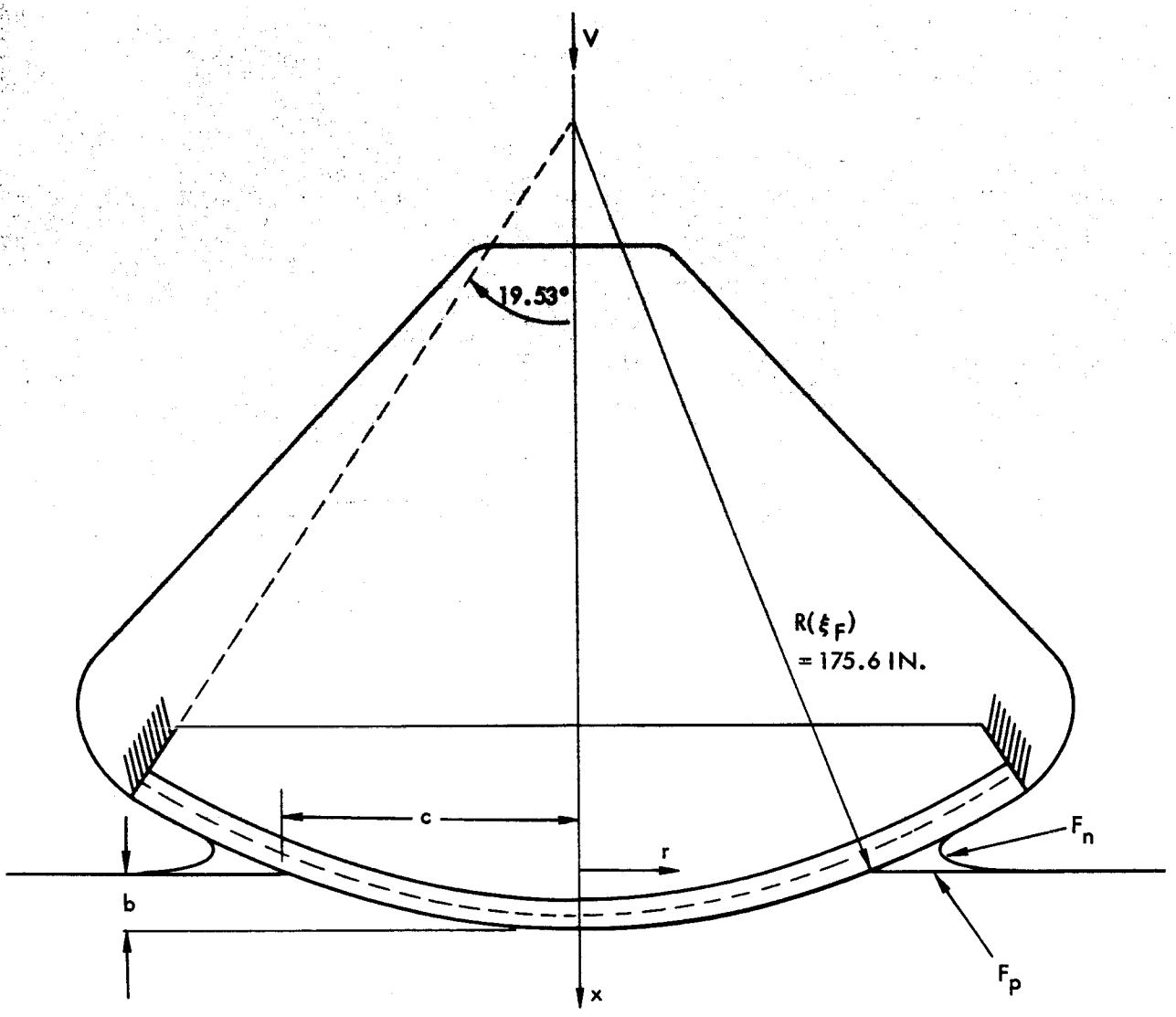


Figure 2. Model of Sample Problem.

5.2 Sample Input Data for a start from zero

In the present problem, we shall use a time interval of .0001 seconds and make a run to 1.0 milliseconds. Because it may, at some future date, be desirable to make a restart at 1.0 ms. (to avoid recalculating the response from zero), we shall punch some quantities on cards to make this restart possible. They will be part of the input in the future restart. Thus we set RESTRT = 0.0, and PUNCH = 1.0,

Sample input sheets are shown below for the start from zero.

FORTRAN FIXED 10 DIGIT DECIMAL DATA

DECK NO. _____ PROGRAMMER _____ DATE _____ PAGE _____ of _____ JOB NO. _____

	NUMBER	IDENTIFICATION	DESCRIPTION DO NOT KEY PUNCH
1	TITLE		
13			
25			
37			
49		73 80	
61			
1	TITLE		
13			
25			
37			
49		73 80	
61			
1	TITLE		
13			
25			
37			
49		73 80	
61			
1	3 0 • 0		Initial Velocity, fps VIN
13	6 2 • 5		Mass density of fluid, lbs/cu ft RHO
25	1 0 0 0 0 • 0		Weight of capsule, lbs. WT
37			
49		73 80	
61			

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FORTRAN FIXED 10 DIGIT DECIMAL DATA

DECK NO. _____ PROGRAMMER _____ DATE _____ PAGE _____ of _____

	NUMBER	IDENTIFICATION	DESCRIPTION DO NOT KEY PUNCH
1	2		
13	1.		AO
25	1.		HO
37	1.		EO
49	1.	73 80	SIGO
61			
1	7		
13			
25	0.33		POI
37			
49		73 80	
61			
1	16		
13	1.0 -3		TAU1
25	10.		ENT1
37	1.		PI1
49		73 80	
61			

FORTRAN FIXED 10 DIGIT DECIMAL DATA

DECK NO. _____ PROGRAMMER _____ DATE _____ PAGE _____ of _____

	NUMBER	IDENTIFICATION	DESCRIPTION DO NOT KEY PUNCH
1	21		
13			
25			
37			
49		73 80	
61	.975-3		MASS
1	30		
13	-1.		SUM
25			
37			
49		73 80	
61			
1	33		
13	-1.		TFI
25	360.		VIN
37			
49	0.0	73 80	RESTRT
61	1.0		PNCH

FORTRAN FIXED 10 DIGIT DECIMAL DATA

DECK NO. _____ PROGRAMMER _____ DATE _____ PAGE _____ of _____

		NUMBER	IDENTIFICATION	DESCRIPTION DO NOT KEY PUNCH
1	-	4476		
13		1.0 +10		EM1N
25		3.0		EM3N
37				
49			73 80	
61				
1		1		GDA
13		2.0		GMI
25		1200.0		EN
37		-1.0		PFLAG
49		175.6	73 80	RC
61		0.0		ROFF
1	-	6		
13		0.0		PHIO
25		19.530		PHIN
37				
49			73 80	
61				

FORTRAN FIXED 10 DIGIT DECIMAL DATA

DECK NO. _____ PROGRAMMER _____ DATE _____ PAGE _____ of _____

	NUMBER	IDENTIFICATION	DESCRIPTION DO NOT KEY PUNCH
1	1	73 80	CDA
13	1.0 +10		DTB
25	3.33 +6		
37			
49			
61			
1	42	73 80	
13	1.0 +10		EKTB
25	3.33 +6		
37			
49			
61			
1	83	73 80	
13	1.0 +10		EITB
25	29.7 +6		
37			
49			
61			

FORTRAN FIXED 10 DIGIT DECIMAL DATA

DECK NO. _____ PROGRAMMER _____ DATE _____ PAGE _____ of _____

	NUMBER	IDENTIFICATION	DESCRIPTION DO NOT KEY PUNCH
1	- 1 6 5	73 80	
13	1 . 0 + 1 0		DNATB
25	1 . 0 2 5		
37			
49			
61			
1		73 80	
13			
25			
37			
49			
61			
1		73 80	
13			
25			
37			
49			
61			

5.3 Sample Data for the Restart

In order to restart the problem at 1.0 ms., the following input is required. Note that the time interval must be the same in all runs. The changes in data are indicated by the arrows in the data sheets. Note particularly that RESTRT = 1.0 here. The output cards obtained from the previous run are placed at the end of the data deck. They are read in subroutine CDAFIT.

The output quantities will be identical to those from the start from zero.

FORTRAN FIXED 10 DIGIT DECIMAL DATA

DECK NO. _____ PROGRAMMER _____ DATE _____ PAGE _____ of _____ JOB NO. _____

	NUMBER	IDENTIFICATION	DESCRIPTION DO NOT KEY PUNCH
1	T I T L E		
13			
25			
37			
49		73 80	
61			
1	T I T L E		
13			
25			
37			
49		73 80	
61			
1	T I T L E		
13			
25			
37			
49		73 80	
61			
1	3 0 . 0		Initial Velocity, fps.
13	6 2 . 5		Mass density of fluid, lbs./in ft.
25	1 0 0 0 0 . 0		Weight of capsule, lbs.
37			
49		73 80	
61			

FORTRAN FIXED 10 DIGIT DECIMAL DATA

DECK NO. _____ PROGRAMMER _____ DATE _____ PAGE _____ of _____

	NUMBER	IDENTIFICATION	DESCRIPTION DO NOT KEY PUNCH
1	2		Same
13	1.		AO
25	1.		HO
37	1.		EO
49	1.	73 80	SIGO
61	0.0		INFO
1	7		Same
13	0.0		ENEL
25	0.33		POI
37	0.0		THETA
49	0.0	73 80	PIXI
61			
1	16		
13	2.0 -3		TAU1 ←
25	20.		ENT1 ←
37	1.		PI1
49		73 80	
61			

FORTRAN FIXED 10 DIGIT DECIMAL DATA

DECK NO. _____ PROGRAMMER _____ DATE _____ PAGE _____ of _____

	NUMBER	IDENTIFICATION	DESCRIPTION DO NOT KEY PUNCH
1	2 1	73 80	Same
13			
25			
37			
49			
61	• 9 7 5 – 3		MASS
1	3 0		Same
13	– 1 •		SUM
25			
37			
49		73 80	
61			
1	3 3		
13	– 1 •		TFI
25	3 6 0 •		VIN
37			
49	1 • 0	73 80	RESTRT ←
61	1 • 0		PNCH

FORTRAN FIXED 10 DIGIT DECIMAL DATA

DECK NO. _____ PROGRAMMER _____ DATE _____ PAGE _____ of _____

	NUMBER	IDENTIFICATION	DESCRIPTION DO NOT KEY PUNCH
1	- 4476	73 80	Same
13	1.0 +10		EM1N
25	30		EM3N
37			
49			
61			
1	1		Same
13	2.0		GMI
25	120.0		EN
37	-10		PFLAG
49	1756	73 80	RA1, RC
61	0.0		AXL, ROFF
1	6		Same
13	0.0		ANX, PHIO
25	19.530		PHIN
37			
49		73 80	
61			

FORTRAN FIXED 10 DIGIT DECIMAL DATA

DECK NO. _____ PROGRAMMER _____ DATE _____ PAGE _____ of _____

	NUMBER	IDENTIFICATION	DESCRIPTION DO NOT KEY PUNCH
1	1	73 80	Same
13	+10		DTB
25	1.0 +6		
37	3.33 +6		
49			
61			
1	42	73 80	Same
13	1.0 +10		EKTB
25	3.33 +6		
37			
49			
61			
1	83	73 80	Same
13	1.0 +10		EITB
25	29.7 +6		
37			
49			
61			

FORTRAN FIXED 10 DIGIT DECIMAL DATA

DECK NO. _____ PROGRAMMER _____ DATE _____ PAGE _____ of _____

	NUMBER	IDENTIFICATION	DESCRIPTION DO NOT KEY PUNCH
1	- 1.6.5	73 80	Same
13	1.0. +10		DNATB
25	1.0.2.5		
37			
49			
61			
1			Set the punched restart cards at this
13			point in the input data deck.
25			
37			
49		73 80	
61			
1			
13			
25			
37			
49		73 80	
61			

5.4 Sample Output

The following pages show the output resulting from the start from zero of the sample problem. Letters in circles correspond to descriptions below.

(A) First Title Card

(B) Second Title Card

(C) Third Title Card

(D) No. of Stations EN

(E) Radius of curvature, ins.

(F) Offset distance from center of curvature = 0

(G) Closed apex, therefore PHIO initial opening angle is zero

(H) PHIN, final opening angle is 19.53°

(I) Station number

(J) R(I), normal distance from shell to axis

(K) W(THETA) nondimensional curvature in θ direction

(L) W(XI) nondimensional curvature in ξ direction

(M) RHOX(I) $R(I)/AO = \rho/AO$

(N) GAMMA (I) ρ'/ρ

(O) DTB, the extensional rigidity (constant over shell)

(P) EKTB, the flexural rigidity (constant over shell)

(Q) EITB, the Young's modulus (constant over shell)

(R) ALFTB, thermal expansion coefficient (zero)

(S) DNATB, 1/2 shell thickness (constant over shell)

(T) TTB, temperature gradient (zero)

U	ENTB, membrane thermal load (zero)
V	EMTB, bending thermal load (zero)
W	All these other quantities, read by CDR, are set to zero.
X	See Sections 4.4 to 4.7 for descriptions
EN	= number of stations
AO	= reference length
HO	= Reference thickness
EO	= Reference Young's modulus
SIGO	= Reference stress level
ENFO	= always zero
ENFL	= always zero
POI	= Poisson's ratio
THETA	= always zero
PIXI	= always zero
SPRL	= location of spring along meridian
UK	= spring value in ξ direction
VK	= always zero
WK	= spring value in normal direction
EMK	= always zero
TAU1	= total length of time from zero
ENT1	= Total no. of time intervals from zero to TAU1
PI1	= point interval. Here PI1 = 1, and output is pointed at end of enc interval

TAU2 = 0

ENT2 = 0

PI2 = 0 } (always zero)

TAU3 = 0

ENT3 = 0

PI3 = 0

MASS = mass density

CFE = coefficient of viscous damping at each station in direction

CZ = coefficient of viscous damping at each station in normal direction

SKFE = spring constant of shell under elastic restraining in direction

SUM = - 1. always

EN1 = 1., open shell; = 2., closed shell; set in GEOM

DEL = distance between station points

BCITP = boundary condition indicator - top boundary

BCIBM = boundary condition indicator - bottom boundary

Y Full Tables of

D Extensional rigidity

EK Flexural rigidity

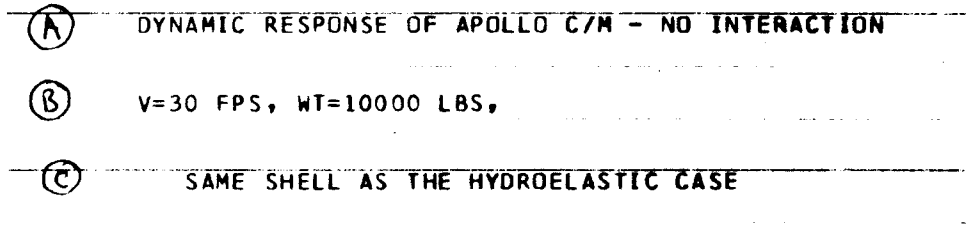
E1 Young's modulus

ALF Coefficient of thermal expansion (zero here)

DNA $\frac{1}{2}$ shell thickness

T	temperature gradient through shell (zero here)
ENT	membrane thermal load (zero here)
EMT	bending thermal load (zero here)
(Z)	Full Tables of PN, PFE, DZO, VZO, AZO, DFO, VFO, AFO, all of which were read as zero in CDA. [See Section 4.7 for their descriptions].
(BA)	is self-explanatory. It shows the time (t), maximum radius of the pressure profile (c), and overall vehicle velocity (V). Maximum pressure is given in BC, and depth submerged is not computed here.
(BB)	is a column showing the station number from the apex (1) to the boundary (120).
(BC)	is a column of the total pressure acting at each station point. Because the maximum radius of the wetted surface is 3.56 ins., and the distance between each station point (DEL, see (X)) is .503 ins., the wetted surface only extends to station 8. Beyond this station, no pressure is applied. Note that the maximum pressure always occurs at the edge of the wetted surface, in this case at station 8.
(CA)	This page contains columns of response output. The columns are as follows:
I	Station points along shell meridian
U(I)	Tangential displacement (ins) of middle surface in ξ direction
V(I)	Tangential displacement of middle surface in θ direction. Here zero because problem is axially symmetric.
W(I)	Transverse displacement (ins.) of middle surface (positive outward).
M(PHI)	Meridional bending moment M_ξ (in lbs/in.)
M(THETA)	Circumferential bending moment M_θ (in lbs./in.)
M(PHI, THETA)	Twisting moment $M_{\xi\theta}$. Zero here because problem is axially symmetric.
Q(PHI)	Shear force Q_ξ (lbs/in.)

Q(THETA)	Shear force Q_θ. Zero here because problem is axially symmetric.
(DA)	Additional columns of response.
I	Station point along meridian
N(PHI)	Meridional membrane force N_ξ (lbs/in.)
N(THETA)	Circumferential membrane force N_θ (lbs/in.)
N(PHI, THETA)	Twisting force $N_{\xi\theta}$. Zero here because problem is axially symmetric.
SIG(PHI)	Stress σ_ξ (psi) on outer fiber of shell.
SIG (THETA)	Stress σ_θ (psi) on outer fiber of shell.
SIG(PHI, THETA)	Stress $\sigma_{\xi\theta}$ on outer fiber of shell. Zero here because problem is axisymmetric.
(BA)	Additional columns of response.
VEL(U)	Tangential velocity in ξ direction (ins./sec.)
VEL(V)	Tangential velocity in θ direction. Zero here because problem is axially symmetric
VEL(W)	Transverse velocity (ins/sec.), positive in outward direction.
ACC(U)	Tangential acceleration in ξ direction (ins./sec^2)
ACC(V)	Tangential acceleration in θ direction (ins./sec^2)
ACC(W)	Transverse acceleration (ins./sec^2), positive in outward direction.


(A) DYNAMIC RESPONSE OF APOLLO C/M - NO INTERACTION
(B) V=30 FPS, WT=10000 LBS,
(C) SAME SHELL AS THE HYDROELASTIC CASE

GEOMETRY DATA FOR REGION... (SPHERE - TOROID)

(D) NUMBER OF STATIONS - 120

(E) RC = 1.7560E 02 (F) ROFF = 0.0000E-39 (G) PHIO = 0.0000E-39 (H) PHIN = 1.9530E 01

(I) I	(J) R(I)	(K) W(THETA)	(L) W(XI)	(M) RHOX(I)	(N) GAMA(I)
1	0.0000000E-39	5.6947608E-03	5.6947608E-03	0.0000000E-39	1.0000000E 10
2	5.0298677E-01	5.6947608E-03	5.6947608E-03	5.0298677E-01	1.9881132E 00
3	1.0059694E 00	5.6947608E-03	5.6947608E-03	1.0059694E 00	9.9404982E-01
4	1.5089438E 00	5.6947608E-03	5.6947608E-03	1.5089438E 00	6.6269082E-01
5	2.0119058E 00	5.6947608E-03	5.6947608E-03	2.0119058E 00	4.9700860E-01
6	2.5148512E 00	5.6947608E-03	5.6947608E-03	2.5148512E 00	3.9759707E-01
7	3.0177760E 00	5.6947608E-03	5.6947608E-03	3.0177760E 00	3.3132092E-01
8	3.5206761E 00	5.6947608E-03	5.6947608E-03	3.5206761E 00	2.8397928E-01
9	4.0235473E 00	5.6947608E-03	5.6947608E-03	4.0235473E 00	2.4847166E-01
10	4.5263854E 00	5.6947608E-03	5.6947608E-03	4.5263854E 00	2.2085342E-01
11	5.0291864E 00	5.6947608E-03	5.6947608E-03	5.0291864E 00	1.9875776E-01
12	5.5319462E 00	5.6947608E-03	5.6947608E-03	5.5319462E 00	1.8067849E-01
13	6.0346605E 00	5.6947608E-03	5.6947608E-03	6.0346605E 00	1.6561151E-01
14	6.5373253E 00	5.6947608E-03	5.6947608E-03	6.5373253E 00	1.5286171E-01
15	7.0399365E 00	5.6947608E-03	5.6947608E-03	7.0399365E 00	1.4193255E-01
16	7.5424901E 00	5.6947608E-03	5.6947608E-03	7.5424901E 00	1.3245986E-01
17	8.0449816E 00	5.6947608E-03	5.6947608E-03	8.0449816E 00	1.2417057E-01
18	8.5474072E 00	5.6947608E-03	5.6947608E-03	8.5474072E 00	1.1685585E-01
19	9.0497625E 00	5.6947608E-03	5.6947608E-03	9.0497625E 00	1.1035329E-01
20	9.5520437E 00	5.6947608E-03	5.6947608E-03	9.5520437E 00	1.0453462E-01
21	1.0054246E 01	5.6947608E-03	5.6947608E-03	1.0054246E 01	9.9297290E-02
22	1.0556367E 01	5.6947608E-03	5.6947608E-03	1.0556367E 01	9.4558232E-02
23	1.1058400E 01	5.6947608E-03	5.6947608E-03	1.1058400E 01	9.0249507E-02
24	1.1560343E 01	5.6947608E-03	5.6947608E-03	1.1560343E 01	8.6314971E-02
25	1.2062191E 01	5.6947608E-03	5.6947608E-03	1.2062191E 01	8.2707830E-02
26	1.2563940E 01	5.6947608E-03	5.6947608E-03	1.2563940E 01	7.9388867E-02
27	1.3065586E 01	5.6947608E-03	5.6947608E-03	1.3065586E 01	7.6324775E-02
28	1.3567125E 01	5.6947608E-03	5.6947608E-03	1.3567125E 01	7.3487252E-02
29	1.4068553E 01	5.6947608E-03	5.6947608E-03	1.4068553E 01	7.0852008E-02
30	1.4569865E 01	5.6947608E-03	5.6947608E-03	1.4569865E 01	6.8398137E-02
31	1.5071057E 01	5.6947608E-03	5.6947608E-03	1.5071057E 01	6.6107531E-02
32	1.5572126E 01	5.6947608E-03	5.6947608E-03	1.5572126E 01	6.3964297E-02
33	1.6073067E 01	5.6947608E-03	5.6947608E-03	1.6073067E 01	6.1954680E-02
34	1.6573876E 01	5.6947608E-03	5.6947608E-03	1.6573876E 01	6.0066543E-02
35	1.7074549E 01	5.6947608E-03	5.6947[illegible]08E-03	1.7074549E 01	5.8289171E-02

36	1.7575083E 01	5.6947608E-03	5.6947608E-03	1.7575083E 01	5.6613040E-02
37	1.8075472E 01	5.6947608E-03	5.6947608E-03	1.8075472E 01	5.5029696E-02
38	1.8575712E 01	5.6947608E-03	5.6947608E-03	1.8575712E 01	5.3531669E-02
39	1.9075800E 01	5.6947608E-03	5.6947608E-03	1.9075800E 01	5.2112206E-02
40	1.9575732E 01	5.6947608E-03	5.6947608E-03	1.9575732E 01	5.0765227E-02
41	2.0075503E 01	5.6947608E-03	5.6947608E-03	2.0075503E 01	4.9485347E-02
42	2.0575110E 01	5.6947608E-03	5.6947608E-03	2.0575110E 01	4.8267643E-02
43	2.1074547E 01	5.6947608E-03	5.6947608E-03	2.1074547E 01	4.7107619E-02
44	2.1573812E 01	5.6947608E-03	5.6947608E-03	2.1573812E 01	4.6001336E-02
45	2.2072900E 01	5.6947608E-03	5.6947608E-03	2.2072900E 01	4.4945092E-02
46	2.2571806E 01	5.6947608E-03	5.6947608E-03	2.2571806E 01	4.3935510E-02
47	2.3070527E 01	5.6947608E-03	5.6947608E-03	2.3070527E 01	4.2969620E-02
48	2.3569060E 01	5.6947608E-03	5.6947608E-03	2.3569060E 01	4.2044602E-02
49	2.4067398E 01	5.6947608E-03	5.6947608E-03	2.4067398E 01	4.1157877E-02
50	2.4565540E 01	5.6947608E-03	5.6947608E-03	2.4565540E 01	4.0307115E-02
51	2.5063479E 01	5.6947608E-03	5.6947608E-03	2.5063479E 01	3.9490150E-02
52	2.5561213E 01	5.6947608E-03	5.6947608E-03	2.5561213E 01	3.8705051E-02
53	2.6058737E 01	5.6947608E-03	5.6947608E-03	2.6058737E 01	3.7949939E-02
54	2.6556047E 01	5.6947608E-03	5.6947608E-03	2.6556047E 01	3.7223095E-02
55	2.7053140E 01	5.6947608E-03	5.6947608E-03	2.7053140E 01	3.6522946E-02
56	2.7550010E 01	5.6947608E-03	5.6947608E-03	2.7550010E 01	3.5848083E-02
57	2.8046654E 01	5.6947608E-03	5.6947608E-03	2.8046654E 01	3.5197140E-02
58	2.8543068E 01	5.6947608E-03	5.6947608E-03	2.8543068E 01	3.4568833E-02
59	2.9039249E 01	5.6947608E-03	5.6947608E-03	2.9039249E 01	3.3961993E-02
60	2.9535190E 01	5.6947608E-03	5.6947608E-03	2.9535190E 01	3.3375551E-02
61	3.0030890E 01	5.6947608E-03	5.6947608E-03	3.0030890E 01	3.2808464E-02
62	3.0526343E 01	5.6947608E-03	5.6947608E-03	3.0526343E 01	3.2259780E-02
63	3.1021546E 01	5.6947608E-03	5.6947608E-03	3.1021546E 01	3.1728643E-02
64	3.1516494E 01	5.6947608E-03	5.6947608E-03	3.1516494E 01	3.1214161E-02
65	3.2011183E 01	5.6947608E-03	5.6947608E-03	3.2011183E 01	3.0715596E-02
66	3.2505610E 01	5.6947608E-03	5.6947608E-03	3.2505610E 01	3.0232223E-02
67	3.2999770E 01	5.6947608E-03	5.6947608E-03	3.2999770E 01	2.9763296E-02
68	3.3493659E 01	5.6947608E-03	5.6947608E-03	3.3493659E 01	2.9308242E-02
69	3.3987274E 01	5.6947608E-03	5.6947608E-03	3.3987274E 01	2.8866410E-02
70	3.4480610E 01	5.6947608E-03	5.6947608E-03	3.4480610E 01	2.8437188E-02
71	3.4973663E 01	5.6947608E-03	5.6947608E-03	3.4973663E 01	2.8020073E-02
72	3.5466428E 01	5.6947608E-03	5.6947608E-03	3.5466428E 01	2.7614568E-02
73	3.5958903E 01	5.6947608E-03	5.6947608E-03	3.5958903E 01	2.7220190E-02
74	3.6451083E 01	5.6947608E-03	5.6947608E-03	3.6451083E 01	2.6836447E-02
75	3.6942964E 01	5.6947608E-03	5.6947608E-03	3.6942964E 01	2.6462908E-02
76	3.7434541E 01	5.6947608E-03	5.6947608E-03	3.7434541E 01	2.6099197E-02
77	3.7925812E 01	5.6947608E-03	5.6947608E-03	3.7925812E 01	2.5744945E-02
78	3.8416771E 01	5.6947608E-03	5.6947608E-03	3.8416771E 01	2.5399712E-02

79	3.8907415E 01	5.6947608E-03	5.6947608E-03	3.8907415E 01	2.5063192E-02
80	3.9397740E 01	5.6947608E-03	5.6947608E-03	3.9397740E 01	2.4735048E-02
81	3.9887742E 01	5.6947608E-03	5.6947608E-03	3.9887742E 01	2.4414981E-02
82	4.0377416E 01	5.6947608E-03	5.6947608E-03	4.0377416E 01	2.4102696E-02
83	4.0866759E 01	5.6947608E-03	5.6947608E-03	4.0866759E 01	2.3797857E-02
84	4.1355767E 01	5.6947608E-03	5.6947608E-03	4.1355767E 01	2.3500226E-02
85	4.1844435E 01	5.6947608E-03	5.6947608E-03	4.1844435E 01	2.3209592E-02
86	4.2332760E 01	5.6947608E-03	5.6947608E-03	4.2332760E 01	2.2925661E-02
87	4.2820738E 01	5.6947608E-03	5.6947608E-03	4.2820738E 01	2.2648175E-02
88	4.3308365E 01	5.6947608E-03	5.6947608E-03	4.3308365E 01	2.2376920E-02
89	4.3795635E 01	5.6947608E-03	5.6947608E-03	4.3795635E 01	2.2111743E-02
90	4.4282547E 01	5.6947608E-03	5.6947608E-03	4.4282547E 01	2.1852427E-02
91	4.4769096E 01	5.6947608E-03	5.6947608E-03	4.4769096E 01	2.1598686E-02
92	4.5255277E 01	5.6947608E-03	5.6947608E-03	4.5255277E 01	2.1350413E-02
93	4.5741087E 01	5.6947608E-03	5.6947608E-03	4.5741087E 01	2.1107439E-02
94	4.6226521E 01	5.6947608E-03	5.6947608E-03	4.6226521E 01	2.0869563E-02
95	4.6711577E 01	5.6947608E-03	5.6947608E-03	4.6711577E 01	2.0636627E-02
96	4.7196249E 01	5.6947608E-03	5.6947608E-03	4.7196249E 01	2.0408472E-02
97	4.7680534E 01	5.6947608E-03	5.6947608E-03	4.7680534E 01	2.0184968E-02
98	4.8164428E 01	5.6947608E-03	5.6947608E-03	4.8164428E 01	1.9965908E-02
99	4.8647925E 01	5.6947608E-03	5.6947608E-03	4.8647925E 01	1.9751240E-02
100	4.9131024E 01	5.6947608E-03	5.6947608E-03	4.9131024E 01	1.9540828E-02
101	4.9613720E 01	5.6947608E-03	5.6947608E-03	4.9613720E 01	1.9334477E-02
102	5.0096010E 01	5.6947608E-03	5.6947608E-03	5.0096010E 01	1.9132114E-02
103	5.0577888E 01	5.6947608E-03	5.6947608E-03	5.0577888E 01	1.8933587E-02
104	5.1059351E 01	5.6947608E-03	5.6947608E-03	5.1059351E 01	1.8738832E-02
105	5.1540396E 01	5.6947608E-03	5.6947608E-03	5.1540396E 01	1.8547681E-02
106	5.2021016E 01	5.6947608E-03	5.6947608E-03	5.2021016E 01	1.8360069E-02
107	5.2501211E 01	5.6947608E-03	5.6947608E-03	5.2501211E 01	1.8175935E-02
108	5.2980975E 01	5.6947608E-03	5.6947608E-03	5.2980975E 01	1.7995102E-02
109	5.3460304E 01	5.6947608E-03	5.6947608E-03	5.3460304E 01	1.7817525E-02
110	5.3939195E 01	5.6947608E-03	5.6947608E-03	5.3939195E 01	1.7643085E-02
111	5.4417642E 01	5.6947608E-03	5.6947608E-03	5.4417642E 01	1.7471705E-02
112	5.4895643E 01	5.6947608E-03	5.6947608E-03	5.4895643E 01	1.7303353E-02
113	5.5373195E 01	5.6947608E-03	5.6947608E-03	5.5373195E 01	1.7137886E-02
114	5.5850291E 01	5.6947608E-03	5.6947608E-03	5.5850291E 01	1.6975232E-02
115	5.6326930E 01	5.6947608E-03	5.6947608E-03	5.6326930E 01	1.6815336E-02
116	5.6803105E 01	5.6947608E-03	5.6947608E-03	5.6803105E 01	1.6658134E-02
117	5.7278816E 01	5.6947608E-03	5.6947608E-03	5.7278816E 01	1.6503576E-02
118	5.7754057E 01	5.6947608E-03	5.6947608E-03	5.7754057E 01	1.6351507E-02
119	5.8228823E 01	5.6947608E-03	5.6947608E-03	5.8228823E 01	1.6201908E-02
120	5.8703112E 01	5.6947608E-03	5.6947608E-03	5.8703112E 01	1.6054856E-02

CURVE FIT TABLES

	(O) DTB	(P) EKTB	(Q) EITB	(R) ALFTB	(S) DNATB	(T) TTB	(U) ENTB	(V) EMTB
1	1.000E 10	1.000E 10	1.000E 10	0.000E-39	1.000E 10	0.000E-39	0.000E-39	0.000E-39
2	3.330E 06	3.330E 06	2.970E 07	0.000E-39	1.025E 00	0.000E-39	0.000E-39	0.000E-39
3	0.000E-39	0.000E-39	0.000E-39	0.000E-39	0.000E-39	0.000E-39	0.000E-39	0.000E-39
4	0.000E-39	0.000E-39	0.000E-39	0.000E-39	0.000E-39	0.000E-39	0.000E-39	0.000E-39
5	0.000E-39	0.000E-39	0.000E-39	0.000E-39	0.000E-39	0.000E-39	0.000E-39	0.000E-39
6	0.000E-39	0.000E-39	0.000E-39	0.000E-39	0.000E-39	0.000E-39	0.000E-39	0.000E-39
7	0.000E-39	0.000E-39	0.000E-39	0.000E-39	0.000E-39	0.000E-39	0.000E-39	0.000E-39
8	0.000E-39	0.000E-39	0.000E-39	0.000E-39	0.000E-39	0.000E-39	0.000E-39	0.000E-39
9	0.000E-39	0.000E-39	0.000E-39	0.000E-39	0.000E-39	0.000E-39	0.000E-39	0.000E-39
10	0.000E-39	0.000E-39	0.000E-39	0.000E-39	0.000E-39	0.000E-39	0.000E-39	0.000E-39
11	0.000E-39	0.000E-39	0.000E-39	0.000E-39	0.000E-39	0.000E-39	0.000E-39	0.000E-39
12	0.000E-39	0.000E-39	0.000E-39	0.000E-39	0.000E-39	0.000E-39	0.000E-39	0.000E-39
13	0.000E-39	0.000E-39	0.000E-39	0.000E-39	0.000E-39	0.000E-39	0.000E-39	0.000E-39
14	0.000E-39	0.000E-39	0.000E-39	0.000E-39	0.000E-39	0.000E-39	0.000E-39	0.000E-39
15	0.000E-39	0.000E-39	0.000E-39	0.000E-39	0.000E-39	0.000E-39	0.000E-39	0.000E-39
16	0.000E-39	0.000E-39	0.000E-39	0.000E-39	0.000E-39	0.000E-39	0.000E-39	0.000E-39
17	0.000E-39	0.000E-39	0.000E-39	0.000E-39	0.000E-39	0.000E-39	0.000E-39	0.000E-39
18	0.000E-39	0.000E-39	0.000E-39	0.000E-39	0.000E-39	0.000E-39	0.000E-39	0.000E-39
19	0.000E-39	0.000E-39	0.000E-39	0.000E-39	0.000E-39	0.000E-39	0.000E-39	0.000E-39
20	0.000E-39	0.000E-39	0.000E-39	0.000E-39	0.000E-39	0.000E-39	0.000E-39	0.000E-39
21	0.000E-39	0.000E-39	0.000E-39	0.000E-39	0.000E-39	0.000E-39	0.000E-39	0.000E-39
22	0.000E-39	0.000E-39	0.000E-39	0.000E-39	0.000E-39	0.000E-39	0.000E-39	0.000E-39
23	0.000E-39	0.000E-39	0.000E-39	0.000E-39	0.000E-39	0.000E-39	0.000E-39	0.000E-39
24	0.000E-39	0.000E-39	0.000E-39	0.000E-39	0.000E-39	0.000E-39	0.000E-39	0.000E-39
25	0.000E-39	0.000E-39	0.000E-39	0.000E-39	0.000E-39	0.000E-39	0.000E-39	0.000E-39
26	0.000E-39	0.000E-39	0.000E-39	0.000E-39	0.000E-39	0.000E-39	0.000E-39	0.000E-39
27	0.000E-39	0.000E-39	0.000E-39	0.000E-39	0.000E-39	0.000E-39	0.000E-39	0.000E-39
28	0.000E-39	0.000E-39	0.000E-39	0.000E-39	0.000E-39	0.000E-39	0.000E-39	0.000E-39
29	0.000E-39	0.000E-39	0.000E-39	0.000E-39	0.000E-39	0.000E-39	0.000E-39	0.000E-39
30	0.000E-39	0.000E-39	0.000E-39	0.000E-39	0.000E-39	0.000E-39	0.000E-39	0.000E-39
31	0.000E-39	0.000E-39	0.000E-39	0.000E-39	0.000E-39	0.000E-39	0.000E-39	0.000E-39
32	0.000E-39	0.000E-39	0.000E-39	0.000E-39	0.000E-39	0.000E-39	0.000E-39	0.000E-39
33	0.000E-39	0.000E-39	0.000E-39	0.000E-39	0.000E-39	0.000E-39	0.000E-39	0.000E-39
34	0.000E-39	0.000E-39	0.000E-39	0.000E-39	0.000E-39	0.000E-39	0.000E-39	0.000E-39
35	0.000E-39	0.000E-39	0.000E-39	0.000E-39	0.000E-39	0.000E-39	0.000E-39	0.000E-39
36	0.000E-39	0.000E-39	0.000E-39	0.000E-39	0.000E-39	0.000E-39	0.000E-39	0.000E-39

37	0.000E-39	0.000E-39	0.000E-39	0.000E-39	0.000E-39	0.000E-39	0.000E-39	0.000E-39
38	0.000E-39	0.000E-39	0.000E-39	0.000E-39	0.000E-39	0.000E-39	0.000E-39	0.000E-39
39	0.000E-39	0.000E-39	0.000E-39	0.000E-39	0.000E-39	0.000E-39	0.000E-39	0.000E-39
40	0.000E-39	0.000E-39	0.000E-39	0.000E-39	0.000E-39	0.000E-39	0.000E-39	0.000E-39
41	0.000E-39	0.000E-39	0.000E-39	0.000E-39	0.000E-39	0.000E-39	0.000E-39	0.000E-39

(W)	PNTB	PFETB	PTHTB	DZOTB	VZOTB	QZOTB	DFOTB	VFOTB	QFOTB
1	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39
2	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39
3	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39
4	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39
5	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39
6	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39
7	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39
8	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39
9	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39
10	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39
11	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39
12	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39
13	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39
14	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39
15	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39
16	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39
17	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39
18	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39
19	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39
20	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39
21	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39
22	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39
23	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39
24	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39
25	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39
26	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39
27	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39
28	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39
29	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39
30	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39
31	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39
32	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39
33	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39

34	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39
35	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39
36	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39
37	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39
38	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39
39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39
40	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39
41	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39

(X)

INITIAL DATA

EN =	1.200E 02	AO =	1.000E 00	HO =	1.000E 00	EO =	1.000E 00
SIGO =	1.000E 00	ENFO =	0.000E-39	ENFL =	0.000E-39	POI =	3.300E-01
THETA =	0.000E-39	PIXI =	0.000E-39	SPRL =	0.000E-39	UK =	0.000E-39
VK =	0.000E-39	WK =	0.000E-39	EMK =	0.000E-39	TAU1 =	1.000E-03
ENT1 =	1.000E 01	PI1 =	1.000E 00	TAU2 =	0.000E-39	ENT2 =	0.000E-39
PI2 =	0.000E-39	TAU3 =	0.000E-39	ENT3 =	0.000E-39	PI3 =	0.000E-39
MASS =	9.750E-04	CFE =	0.000E-39	CZ =	0.000E-39	SKFE =	0.000E-39
SKZ =	0.000E-39	SUM =	-1.000E 00	EN1 =	2.000E 00	DEL =	5.030E-01
BCITP =	0.000E-39	BCIBM =	3.000E 00				

(Y)

	D	EK	E1	ALF	DNA	T	ENT	EMT
1	3.330E 06	3.330E 06	2.970E 07	0.000E-39	1.025E 00	0.000E-39	0.000E-39	0.000E-39
2	3.330E 06	3.330E 06	2.970E 07	0.000E-39	1.025E 00	0.000E-39	0.000E-39	0.000E-39
3	3.330E 06	3.330E 06	2.970E 07	0.000E-39	1.025E 00	0.000E-39	0.000E-39	0.000E-39
4	3.330E 06	3.330E 06	2.970E 07	0.000E-39	1.025E 00	0.000E-39	0.000E-39	0.000E-39
5	3.330E 06	3.330E 06	2.970E 07	0.000E-39	1.025E 00	0.000E-39	0.000E-39	0.000E-39
6	3.330E 06	3.330E 06	2.970E 07	0.000E-39	1.025E 00	0.000E-39	0.000E-39	0.000E-39
7	3.330E 06	3.330E 06	2.970E 07	0.000E-39	1.025E 00	0.000E-39	0.000E-39	0.000E-39
8	3.330E 06	3.330E 06	2.970E 07	0.000E-39	1.025E 00	0.000E-39	0.000E-39	0.000E-39
9	3.330E 06	3.330E 0	2.970E 07	0.000E-39	1.025E 00	0.000E-39	0.000E-39	0.000E-39
10	3.330E 06	3.330E 06	2.970E 07	0.000E-39	1.025E 00	0.000E-39	0.000E-39	0.000E-39
11	3.330E 06	3.330E 06	2.970E 07	0.000E-39	1.025E 00	0.000E-39	0.000E-39	0.000E-39
12	3.330E 06	3.330E 06	2.970E 07	0.000E-39	1.025E 00	0.000E-39	0.000E-39	0.000E-39
13	3.330E 06	3.330E 06	2.970E 07	0.000E-39	1.025E 00	0.000E-39	0.000E-39	0.000E-39
14	3.330E 06	3.330E 06	2.970E 07	0.000E-39	1.025E 00	0.000E-39	0.000E-39	0.000E-39
15	3.330E 06	3.330E 06	2.970E 07	0.000E-39	1.025E 00	0.000E-39	0.000E-39	0.000E-39
16	3.330E 06	3.330E 06	2.970E 07	0.000E-39	1.025E 00	0.000E-39	0.000E-39	0.000E-39
17	3.330E 06	3.330E 06	2.970E 07	0.000E-39	1.025E 00	0.000E-39	0.000E-39	0.000E-39
18	3.330E 06	3.330E 06	2.970E 07	0.000E-39	1.025E 00	0.000E-39	0.000E-39	0.000E-39
19	3 [illegible]30E 06	3.330E 06	2.970E 07	0.000E-[illegible]	1.025E 00	0.000E-39	0.000E-39	0.[illegible]0E-39

20	3.330E 06	3.330E 06	2.970E 07	0.000E-39	1.025E 00	0.000E-39	0.000E-39	0.000E-39
21	3.330E 06	3.330E 06	2.970E 07	0.000E-39	1.025E 00	0.000E-39	0.000E-39	0.000E-39
22	3.330E 06	3.330E 06	2.970E 07	0.000E-39	1.025E 00	0.000E-39	0.000E-39	0.000E-39
23	3.330E 06	3.330E 06	2.970E 07	0.000E-39	1.025E 00	0.000E-39	0.000E-39	0.000E-39
24	3.330E 06	3.330E 06	2.970E 07	0.000E-39	1.025E 00	0.000E-39	0.000E-39	0.000E-39
25	3.330E 06	3.330E 06	2.970E 07	0.000E-39	1.025E 00	0.000E-39	0.000E-39	0.000E-39
26	3.330E 06	3.330E 06	2.970E 07	0.000E-39	1.025E 00	0.000E-39	0.000E-39	0.000E-39
27	3.330E 06	3.330E 06	2.970E 07	0.000E-39	1.025E 00	0.000E-39	0.000E-39	0.000E-39
28	3.330E 06	3.330E 06	2.970E 07	0.000E-39	1.025E 00	0.000E-39	0.000E-39	0.000E-39
29	3.330E 06	3.330E 06	2.970E 07	0.000E-39	1.025E 00	0.000E-39	0.000E-39	0.000E-39
30	3.330E 06	3.330E 06	2.970E 07	0.000E-39	1.025E 00	0.000E-39	0.000E-39	0.000E-39
31	3.330E 06	3.330E 06	2.970E 07	0.000E-39	1.025E 00	0.000E-39	0.000E-39	0.000E-39
32	3.330E 06	3.330E 06	2.970E 07	0.000E-39	1.025E 00	0.000E-39	0.000E-39	0.000E-39
33	3.330E 06	3.330E 06	2.970E 07	0.000E-39	1.025E 00	0.000E-39	0.000E-39	0.000E-39
34	3.330E 06	3.330E 06	2.970E 07	0.000E-39	1.025E 00	0.000E-39	0.000E-39	0.000E-39
35	3.330E 06	3.330E 06	2.970E 07	0.000E-39	1.025E 00	0.000E-39	0.000E-39	0.000E-39
36	3.330E 06	3.330E 06	2.970E 07	0.000E-39	1.025E 00	0.000E-39	0.000E-39	0.000E-39
37	3.330E 06	3.330E 06	2.970E 07	0.000E-39	1.025E 00	0.000E-39	0.000E-39	0.000E-39
38	3.330E 06	3.330E 06	2.970E 07	0.000E-39	1.025E 00	0.000E-39	0.000E-39	0.000E-39
39	3.330E 06	3.330E 06	2.970E 07	0.000E-39	1.025E 00	0.000E-39	0.000E-39	0.000E-39
40	3.330E 06	3.330E 06	2.970E 07	0.000E-39	1.025E 00	0.000E-39	0.000E-39	0.000E-39
41	3.330E 06	3.330E 06	2.970E 07	0.000E-39	1.025E 00	0.000E-39	0.000E-39	0.000E-39
42	3.330E 06	3.330E 06	2.970E 07	0.000E-39	1.025E 00	0.000E-39	0.000E-39	0.000E-39
43	3.330E 06	3.330E 06	2.970E 07	0.000E-39	1.025E 00	0.000E-39	0.000E-39	0.000E-39
44	3.330E 06	3.330E 06	2.970E 07	0.000E-39	1.025E 00	0.000E-39	0.000E-39	0.000E-39
45	3.330E 06	3.330E 06	2.970E 07	0.000E-39	1.025E 00	0.000E-39	0.000E-39	0.000E-39
46	3.330E 06	3.330E 06	2.970E 07	0.000E-39	1.025E 00	0.000E-39	0.000E-39	0.000E-39
47	3.330E 06	3.330E 06	2.970E 07	0.000E-39	1.025E 00	0.000E-39	0.000E-39	0.000E-39
48	3.330E 06	3.330E 06	2.970E 07	0.000E-39	1.025E 00	0.000E-39	0.000E-39	0.000E-39
49	3.330E 06	3.330E 06	2.970E 07	0.000E-39	1.025E 00	0.000E-39	0.000E-39	0.000E-39
50	3.330E 06	3.330E 06	2.970E 07	0.000E-39	1.025E 00	0.000E-39	0.000E-39	0.000E-39
51	3.330E 06	3.330E 06	2.970E 07	0.000E-39	1.025E 00	0.000E-39	0.000E-39	0.000E-39
52	3.330E 06	3.330E 06	2.970E 07	0.000E-39	1.025E 00	0.000E-39	0.000E-39	0.000E-39
53	3.330E 06	3.330E 06	2.970E 07	0.000E-39	1.025E 00	0.000E-39	0.000E-39	0.000E-39
54	3.330E 06	3.330E 06	2.970E 07	0.000E-39	1.025E 00	0.000E-39	0.000E-39	0.000E-39
55	3.330E 06	3.330E 06	2.970E 07	0.000E-39	1.025E 00	0.000E-39	0.000E-39	0.000E-39
56	3.330E 06	3.330E 06	2.970E 07	0.000E-39	1.025E 00	0.000E-39	0.000E-39	0.000E-39
57	3.330E 06	3.330E 06	2.970E 07	0.000E-39	1.025E 00	0.000E-39	0.000E-39	0.000E-39
58	3.330E 06	3.330E 06	2.970E 07	0.000E-39	1.025E 00	0.000E-39	0.000E-39	0.000E-39
59	3.330E 06	3.330E 06	2.970E 07	0.000E-39	1.025E 00	0.000E-39	0.000E-39	0.000E-39
60	3.330E 06	3.330E 06	2.970E 07	0.000E-39	1.025E 00	0.000E-39	0.000E-39	0.000E-39
61	3.330E 06	3.330E 06	2.970E 07	0.000E-39	1.025E 00	0.000E-39	0.000E-39	0.000E-39
62	3.330E 06	3.330E 06	2.970E 07	0.000E-39	1.025E 00	0.000E-39	0.000E-39	0.000E-39

63	3.330E 06	3.330E 06	2.970E 07	0.000E-39	1.025E 00	0.000E-39	0.000E-39	0.000E-39
64	3.330E 06	3.330E 06	2.970E 07	0.000E-39	1.025E 00	0.000E-39	0.000E-39	0.000E-39
65	3.330E 06	3.330E 06	2.970E 07	0.000E-39	1.025E 00	0.000E-39	0.000E-39	0.000E-39
66	3.330E 06	3.330E 06	2.970E 07	0.000E-39	1.025E 00	0.000E-39	0.000E-39	0.000E-39
67	3.330E 06	3.330E 06	2.970E 07	0.000E-39	1.025E 00	0.000E-39	0.000E-39	0.000E-39
68	3.330E 06	3.330E 06	2.970E 07	0.000E-39	1.025E 00	0.000E-39	0.000E-39	0.000E-39
69	3.330E 06	3.330E 06	2.970E 07	0.000E-39	1.025E 00	0.000E-39	0.000E-39	0.000E-39
70	3.330E 06	3.330E 06	2.970E 07	0.000E-39	1.025E 00	0.000E-39	0.000E-39	0.000E-39
71	3.330E 06	3.330E 06	2.970E 07	0.000E-39	1.025E 00	0.000E-39	0.000E-39	0.000E-39
72	3.330E 06	3.330E 06	2.970E 07	0.000E-39	1.025E 00	0.000E-39	0.000E-39	0.000E-39
73	3.330E 06	3.330E 06	2.970E 07	0.000E-39	1.025E 00	0.000E-39	0.000E-39	0.000E-39
74	3.330E 06	3.330E 06	2.970E 07	0.000E-39	1.025E 00	0.000E-39	0.000E-39	0.000E-39
75	3.330E 06	3.330E 06	2.970E 07	0.000E-39	1.025E 00	0.000E-39	0.000E-39	0.000E-39
76	3.330E 06	3.330E 06	2.970E 07	0.000E-39	1.025E 00	0.000E-39	0.000E-39	0.000E-39
77	3.330E 06	3.330E 06	2.970E 07	0.000E-39	1.025E 00	0.000E-39	0.000E-39	0.000E-39
78	3.330E 06	3.330E 06	2.970E 07	0.000E-39	1.025E 00	0.000E-39	0.000E-39	0.000E-39
79	3.330E 06	3.330E 06	2.970E 07	0.000E-39	1.025E 00	0.000E-39	0.000E-39	0.000E-39
80	3.330E 06	3.330E 06	2.970E 07	0.000E-39	1.025E 00	0.000E-39	0.000E-39	0.000E-39
81	3.330E 06	3.330E 06	2.970E 07	0.000E-39	1.025E 00	0.000E-39	0.000E-39	0.000E-39
82	3.330E 06	3.330E 06	2.970E 07	0.000E-39	1.025E 00	0.000E-39	0.000E-39	0.000E-39
83	3.330E 06	3.330E 06	2.970E 07	0.000E-39	1.025E 00	0.000E-39	0.000E-39	0.000E-39
84	3.330E 06	3.330E 06	2.970E 07	0.000E-39	1.025E 00	0.000E-39	0.000E-39	0.000E-39
85	3.330E 06	3.330E 06	2.970E 07	0.000E-39	1.025E 00	0.000E-39	0.000E-39	0.000E-39
86	3.330E 06	3.330E 06	2.970E 07	0.000E-39	1.025E 00	0.000E-39	0.000E-39	0.000E-39
87	3.330E 06	3.330E 06	2.970E 07	0.000E-39	1.025E 00	0.000E-39	0.000E-39	0.000E-39
88	3.330E 06	3.330E 06	2.970E 07	0.000E-39	1.025E 00	0.000E-39	0.000E-39	0.000E-39
89	3.330E 06	3.330E 06	2.970E 07	0.000E-39	1.025E 00	0.000E-39	0.000E-39	0.000E-39
90	3.330E 06	3.330E 06	2.970E 07	0.000E-39	1.025E 00	0.000E-39	0.000E-39	0.000E-39
91	3.330E 06	3.330E 06	2.970E 07	0.000E-39	1.025E 00	0.000E-39	0.000E-39	0.000E-39
92	3.330E 06	3.330E 06	2.970E 07	0.000E-39	1.025E 00	0.000E-39	0.000E-39	0.000E-39
93	3.330E 06	3.330E 06	2.970E 07	0.000E-39	1.025E 00	0.000E-39	0.000E-39	0.000E-39
94	3.330E 06	3.330E 06	2.970E 07	0.000E-39	1.025E 00	0.000E-39	0.000E-39	0.000E-39
95	3.330E 06	3.330E 06	2.970E 07	0.000E-39	1.025E 00	0.000E-39	0.000E-39	0.000E-39
96	3.330E 06	3.330E 06	2.970E 07	0.000E-39	1.025E 00	0.000E-39	0.000E-39	0.000E-39
97	3.330E 06	3.330E 06	2.970E 07	0.000E-39	1.025E 00	0.000E-39	0.000E-39	0.000E-39
98	3.330E 06	3.330E 06	2.970E 07	0.000E-39	1.025E 00	0.000E-39	0.000E-39	0.000E-39
99	3.330E 06	3.330E 06	2.970E 07	0.000E-39	1.025E 00	0.000E-39	0.000E-39	0.000E-39
100	3.330E 06	3.330E 06	2.970E 07	0.000E-39	1.025E 00	0.000E-39	0.000E-39	0.000E-39
101	3.330E 06	3.330E 06	2.970E 07	0.000E-39	1.025E 00	0.000E-39	0.000E-39	0.000E-39
102	3.330E 06	3.330E 06	2.970E 07	0.000E-39	1.025E 00	0.000E-39	0.000E-39	0.000E-39
103	3.330E 06	3.330E 06	2.970E 07	0.000E-39	1.025E 00	0.000E-39	0.000E-39	0.000E-39
104	3.330E 06	3.330E 06	2.970E 07	0.000E-39	1.025E 00	0.000E-39	0.000E-39	0.000E-39
105	3.330E 06	3.330E 06	2.970E 07	0.000E-39	1.025E 00	0.000E-39	0.000E-39	0.000E-39

106	3.330E 06	3.330E 06	2.970E 07	0.000E-39	1.025E 00	0.000E-39	0.000E-39	0.000E-39
107	3.330E 06	3.330E 06	2.970E 07	0.000E-39	1.025E 00	0.000E-39	0.000E-39	0.000E-39
108	3.330E 06	3.330E 06	2.970E 07	0.000E-39	1.025E 00	0.000E-39	0.000E-39	0.000E-39
109	3.330E 06	3.330E 06	2.970E 07	0.000E-39	1.025E 00	0.000E-39	0.000E-39	0.000E-39
110	3.330E 06	3.330E 06	2.970E 07	0.000E-39	1.025E 00	0.000E-39	0.000E-39	0.000E-39
111	3.330E 06	3.330E 06	2.970E 07	0.000E-39	1.025E 00	0.000E-39	0.000E-39	0.000E-39
112	3.330E 06	3.330E 06	2.970E 07	0.000E-39	1.025E 00	0.000E-39	0.000E-39	0.000E-39
113	3.330E 06	3.330E 06	2.970E 07	0.000E-39	1.025E 00	0.000E-39	0.000E-39	0.000E-39
114	3.330E 06	3.330E 06	2.970E 07	0.000E-39	1.025E 00	0.000E-39	0.000E-39	0.000E-39
115	3.330E 06	3.330E 06	2.970E 07	0.000E-39	1.025E 00	0.000E-39	0.000E-39	0.000E-39
116	3.330E 06	3.330E 06	2.970E 07	0.000E-39	1.025E 00	0.000E-39	0.000E-39	0.000E-39
117	3.330E 06	3.330E 06	2.970E 07	0.000E-39	1.025E 00	0.000E-39	0.000E-39	0.000E-39
118	3.330E 06	3.330E 06	2.970E 07	0.000E-39	1.025E 00	0.000E-39	0.000E-39	0.000E-39
119	3.330E 06	3.330E 06	2.970E 07	0.000E-39	1.025E 00	0.000E-39	0.000E-39	0.000E-39
120	3.330E 06	3.330E 06	2.970E 07	0.000E-39	1.025E 00	0.000E-39	0.000E-39	0.000E-39

(2)

	PN	PFE	PTH	DZO	VZO	AZO	DFO	VFO	AFO
1	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39
2	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39
3	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39
4	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39
5	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39
6	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39
7	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39
8	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39
9	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39
10	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39
11	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39
12	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39
13	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39
14	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39
15	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39
16	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39
17	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39
18	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39
19	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39
20	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39
21	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39
22	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39
23	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39

24	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39
25	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39
26	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39
27	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39
28	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39
29	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39
30	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39
31	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39
32	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39
33	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39
34	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39
35	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39
36	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39
37	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39
38	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39
39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39
40	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39
41	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39
42	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39
43	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39
44	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39
45	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39
46	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39
47	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39
48	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39
49	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39
50	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39
51	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39
52	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39
53	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39
54	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39
55	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39
56	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39
57	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39
58	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39
59	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39
60	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39
61	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39
62	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39
63	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39
64	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39
65	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39
66	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39

67	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39
68	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39
69	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39
70	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39
71	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39
72	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39
73	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39
74	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39
75	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39
76	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39
77	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39
78	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39
79	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39
80	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39
81	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39
82	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39
83	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39
84	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39
85	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39
86	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39
87	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39
88	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39
89	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39
90	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39
91	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39
92	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39
93	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39
94	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39
95	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39
96	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39
97	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39
98	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39
99	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39
100	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39
101	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39
102	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39
103	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39
104	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39
105	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39
106	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39
107	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39
108	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39
109	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39

110	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39
111	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39
112	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39
113	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39
114	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39
115	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39
116	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39
117	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39
118	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39
119	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39
120	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39	0.00E-39

LOADS OUTPUT FROM ACCN SUBROUTINE

MAX RAD. OF PRESSURE PROFILE = 3.5557E 00 (BA)

TIME = 1.0000E-04

NORMAL PRESSURES (PN) (BB)

	PN
1	3.8107E 02
2	3.8494E 02
3	3.9732E 02
4	4.2089E 02
5	4.6227E 02
6	5.3923E 02
7	7.2098E 02
8	1.0891E 03
9	0.0000E-39
10	0.0000E-39
11	0.0000E-39
12	0.0000E-39
13	0.0000E-39
14	0.0000E-39
15	0.0000E-39
16	0.0000E-39
17	0.0000E-39
18	0.0000E-39
19	0.0000E-39
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22	0.0000E-39
23	0.0000E-39
24	0.0000E-39
25	0.0000E-39
26	0.0000E-39
27	0.0000E-39

28	0.0000E-39
29	0.0000E-39
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31	0.0000E-39
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33	0.0000E-39
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35	0.0000E-39
36	0.0000E-39
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38	0.0000E-39
39	0.0000E-39
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41	0.0000E-39
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69	0.0000E-39
70	0.0000E-39

71	0.0000E-39
72	0.0000E-39
73	0.0000E-39
74	0.0000E-39
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76	0.0000E-39
77	0.0000E-39
78	0.0000E-39
79	0.0000E-39
80	0.0000E-39
81	0.0000E-39
82	0.0000E-39
83	0.0000E-39
84	0.0000E-39
85	0.0000E-39
86	0.0000E-39
87	0.0000E-39
88	0.0000E-39
89	0.0000E-39
90	0.0000E-39
91	0.0000E-39
92	0.0000E-39
93	0.0000E-39
94	0.0000E-39
95	0.0000E-39
96	0.0000E-39
97	0.0000E-39
98	0.0000E-39
99	0.0000E-39
100	0.0000E-39
101	0.0000E-39
102	0.0000E-39
103	0.0000E-39
104	0.0000E-39
105	0.0000E-39
106	0.0000E-39
107	0.0000E-39
108	0.0000E-39
109	0.0000E-39
110	0.0000E-39
111	0.0000E-39
112	0.0000E-39
113	0.0000E-39

114	0.0000E-39
115	0.0000E-39
116	0.0000E-39
117	0.0000E-39
118	0.0000E-39
119	0.0000E-39
120	0.0000E-39

(eA)

DEFLECTIONS AND INTERNAL LOADS, TIME = 1.0000E-04

I	U(I)	V(I)	W(I)	M(PHI)	M(THETA)	M(PHI,THETA)	Q(PHI)	Q(THETA)
1	1.8190E-11	-0.0000E-39	5.3015E-03	1.1000E 03	1.1000E 03	0.0000E-39	-7.2222E 00	0.0000E-39
2	-8.0499E-06	-0.0000E-39	5.2702E-03	1.0964E 03	1.0964E 03	-0.0000E-39	-1.4364E 01	-0.0000E-39
3	-1.5960E-05	-0.0000E-39	5.1762E-03	1.0855E 03	1.0906E 03	-0.0000E-39	-3.8050E 01	-0.0000E-39
4	-2.3562E-05	-0.0000E-39	5.0203E-03	1.0631E 03	1.0779E 03	-0.0000E-39	-7.1309E 01	-0.0000E-39
5	-3.0691E-05	-0.0000E-39	4.8041E-03	1.0237E 03	1.0559E 03	-0.0000E-39	-1.2077E 02	-0.0000E-39
6	-3.7186E-05	-0.0000E-39	4.5303E-03	9.5775E 02	1.0201E 03	-0.0000E-39	-1.9893E 02	-0.0000E-39
7	-4.2884E-05	-0.0000E-39	4.2036E-03	8.4849E 02	9.6270E 02	-0.0000E-39	-3.3701E 02	-0.0000E-39
8	-4.7617E-05	-0.0000E-39	3.8315E-03	6.5679E 02	8.6629E 02	-0.0000E-39	-5.9933E 02	-0.0000E-39
9	-5.1203E-05	-0.0000E-39	3.4279E-03	3.0543E 02	6.9702E 02	-0.0000E-39	-6.9143E 02	-0.0000E-39
10	-5.3593E-05	-0.0000E-39	3.0178E-03	5.9116E 01	5.4691E 02	-0.0000E-39	-5.2245E 02	-0.0000E-39
11	-5.4908E-05	-0.0000E-39	2.6180E-03	-1.1177E 02	4.1918E 02	-0.0000E-39	-3.8996E 02	-0.0000E-39
12	-5.5281E-05	-0.0000E-39	2.2395E-03	-2.2702E 02	3.1329E 02	-0.0000E-39	-2.8538E 02	-0.0000E-39
13	-5.4847E-05	-0.0000E-39	1.8893E-03	-3.0065E 02	2.2721E 02	-0.0000E-39	-2.0279E 02	-0.0000E-39
14	-5.3740E-05	-0.0000E-39	1.5710E-03	-3.4307E 02	1.5844E 02	-0.0000E-39	-1.3782E 02	-0.0000E-39
15	-5.2088E-05	-0.0000E-39	1.2865E-03	-3.6218E 02	1.0444E 02	-0.0000E-39	-8.7141E 01	-0.0000E-39
16	-5.0009E-05	0.0000E-39	1.0358E-03	-3.6411E 02	6.2826E 01	-0.0000E-39	-4.8082E 01	-0.0000E-39
17	-4.7610E-05	0.0000E-39	8.1788E-04	-3.5366E 02	3.1438E 01	-0.0000E-39	-1.8488E 01	-0.0000E-39
18	-4.4986E-05	0.0000E-39	6.3103E-04	-3.3460E 02	8.3856E 00	-0.0000E-39	3.4213E 00	-0.0000E-39
19	-4.2220E-05	0.0000E-39	4.7296E-04	-3.0990E 02	-7.9633E 00	-0.0000E-39	1.9127E 01	-0.0000E-39
20	-3.9383E-05	0.0000E-39	3.4108E-04	-2.8184E 02	-1.9001E 01	-0.0000E-39	2.9865E 01	-0.0000E-39
21	-3.6535E-05	0.0000E-39	2.3272E-04	-2.5221E 02	-2.5897E 01	-0.0000E-39	3.6671E 01	-0.0000E-39
22	-3.3724E-05	0.0000E-39	1.4513E-04	-2.2235E 02	-2.9627E 01	-0.0000E-39	4.0407E 01	-0.0000E-39
23	-3.0990E-05	0.0000E-39	7.5680E-05	-1.9323E 02	-3.0992E 01	-0.0000E-39	4.1791E 01	-0.0000E-39
24	-2.8362E-05	0.0000E-39	2.1838E-05	-1.6558E 02	-3.0641E 01	-0.0000E-39	4.1416E 01	-0.0000E-39
25	-2.5863E-05	0.0000E-39	-1.8742E-05	-1.3985E 02	-2.9098E 01	-0.0000E-39	3.9767E 01	-0.0000E-39
26	-2.3508E-05	0.0000E-39	-4.8210E-05	-1.1636E 02	-2.6776E 01	-0.0000E-39	3.7238E 01	-0.0000E-39
27	-2.1308E-05	0.0000E-39	-6.8504E-05	-9.5238E 01	-2.3996E 01	-0.0000E-39	3.4145E 01	-0.0000E-39
28	-1.9267E-05	0.0000E-39	-8.1347E-05	-7.6538E 01	-2.1001E 01	-0.0000E-39	3.0736E 01	-0.0000E-39
29	-1.7386E-05	0.0000E-39	-8.8250E-05	-6.0213E 01	-1.7974E 01	-0.0000E-39	2.7205E 01	-0.0000E-39
30	-1.5662E-05	0.0000E-39	-9.0520E-05	-4.6160E 01	-1.5044E 01	-0.0000E-39	2.3697E 01	0.0000E-39
31	-1.4092E-05	-0.0000E-39	-8.9272E-05	-3.4233E 01	-1.2302E 01	0.0000E-39	2.0319E 01	0.0000E-39
32	-1.2668E-05	-0.0000E-39	-8.5448E-05	-2.4261E 01	-9.8018E 00	0.0000E-39	1.7146E 01	0.0000E-39
33	-1.1383E-05	-0.0000E-39	-7.9828E-05	-1.6055E 01	-7.5761E 00	0.0000E-39	1.4227E 01	0.0000E-39
34	-1.0227E-05	-0.0000E-39	-7.3048E-05	-9.4207E 00	-5.6365E 00	0.0000E-39	1.1590E 01	0.0000E-39
35	-9.1911E-06	-0.0000E-39	-6.5620E-05	-4.1669E 00	-3.9806E 00	0.0000E-39	9.2473E 00	0.0000E-39
36	-8.2654E-06	-0.0000E-39	-5.7946E-05	-1.0726E-01	-2.5960E 00	0.0000E-39	7.1989E 00	0.0000E-39
37	-7.4403E-06	-0.0000E-39	-5.0334E-05	2.9333E 00	-1.4633E 00	0.0000E-39	5.4351E 00	0.0000E-39
38	-6.7063E-06	-0.0000E-39	-4.3011E-05	5.1170E 00	-5.5916E-01	0.0000E-39	3.9401E 00	0.0000E-39
39	-6.0544E-06	-0.0000E-39	-3.6138E-05	6.5913E 00	1.4222E-01	0.0000E-39	2.6935E 00	0.0000E-39

40	-5.4759E-06	-0.0000E-39	-2.9821E-05	7.4885E 00	6.6718E-01	0.0000E-39	1.6723E 00	0.0000E-39
41	-4.9629E-06	-0.0000E-39	-2.4122E-05	7.9252E 00	1.0416E 00	0.0000E-39	8.5224E-01	0.0000E-39
42	-4.5080E-06	-0.0000E-39	-1.9068E-05	8.0031E 00	1.2900E 00	0.0000E-39	2.0894E-01	0.0000E-39
43	-4.1042E-06	-0.0000E-39	-1.4659E-05	7.8094E 00	1.4353E 00	0.0000E-39	-2.8146E-01	0.0000E-39
44	-3.7455E-06	-0.0000E-39	-1.0874E-05	7.4179E 00	1.4979E 00	0.0000E-39	-6.4160E-01	0.0000E-39
45	-3.4264E-06	-0.0000E-39	-7.6786E-06	6.8900E 00	1.4960E 00	0.0000E-39	-8.9251E-01	0.0000E-39
46	-3.1418E-06	-0.0000E-39	-5.0277E-06	6.2762E 00	1.4457E 00	0.0000E-39	-1.0534E 00	0.0000E-39
47	-2.8873E-06	-0.0000E-39	-2.8705E-06	5.6168E 00	1.3604E 00	0.0000E-39	-1.1415E 00	0.0000E-39
48	-2.6591E-06	-0.0000E-39	-1.1532E-06	4.9438E 00	1.2514E 00	0.0000E-39	-1.1721E 00	0.0000E-39
49	-2.4538E-06	-0.0000E-39	1.7846E-07	4.2815E 00	1.1283E 00	0.0000E-39	-1.1584E 00	0.0000E-39
50	-2.2684E-06	-0.0000E-39	1.1774E-06	3.6479E 00	9.9833E-01	0.0000E-39	-1.1117E 00	0.0000E-39
51	-2.1005E-06	-0.0000E-39	1.8938E-06	3.0557E 00	8.6752E-01	0.0000E-39	-1.0416E 00	0.0000E-39
52	-1.9477E-06	-0.0000E-39	2.3746E-06	2.5132E 00	7.4032E-01	0.0000E-39	-9.5608E-01	0.0000E-39
53	-1.8081E-06	-0.0000E-39	2.6624E-06	2.0249E 00	6.1996E-01	0.0000E-39	-8.6153E-01	0.0000E-39
54	-1.6803E-06	-0.0000E-39	2.7954E-06	1.5928E 00	5.0868E-01	0.0000E-39	-7.6313E-01	-0.0000E-39
55	-1.5628E-06	0.0000E-39	2.8072E-06	1.2166E 00	4.0788E-01	-0.0000E-39	-6.6488E-01	-0.0000E-39
56	-1.4543E-06	0.0000E-39	2.7271E-06	8.9428E-01	3.1825E-01	-0.0000E-39	-5.6981E-01	-0.0000E-39
57	-1.3541E-06	0.0000E-39	2.5800E-06	6.2264E-01	2.3999E-01	-0.0000E-39	-4.8009E-01	-0.0000E-39
58	-1.2611E-06	0.0000E-39	2.3869E-06	3.9777E-01	1.7285E-01	-0.0000E-39	-3.9722E-01	-0.0000E-39
59	-1.1747E-06	0.0000E-39	2.1649E-06	2.1523E-01	1.1631E-01	-0.0000E-39	-3.2209E-01	-0.0000E-39
60	-1.0942E-06	0.0000E-39	1.9282E-06	7.0370E-02	6.9603E-02	-0.0000E-39	-2.5516E-01	-0.0000E-39
61	-1.0193E-06	0.0000E-39	1.6876E-06	-4.1482E-02	3.1866E-02	-0.0000E-39	-1.9651E-01	-0.0000E-39
62	-9.4931E-07	0.0000E-39	1.4516E-06	-1.2489E-01	2.1385E-03	-0.0000E-39	-1.4594E-01	-0.0000E-39
63	-8.8397E-07	0.0000E-39	1.2265E-06	-1.8418E-01	-2.0557E-02	-0.0000E-39	-1.0307E-01	-0.0000E-39
64	-8.2292E-07	0.0000E-39	1.0168E-06	-2.2336E-01	-3.7189E-02	-0.0000E-39	-6.7364E-02	-0.0000E-39
65	-7.6587E-07	0.0000E-39	8.2520E-07	-2.4610E-01	-4.8684E-02	-0.0000E-39	-3.8185E-02	-0.0000E-39
66	-7.1254E-07	0.0000E-39	6.5339E-07	-2.5567E-01	-5.5908E-02	-0.0000E-39	-1.4859E-02	-0.0000E-39
67	-6.6270E-07	0.0000E-39	5.0194E-07	-2.5497E-01	-5.9655E-02	-0.0000E-39	3.3048E-03	-0.0000E-39
68	-6.1615E-07	0.0000E-39	3.7070E-07	-2.4650E-01	-6.0637E-02	-0.0000E-39	1.6992E-02	-0.0000E-39
69	-5.7267E-07	0.0000E-39	2.5890E-07	-2.3240E-01	-5.9485E-02	-0.0000E-39	2.6859E-02	-0.0000E-39
70	-5.3209E-07	0.0000E-39	1.6535E-07	-2.1446E-01	-5.6742E-02	-0.0000E-39	3.3522E-02	-0.0000E-39
71	-4.9423E-07	0.0000E-39	8.8607E-08	-1.9416E-01	-5.2875E-02	-0.0000E-39	3.7547E-02	-0.0000E-39
72	-4.5894E-07	0.0000E-39	2.7034E-08	-1.7270E-01	-4.8272E-02	-0.0000E-39	3.9444E-02	-0.0000E-39
73	-4.2605E-07	0.0000E-39	-2.1075E-08	-1.5103E-01	-4.3252E-02	-0.0000E-39	3.9666E-02	-0.0000E-39
74	-3.9543E-07	0.0000E-39	-5.7433E-08	-1.2985E-01	-3.8072E-02	-0.0000E-39	3.8609E-02	-0.0000E-39
75	-3.6694E-07	0.0000E-39	-8.3707E-08	-1.0971E-01	-3.2930E-02	-0.0000E-39	3.6612E-02	-0.0000E-39
76	-3.4044E-07	0.0000E-39	-1.0147E-07	-9.0975E-02	-2.7978E-02	-0.0000E-39	3.3962E-02	-0.0000E-39
77	-3.1580E-07	0.0000E-39	-1.1220E-07	-7.3890E-02	-2.3326E-02	-0.0000E-39	3.0897E-02	-0.0000E-39
78	-2.9291E-07	0.0000E-39	-1.1721E-07	-5.8584E-02	-1.9046E-02	-0.0000E-39	2.7611E-02	0.0000E-39
79	-2.7166E-07	-0.0000E-39	-1.1770E-07	-4.5104E-02	-1.5184E-02	0.0000E-39	2.4258E-02	0.0000E-39
80	-2.5193E-07	-0.0000E-39	-1.1472E-07	-3.3427E-02	-1.1760E-02	0.0000E-39	2.0956E-02	0.0000E-39
81	-2.3362E-07	-0.0000E-39	-1.0916E-07	-2.3483E-02	-8.7766E-03	0.0000E-39	1.7796E-02	0.0000E-39
82	-2.166?E-07	-0.0000E-39	-1.0179E-07	-1.5164E-0?	-6.2223E-03	0.0000E-39	1.4840E-02	?.0000E-39

83	-2.0087E-07	-0.0000E-39	-9.3265E-08	-8.3379E-03	-4.0747E-03	0.0000E-39	1.2130E-02	0.0000E-39
84	-1.8626E-07	-0.0000E-39	-8.4096E-08	-2.8596E-03	-2.3041E-03	0.0000E-39	9.6903E-03	0.0000E-39
85	-1.7270E-07	-0.0000E-39	-7.4707E-08	1.4234E-03	-8.7614E-04	0.0000E-39	7.5318E-03	0.0000E-39
86	-1.6013E-07	-0.0000E-39	-6.5427E-08	4.6635E-03	2.4586E-04	0.0000E-39	5.6535E-03	0.0000E-39
87	-1.4846E-07	-0.0000E-39	-5.6503E-08	7.0088E-03	1.0994E-03	0.0000E-39	4.0462E-03	0.0000E-39
88	-1.3764E-07	-0.0000E-39	-4.8113E-08	8.5993E-03	1.7214E-03	0.0000E-39	2.6947E-03	0.0000E-39
89	-1.2759E-07	-0.0000E-39	-4.0378E-08	9.5648E-03	2.1471E-03	0.0000E-39	1.5794E-03	0.0000E-39
90	-1.1827E-07	-0.0000E-39	-3.3370E-08	1.0023E-02	2.4096E-03	0.0000E-39	6.7837E-04	0.0000E-39
91	-1.0961E-07	-0.0000E-39	-2.7124E-08	1.0080E-02	2.5391E-03	0.0000E-39	-3.1766E-05	0.0000E-39
92	-1.0156E-07	-0.0000E-39	-2.1641E-08	9.8273E-03	2.5627E-03	0.0000E-39	-5.7462E-04	0.0000E-39
93	-9.4075E-08	-0.0000E-39	-1.6902E-08	9.3457E-03	2.5044E-03	0.0000E-39	-9.7332E-04	0.0000E-39
94	-8.7114E-08	-0.0000E-39	-1.2869E-08	8.7029E-03	2.3850E-03	0.0000E-39	-1.2499E-03	0.0000E-39
95	-8.0634E-08	-0.0000E-39	-9.4914E-09	7.9558E-03	2.2225E-03	0.0000E-39	-1.4248E-03	0.0000E-39
96	-7.4596E-08	-0.0000E-39	-6.7116E-09	7.1506E-03	2.0316E-03	0.0000E-39	-1.5168E-03	0.0000E-39
97	-6.8967E-08	-0.0000E-39	-4.4676E-09	6.3248E-03	1.8246E-03	0.0000E-39	-1.5427E-03	0.0000E-39
98	-6.3714E-08	-0.0000E-39	-2.6959E-09	5.5073E-03	1.6114E-03	0.0000E-39	-1.5174E-03	0.0000E-39
99	-5.8806E-08	-0.0000E-39	-1.3339E-09	4.7201E-03	1.3997E-03	0.0000E-39	-1.4536E-03	0.0000E-39
100	-5.4217E-08	-0.0000E-39	-3.2129E-10	3.9791E-03	1.1953E-03	0.0000E-39	-1.3623E-03	0.0000E-39
101	-4.9920E-08	-0.0000E-39	3.9839E-10	3.2950E-03	1.0027E-03	0.0000E-39	-1.2527E-03	0.0000E-39
102	-4.5892E-08	-0.0000E-39	8.7727E-10	2.6743E-03	8.2455E-04	0.0000E-39	-1.1323E-03	0.0000E-39
103	-4.2110E-08	-0.0000E-39	1.1625E-09	2.1203E-03	6.6282E-04	0.0000E-39	-1.0071E-03	0.0000E-39
104	-3.8555E-08	-0.0000E-39	1.2962E-09	1.6335E-03	5.1840E-04	0.0000E-39	-8.8164E-04	0.0000E-39
105	-3.5207E-08	-0.0000E-39	1.3150E-09	1.2124E-03	3.9152E-04	0.0000E-39	-7.5953E-04	-0.0000E-39
106	-3.2049E-08	-0.0000E-39	1.2508E-09	8.5407E-04	2.8189E-04	-0.0000E-39	-6.4320E-04	-0.0000E-39
107	-2.9063E-08	-0.0000E-39	1.1306E-09	5.5474E-04	1.8884E-04	-0.0000E-39	-5.3428E-04	-0.0000E-39
108	-2.6235E-08	0.0000E-39	9.7662E-10	3.0991E-04	1.1145E-04	-0.0000E-39	-4.3365E-04	-0.0000E-39
109	-2.3549E-08	0.0000E-39	8.0730E-10	1.1490E-04	4.8674E-05	-0.0000E-39	-3.4163E-04	-0.0000E-39
110	-2.0993E-08	0.0000E-39	6.3706E-10	-3.4947E-05	-5.9862E-07	-0.0000E-39	-2.5806E-04	-0.0000E-39
111	-1.8553E-08	0.0000E-39	4.7694E-10	-1.4409E-04	-3.7454E-05	-0.0000E-39	-1.8244E-04	-0.0000E-39
112	-1.6217E-08	0.0000E-39	3.3489E-10	-2.1660E-04	-6.2907E-05	-0.0000E-39	-1.1399E-04	-0.0000E-39
113	-1.3974E-08	0.0000E-39	2.1609E-10	-2.5609E-04	-7.7857E-05	-0.0000E-39	-5.1782E-05	-0.0000E-39
114	-1.1813E-08	0.0000E-39	1.2325E-10	-2.6562E-04	-8.3068E-05	-0.0000E-39	5.2256E-06	-0.0000E-39
115	-9.7231E-09	0.0000E-39	5.6802E-11	-2.4771E-04	-7.9147E-05	-0.0000E-39	5.8093E-05	-0.0000E-39
116	-7.6941E-09	0.0000E-39	1.5148E-11	-2.0433E-04	-6.6547E-05	-0.0000E-39	1.0785E-04	0.0000E-39
117	-5.7166E-09	0.0000E-39	-5.2195E-12	-1.3691E-04	-4.5571E-05	0.0000E-39	1.5543E-04	0.0000E-39
118	-3.7811E-09	-0.0000E-39	-9.5918E-12	-4.6459E-05	-1.6388E-05	0.0000E-39	2.0162E-04	0.0000E-39
119	-1.8785E-09	-0.0000E-39	-4.9673E-12	6.6404E-05	2.0940E-05	0.0000E-39	2.4702E-04	0.0000E-39
120	-0.0000E-39	0.0000E-39	0.0000E-39	2.0130E-04	6.5942E-05	0.0000E-39	2.9227E-04	0.0000E-39

(DA)

I	N(PHI)	N(THETA)	N(PHI,THETA)	SIG(PHI)	SIG(THETA)	SG(PHI,THETA)
1	6.2831E 01	6.2831E 01	0.0000E-39	1.1914E 04	1.1914E 04	0.0000E-39
2	6.2502E 01	6.2193E 01	0.0000E-39	1.1873E 04	1.1870E 04	-0.0000E-39
3	6.1770E 01	6.0775E 01	0.0000E-39	1.1755E 04	1.1796E 04	-0.0000E-39
4	6.0701E 01	5.8535E 01	0.0000E-39	1.1514E 04	1.1644E 04	-0.0000E-39
5	5.9306E 01	5.5490E 01	0.0000E-39	1.1095E 04	1.1388E 04	-0.0000E-39
6	5.7653E 01	5.1709E 01	0.0000E-39	1.0403E 04	1.0983E 04	-0.0000E-39
7	5.5876E 01	4.7311E 01	0.0000E-39	9.2640E 03	1.0350E 04	-0.0000E-39
8	5.4239E 01	4.2520E 01	0.0000E-39	7.2810E 03	9.3130E 03	-0.0000E-39
9	5.2694E 01	3.7562E 01	0.0000E-39	3.6609E 03	7.5267E 03	-0.0000E-39
10	5.0840E 01	3.2650E 01	0.0000E-39	1.1153E 03	5.9376E 03	-0.0000E-39
11	4.8450E 01	2.7844E 01	0.0000E-39	-6.6173E 02	4.5791E 03	-0.0000E-39
12	4.5712E 01	2.3292E 01	0.0000E-39	-1.8714E 03	3.4472E 03	-0.0000E-39
13	4.2769E 01	1.9086E 01	0.0000E-39	-2.6564E 03	2.5220E 03	-0.0000E-39
14	3.9728E 01	1.5282E 01	0.0000E-39	-3.1220E 03	1.7784E 03	-0.0000E-39
15	3.6674E 01	1.1904E 01	0.0000E-39	-3.3486E 03	1.1906E 03	-0.0000E-39
16	3.3669E 01	8.9574E 00	-0.0000E-39	-3.3984E 03	7.3419E 02	0.0000E-39
17	3.0760E 01	6.4294E 00	-0.0000E-39	-3.3204E 03	3.8687E 02	0.0000E-39
18	2.7981E 01	4.2981E 00	-0.0000E-39	-3.1527E 03	1.2905E 02	0.0000E-39
19	2.5355E 01	2.5340E 00	-0.0000E-39	-2.9255E 03	-5.6333E 01	0.0000E-39
20	2.2897E 01	1.1034E 00	-0.0000E-39	-2.6623E 03	-1.8389E 02	0.0000E-39
21	2.0615E 01	-2.9634E-02	-0.0000E-39	-2.3812E 03	-2.6598E 02	0.0000E-39
22	1.8512E 01	-9.0132E-01	-0.0000E-39	-2.0958E 03	-3.1297E 02	0.0000E-39
23	1.6585E 01	-1.5471E 00	-0.0000E-39	-1.8164E 03	-3.3343E 02	0.0000E-39
24	1.4832E 01	-2.0008E 00	-0.0000E-39	-1.5502E 03	-3.3438E 02	0.0000E-39
25	1.3243E 01	-2.2938E 00	-0.0000E-39	-1.3022E 03	-3.2148E 02	0.0000E-39
26	1.1811E 01	-2.4549E 00	-0.0000E-39	-1.0755E 03	-2.9927E 02	0.0000E-39
27	1.0526E 01	-2.5100E 00	-0.0000E-39	-8.7170E 02	-2.7129E 02	0.0000E-39
28	9.3764E 00	-2.4818E 00	-0.0000E-39	-6.9136E 02	-2.4029E 02	0.0000E-39
29	8.3520E 00	-2.3903E 00	-0.0000E-39	-5.3413E 02	-2.0832E 02	0.0000E-39
30	7.4419E 00	-2.2527E 00	-0.0000E-39	-3.9907E 02	-1.7689E 02	0.0000E-39
31	6.6354E 00	-2.0833E 00	0.0000E-39	-2.8479E 02	-1.4706E 02	0.0000E-39
32	5.9223E 00	-1.8941E 00	0.0000E-39	-1.8962E 02	-1.1952E 02	0.0000E-39
33	5.2929E 00	-1.6950E 00	0.0000E-39	-1.1173E 02	-9.4689E 01	0.0000E-39
34	4.7382E 00	-1.4936E 00	0.0000E-39	-4.9224E 01	-7.2775E 01	0.0000E-39
35	4.2498E 00	-1.2962E 00	0.0000E-39	-2.1262E-01	-5.3811E 01	0.0000E-39
36	3.8199E 00	-1.1071E 00	0.0000E-39	3.7133E 01	-3.7714E 01	0.0000E-39
37	3.4415E 00	-9.2981E-01	0.0000E-39	6.4539E 01	-2.4319E 01	0.0000E-39
38	3.1083E 00	-7.6635E-01	0.0000E-39	8.3606E 01	-1.3407E 01	0.0000E-39
39	2.8146E 00	-6.1808E-01	0.0000E-39	9.5792E 01	-4.7273E 00	0.0000E-39
40	2.5553E 00	-4.8557E-01	0.0000E-39	1.0240E 02	1.9846E 00	0.0000E-39
41	2.3259E 00	-3.6884E-01	0.0000E-39	1.0459E 02	6.9941E 00	0.0000E-39
42	2.122[illegible] 00	-2.6747E-01	0.0000E-39	1.0335E [illegible]	1.0558E 01	-0.0000E-39

43	1.9416E 00	-1.8069E-01	0.0000E-39	9.9551E 01	1.2916E 01	-0.0000E-39
44	1.7802E 00	-1.0755E-01	0.0000E-39	9.3919E 01	1.4290E 01	-0.0000E-39
45	1.6358E 00	-4.6917E-02	0.0000E-39	8.7058E 01	1.4878E 01	-0.0000E-39
46	1.5060E 00	2.4225E-03	0.0000E-39	7.9462E 01	1.4856E 01	-0.0000E-39
47	1.3890E 00	4.1701E-02	0.0000E-39	7.1526E 01	1.4374E 01	-0.0000E-39
48	1.2830E 00	7.2146E-02	0.0000E-39	6.3561E 01	1.3561E 01	-0.0000E-39
49	1.1867E 00	9.4940E-02	0.0000E-39	5.5802E 01	1.2525E 01	-0.0000E-39
50	1.0989E 00	1.1120E-01	0.0000E-39	4.8423E 01	1.1355E 01	-0.0000E-39
51	1.0185E 00	1.2197E-01	0.0000E-39	4.1543E 01	1.0121E 01	-0.0000E-39
52	9.4470E-01	1.2819E-01	0.0000E-39	3.5238E 01	8.8780E 00	-0.0000E-39
53	8.7676E-01	1.3071E-01	0.0000E-39	2.9549E 01	7.6685E 00	-0.0000E-39
54	8.1406E-01	1.3028E-01	0.0000E-39	2.4489E 01	6.5226E 00	-0.0000E-39
55	7.5606E-01	1.2757E-01	-0.0000E-39	2.0049E 01	5.4613E 00	-0.0000E-39
56	7.0232E-01	1.2314E-01	-0.0000E-39	1.6204E 01	4.4976E 00	-0.0000E-39
57	6.5244E-01	1.1748E-01	-0.0000E-39	1.2918E 01	3.6380E 00	-0.0000E-39
58	6.0610E-01	1.1099E-01	-0.0000E-39	1.0147E 01	2.8842E 00	-0.0000E-39
59	5.6300E-01	1.0399E-01	-0.0000E-39	7.8431E 00	2.2341E 00	-0.0000E-39
60	5.2291E-01	9.6771E-02	-0.0000E-39	5.9556E 00	1.6826E 00	-0.0000E-39
61	4.8558E-01	8.9528E-02	-0.0000E-39	4.4346E 00	1.2230E 00	-0.0000E-39
62	4.5083E-01	8.2431E-02	-0.0000E-39	3.2311E 00	8.4698E-01	-0.0000E-39
63	4.1849E-01	7.5601E-02	-0.0000E-39	2.2991E 00	5.4578E-01	-0.0000E-39
64	3.8838E-01	6.9124E-02	-0.0000E-39	1.5958E 00	3.1033E-01	-0.0000E-39
65	3.6036E-01	6.3058E-02	-0.0000E-39	1.0820E 00	1.3169E-01	-0.0000E-39
66	3.3429E-01	5.7436E-02	-0.0000E-39	7.2296E-01	1.3065E-03	-0.0000E-39
67	3.1006E-01	5.2272E-02	-0.0000E-39	4.8759E-01	-8.8817E-02	0.0000E-39
68	2.8754E-01	4.7566E-02	-0.0000E-39	3.4906E-01	-1.4601E-01	0.0000E-39
69	2.6661E-01	4.3304E-02	-0.0000E-39	2.8433E-01	-1.7684E-01	0.0000E-39
70	2.4719E-01	3.9467E-02	-0.0000E-39	2.7394E-01	-1.8711E-01	0.0000E-39
71	2.2916E-01	3.6027E-02	-0.0000E-39	3.0173E-01	-1.8186E-01	0.0000E-39
72	2.1244E-01	3.2956E-02	-0.0000E-39	3.5453E-01	-1.6537E-01	0.0000E-39
73	1.9694E-01	3.0221E-02	-0.0000E-39	4.2178E-01	-1.4125E-01	0.0000E-39
74	1.8258E-01	2.7790E-02	-0.0000E-39	4.9526E-01	-1.1243E-01	0.0000E-39
75	1.6927E-01	2.5631E-02	-0.0000E-39	5.6870E-01	-8.1294E-02	0.0000E-39
76	1.5695E-01	2.3713E-02	-0.0000E-39	6.3757E-01	-4.9691E-02	0.0000E-39
77	1.4554E-01	2.2008E-02	-0.0000E-39	6.9868E-01	-1.9029E-02	0.0000E-39
78	1.3499E-01	2.0488E-02	-0.0000E-39	7.5005E-01	9.6664E-03	0.0000E-39
79	1.2522E-01	1.9130E-02	0.0000E-39	7.9058E-01	3.5695E-02	0.0000E-39
80	1.1618E-01	1.7911E-02	0.0000E-39	8.1993E-01	5.8623E-02	0.0000E-39
81	1.0782E-01	1.6812E-02	0.0000E-39	8.3829E-01	7.8231E-02	0.0000E-39
82	1.0009E-01	1.5817E-02	0.0000E-39	8.4625E-01	9.4471E-02	0.0000E-39
83	9.2942E-02	1.4910E-02	0.0000E-39	8.4470E-01	1.0743E-01	0.0000E-39
84	8.6328E-02	1.4079E-02	0.0000E-39	8.3471E-01	1.1728E-01	0.0000E-39
85	8.0211E-02	1.3313E-02	0.0000E-39	8.1742E-01	1.2426E-01	0.0000E-39

86	7.4553E-02	1.2604E-02	0.0000E-39	7.9404E-01	1.2867E-01	0.0000E-39
87	6.9320E-02	1.1943E-02	0.0000E-39	7.6572E-01	1.3082E-01	0.0000E-39
88	6.4479E-02	1.1326E-02	0.0000E-39	7.3358E-01	1.3102E-01	0.0000E-39
89	6.0001E-02	1.0746E-02	0.0000E-39	6.9867E-01	1.2959E-01	0.0000E-39
90	5.5859E-02	1.0201E-02	0.0000E-39	6.6191E-01	1.2682E-01	0.0000E-39
91	5.2027E-02	9.6858E-03	0.0000E-39	6.2414E-01	1.2299E-01	-0.0000E-39
92	4.8483E-02	9.1994E-03	0.0000E-39	5.8608E-01	1.1837E-01	-0.0000E-39
93	4.5204E-02	8.7394E-03	0.0000E-39	5.4832E-01	1.1316E-01	-0.0000E-39
94	4.2172E-02	8.3045E-03	0.0000E-39	5.1138E-01	1.0759E-01	-0.0000E-39
95	3.9368E-02	7.8934E-03	0.0000E-39	4.7565E-01	1.0180E-01	-0.0000E-39
96	3.6776E-02	7.5053E-03	0.0000E-39	4.4145E-01	9.5962E-02	-0.0000E-39
97	3.4381E-02	7.1395E-03	0.0000E-39	4.0901E-01	9.0177E-02	-0.0000E-39
98	3.2169E-02	6.7955E-03	0.0000E-39	3.7848E-01	8.4546E-02	-0.0000E-39
99	3.0127E-02	6.4728E-03	0.0000E-39	3.4996E-01	7.9145E-02	-0.0000E-39
100	2.8243E-02	6.1711E-03	0.0000E-39	3.2350E-01	7.4029E-02	-0.0000E-39
101	2.6507E-02	5.8900E-03	0.0000E-39	2.9911E-01	6.9239E-02	-0.0000E-39
102	2.4909E-02	5.6293E-03	0.0000E-39	2.7674E-01	6.4802E-02	-0.0000E-39
103	2.3439E-02	5.3886E-03	0.0000E-39	2.5635E-01	6.0734E-02	-0.0000E-39
104	2.2090E-02	5.1677E-03	0.0000E-39	2.3785E-01	5.7041E-02	-0.0000E-39
105	2.0854E-02	4.9662E-03	0.0000E-39	2.2116E-01	5.3723E-02	-0.0000E-39
106	1.9724E-02	4.7840E-03	0.0000E-39	2.0618E-01	5.0774E-02	-0.0000E-39
107	1.8694E-02	4.6205E-03	0.0000E-39	1.9279E-01	4.8183E-02	-0.0000E-39
108	1.7758E-02	4.4756E-03	-0.0000E-39	1.8091E-01	4.5939E-02	-0.0000E-39
109	1.6910E-02	4.3490E-03	-0.0000E-39	1.7043E-01	4.4028E-02	-0.0000E-39
110	1.6147E-02	4.2403E-03	-0.0000E-39	1.6126E-01	4.2434E-02	-0.0000E-39
111	1.5464E-02	4.1492E-03	-0.0000E-39	1.5330E-01	4.1145E-02	-0.0000E-39
112	1.4856E-02	4.0756E-03	-0.0000E-39	1.4647E-01	4.0147E-02	-0.0000E-39
113	1.4321E-02	4.0191E-03	-0.0000E-39	1.4071E-01	3.9428E-02	-0.0000E-39
114	1.3856E-02	3.9795E-03	-0.0000E-39	1.3596E-01	3.8978E-02	0.0000E-39
115	1.3457E-02	3.9566E-03	-0.0000E-39	1.3215E-01	3.8789E-02	0.0000E-39
116	1.3122E-02	3.9502E-03	-0.0000E-39	1.2924E-01	3.8854E-02	0.0000E-39
117	1.2849E-02	3.9602E-03	-0.0000E-39	1.2720E-01	3.9169E-02	0.0000E-39
118	1.2637E-02	3.9864E-03	0.0000E-39	1.2600E-01	3.9732E-02	0.0000E-39
119	1.2483E-02	4.0289E-03	0.0000E-39	1.2562E-01	4.0539E-02	0.0000E-39
120	1.2357E-02	4.0779E-03	-0.0000E-39	1.2575E-01	4.1492E-02	0.0000E-39

EA

VELOCITIES AND ACCELERATIONS

VEL(U)	VEL(V)	VEL(W)	ACC(U)	ACC(V)	ACC(W)
.819E-07	-0.000E-39	5.301E 01	1.819E-03	0.000E-39	5.301E 05

-8.050E-02	-0.000E-39	5.270E 01	-8.050E 02	0.000E-39	5.270E 05
-1.596E-01	-0.000E-39	5.176E 01	-1.596E 03	0.000E-39	5.176E 05
-2.356E-01	-0.000E-39	5.020E 01	-2.356E 03	0.000E-39	5.020E 05
-3.069E-01	-0.000E-39	4.804E 01	-3.069E 03	0.000E-39	4.804E 05
-3.719E-01	-0.000E-39	4.530E 01	-3.719E 03	0.000E-39	4.530E 05
-4.288E-01	-0.000E-39	4.204E 01	-4.288E 03	0.000E-39	4.204E 05
-4.762E-01	-0.000E-39	3.832E 01	-4.762E 03	0.000E-39	3.832E 05
-5.120E-01	-0.000E-39	3.428E 01	-5.120E 03	0.000E-39	3.428E 05
-5.359E-01	-0.000E-39	3.018E 01	-5.359E 03	0.000E-39	3.018E 05
-5.491E-01	-0.000E-39	2.618E 01	-5.491E 03	0.000E-39	2.618E 05
-5.528E-01	-0.000E-39	2.240E 01	-5.528E 03	0.000E-39	2.240E 05
-5.485E-01	-0.000E-39	1.889E 01	-5.485E 03	0.000E-39	1.889E 05
-5.374E-01	-0.000E-39	1.571E 01	-5.374E 03	0.000E-39	1.571E 05
-5.209E-01	-0.000E-39	1.286E 01	-5.209E 03	0.000E-39	1.286E 05
-5.001E-01	0.000E-39	1.036E 01	-5.001E 03	0.000E-39	1.036E 05
-4.761E-01	0.000E-39	8.179E 00	-4.761E 03	0.000E-39	8.179E 04
-4.499E-01	0.000E-39	6.310E 00	-4.499E 03	0.000E-39	6.310E 04
-4.222E-01	0.000E-39	4.730E 00	-4.222E 03	0.000E-39	4.730E 04
-3.938E-01	0.000E-39	3.411E 00	-3.938E 03	0.000E-39	3.411E 04
-3.653E-01	0.000E-39	2.327E 00	-3.653E 03	0.000E-39	2.327E 04
-3.372E-01	0.000E-39	1.451E 00	-3.372E 03	0.000E-39	1.451E 04
-3.099E-01	0.000E-39	7.568E-01	-3.099E 03	0.000E-39	7.568E 03
-2.836E-01	0.000E-39	2.184E-01	-2.836E 03	0.000E-39	2.184E 03
-2.586E-01	0.000E-39	-1.874E-01	-2.586E 03	0.000E-39	-1.874E 03
-2.351E-01	0.000E-39	-4.821E-01	-2.351E 03	0.000E-39	-4.821E 03
-2.131E-01	0.000E-39	-6.850E-01	-2.131E 03	0.000E-39	-6.850E 03
-1.927E-01	0.000E-39	-8.135E-01	-1.927E 03	0.000E-39	-8.135E 03
-1.739E-01	0.000E-39	-8.825E-01	-1.739E 03	0.000E-39	-8.825E 03
-1.566E-01	0.000E-39	-9.052E-01	-1.566E 03	0.000E-39	-9.052E 03
-1.409E-01	-0.000E-39	-8.927E-01	-1.409E 03	0.000E-39	-8.927E 03
-1.267E-01	-0.000E-39	-8.545E-01	-1.267E 03	0.000E-39	-8.545E 03
-1.138E-01	-0.000E-39	-7.983E-01	-1.138E 03	0.000E-39	-7.983E 03
-1.023E-01	-0.000E-39	-7.305E-01	-1.023E 03	0.000E-39	-7.305E 03
-9.191E-02	-0.000E-39	-6.562E-01	-9.191E 02	0.000E-39	-6.562E 03
-8.265E-02	-0.000E-39	-5.795E-01	-8.265E 02	0.000E-39	-5.795E 03
-7.440E-02	-0.000E-39	-5.033E-01	-7.440E 02	0.000E-39	-5.033E 03
-6.706E-02	-0.000E-39	-4.301E-01	-6.706E 02	0.000E-39	-4.301E 03
-6.054E-02	-0.000E-39	-3.614E-01	-6.054E 02	0.000E-39	-3.614E 03
-5.476E-02	-0.000E-39	-2.982E-01	-5.476E 02	0.000E-39	-2.982E 03
-4.963E-02	-0.000E-39	-2.412E-01	-4.963E 02	0.000E-39	-2.412E 03
-4.508E-02	-0.000E-39	-1.907E-01	-4.508E 02	0.000E-39	-1.907E 03
-4.104E-02	-0.000E-39	-1.466E-01	-4.104E 02	0.000E-39	-1.466E 03
-3.746E-02	-0.000E-39	-1.087E-01	-3.746E 02	0.000E-39	-1.087E 03

-1.376E-03	-0.000E-39	-4.811E-04	-1.376E 01	0.000E-39	-4.811E 00
-1.276E-03	-0.000E-39	-4.038E-04	-1.276E 01	0.000E-39	-4.038E 00
-1.183E-03	-0.000E-39	-3.337E-04	-1.183E 01	0.000E-39	-3.337E 00
-1.096E-03	-0.000E-39	-2.712E-04	-1.096E 01	0.000E-39	-2.712E 00
-1.016E-03	-0.000E-39	-2.164E-04	-1.016E 01	0.000E-39	-2.164E 00
-9.408E-04	-0.000E-39	-1.690E-04	-9.408E 00	0.000E-39	-1.690E 00
-8.711E-04	-0.000E-39	-1.287E-04	-8.711E 00	0.000E-39	-1.287E 00
-8.063E-04	-0.000E-39	-9.491E-05	-8.063E 00	0.000E-39	-9.491E-01
-7.460E-04	-0.000E-39	-6.712E-05	-7.460E 00	0.000E-39	-6.712E-01
-6.897E-04	-0.000E-39	-4.468E-05	-6.897E 00	0.000E-39	-4.468E-01
-6.371E-04	-0.000E-39	-2.696E-05	-6.371E 00	0.000E-39	-2.696E-01
-5.881E-04	-0.000E-39	-1.334E-05	-5.881E 00	0.000E-39	-1.334E-01
-5.422E-04	-0.000E-39	-3.213E-06	-5.422E 00	0.000E-39	-3.213E-02
-4.992E-04	-0.000E-39	3.984E-06	-4.992E 00	0.000E-39	3.984E-02
-4.589E-04	-0.000E-39	8.773E-06	-4.589E 00	0.000E-39	8.773E-02
-4.211E-04	-0.000E-39	1.163E-05	-4.211E 00	0.000E-39	1.163E-01
-3.856E-04	-0.000E-39	1.296E-05	-3.856E 00	0.000E-39	1.296E-01
-3.521E-04	-0.000E-39	1.315E-05	-3.521E 00	0.000E-39	1.315E-01
-3.205E-04	-0.000E-39	1.251E-05	-3.205E 00	0.000E-39	1.251E-01
-2.906E-04	-0.000E-39	1.131E-05	-2.906E 00	0.000E-39	1.131E-01
-2.623E-04	0.000E-39	9.766E-06	-2.623E 00	0.000E-39	9.766E-02
-2.355E-04	0.000E-39	8.073E-06	-2.355E 00	0.000E-39	8.073E-02
-2.099E-04	0.000E-39	6.371E-06	-2.099E 00	0.000E-39	6.371E-02
-1.855E-04	0.000E-39	4.769E-06	-1.855E 00	0.000E-39	4.769E-02
-1.622E-04	0.000E-39	3.349E-06	-1.622E 00	0.000E-39	3.349E-02
-1.397E-04	0.000E-39	2.161E-06	-1.397E 00	0.000E-39	2.161E-02
-1.181E-04	0.000E-39	1.232E-06	-1.181E 00	0.000E-39	1.232E-02
-9.723E-05	0.000E-39	5.680E-07	-9.723E-01	0.000E-39	5.680E-03
-7.694E-05	0.000E-39	1.515E-07	-7.694E-01	0.000E-39	1.515E-03
-5.717E-05	0.000E-39	-5.220E-08	-5.717E-01	0.000E-39	-5.220E-04
-3.781E-05	-0.000E-39	-9.592E-08	-3.781E-01	0.000E-39	-9.592E-04
-1.879E-05	-0.000E-39	-4.967E-08	-1.879E-01	0.000E-39	-4.967E-04
-0.000E-39	0.000E-39	0.000E-39	-0.000E-39	0.000E-39	0.000E-39

-3.426E-02	-0.000E-39	-7.679E-02	-3.426E 02	0.000E-39	-7.679E 02
-3.142E-02	-0.000E-39	-5.028E-02	-3.142E 02	0.000E-39	-5.028E 02
-2.887E-02	-0.000E-39	-2.870E-02	-2.887E 02	0.000E-39	-2.870E 02
-2.659E-02	-0.000E-39	-1.153E-02	-2.659E 02	0.000E-39	-1.153E 02
-2.454E-02	-0.000E-39	1.785E-03	-2.454E 02	0.000E-39	1.785E 01
-2.268E-02	-0.000E-39	1.177E-02	-2.268E 02	0.000E-39	1.177E 02
-2.100E-02	-0.000E-39	1.894E-02	-2.100E 02	0.000E-39	1.894E 02
-1.948E-02	-0.000E-39	2.375E-02	-1.948E 02	0.000E-39	2.375E 02
-1.808E-02	-0.000E-39	2.662E-02	-1.808E 02	0.000E-39	2.662E 02
-1.680E-02	-0.000E-39	2.795E-02	-1.680E 02	0.000E-39	2.795E 02
-1.563E-02	0.000E-39	2.807E-02	-1.563E 02	0.000E-39	2.807E 02
-1.454E-02	0.000E-39	2.727E-02	-1.454E 02	0.000E-39	2.727E 02
-1.354E-02	0.000E-39	2.580E-02	-1.354E 02	0.000E-39	2.580E 02
-1.261E-02	0.000E-39	2.387E-02	-1.261E 02	0.000E-39	2.387E 02
-1.175E-02	0.000E-39	2.165E-02	-1.175E 02	0.000E-39	2.165E 02
-1.094E-02	0.000E-39	1.928E-02	-1.094E 02	0.000E-39	1.928E 02
-1.019E-02	0.000E-39	1.688E-02	-1.019E 02	0.000E-39	1.688E 02
-9.493E-03	0.000E-39	1.452E-02	-9.493E 01	0.000E-39	1.452E 02
-8.840E-03	0.000E-39	1.227E-02	-8.840E 01	0.000E-39	1.227E 02
-8.229E-03	0.000E-39	1.017E-02	-8.229E 01	0.000E-39	1.017E 02
-7.659E-03	0.000E-39	8.252E-03	-7.659E 01	0.000E-39	8.252E 01
-7.125E-03	0.000E-39	6.534E-03	-7.125E 01	0.000E-39	6.534E 01
-6.627E-03	0.000E-39	5.019E-03	-6.627E 01	0.000E-39	5.019E 01
-6.161E-03	0.000E-39	3.707E-03	-6.161E 01	0.000E-39	3.707E 01
-5.727E-03	0.000E-39	2.589E-03	-5.727E 01	0.000E-39	2.589E 01
-5.321E-03	0.000E-39	1.654E-03	-5.321E 01	0.000E-39	1.654E 01
-4.942E-03	0.000E-39	8.861E-04	-4.942E 01	0.000E-39	8.861E 00
-4.589E-03	0.000E-39	2.703E-04	-4.589E 01	0.000E-39	2.703E 00
-4.261E-03	0.000E-39	-2.107E-04	-4.261E 01	0.000E-39	-2.107E 00
-3.954E-03	0.000E-39	-5.743E-04	-3.954E 01	0.000E-39	-5.743E 00
-3.669E-03	0.000E-39	-8.371E-04	-3.669E 01	0.000E-39	-8.371E 00
-3.404E-03	0.000E-39	-1.015E-03	-3.404E 01	0.000E-39	-1.015E 01
-3.158E-03	0.000E-39	-1.122E-03	-3.158E 01	0.000E-39	-1.122E 01
-2.929E-03	0.000E-39	-1.172E-03	-2.929E 01	0.000E-39	-1.172E 01
-2.717E-03	-0.000E-39	-1.177E-03	-2.717E 01	0.000E-39	-1.177E 01
-2.519E-03	-0.000E-39	-1.147E-03	-2.519E 01	0.000E-39	-1.147E 01
-2.336E-03	-0.000E-39	-1.092E-03	-2.336E 01	0.000E-39	-1.092E 01
-2.166E-03	-0.000E-39	-1.018E-03	-2.166E 01	0.000E-39	-1.018E 01
-2.009E-03	-0.000E-39	-9.327E-04	-2.009E 01	0.000E-39	-9.327E 00
-1.863E-03	-0.000E-39	-8.410E-04	-1.863E 01	0.000E-39	-8.410E 00
-1.727E-03	-0.000E-39	-7.471E-04	-1.727E 01	0.000E-39	-7.471E 00
-1.601E-03	-0.000E-39	-6.543E-04	-1.601E 01	0.000E-39	-6.543E 00
-1.485E-03	-0.000E-39	-5.650E-04	-1.485E 01	0.000E-39	-5.650E 00

7.1 PRO(

6.1 WARNINGS AND RECOMMENDATIONS

6.1.1 Choice of Time Interval

The proper choice of the appropriate time interval Δt is important for obtaining good results. If Δt is too large, the response will be highly damped and inaccurate. On the other hand, if Δt is too small, the program will take a large amount of time to run. In the sample problem Δt of 0.05 ms was used, which gave good results.

6.1.2 Number of Iterations

There is an unidentifiable bug in the problem which makes it necessary that a restart be made after about 140 iterations through the shell program. Should 160 iterations be exceeded, the program will "blow up." Therefore, it is recommended that the job be run in segments of roughly 120 iterations between restarts. The method of restarting is explained in Sections 1.3 and 5.3.

6.1.3 DECRD

The subroutine DECRD is in the NAA program library and consequently does not appear specifically in the source decks. In installations without this program in their library, the subroutine should be inserted in the zero link behind the subroutine MMY.

7.1 PROGRAM LISTING

```
$IBJOB                                                                  00000000
$IBFTC 157DR                                                            00000010
C      DYNAMIC RESPONSE OF SHELLS OF REVOLUTION              6J-157DR   00000020
C                                                                       00000030
C      REFERENCE   ** AIAA JOURNAL, VOL. 1, NO. 8, AUGUST 1963, PG.1833FF 00000040
C                     AND VOL. 2, NO. 3, MARCH 1964, PG. 590FF          00000050
C                                                                       00000060
C   NOMENCLATURE                                                        00000070
C      EN          NUMBER OF POINTS                                     00000080
C    * AO          REFERENCE LENGTH (IN)                                00000090
C    * HO          REFERENCE THICKNESS (IN)                             00000100
C    * EO          REFERENCE YOUNGS MODULUS (PSI)                       00000110
C    * SIGO        REFERENCE STRESS (PSI)                               00000120
C    * ENFO        INITIAL VALUE OF THE FOURIER COMPONENT               00000130
C    * ENFL        LAST FOURIER COMPONENT                               00000140
C    * POI         POISSONS RATIO                                       00000150
C    * THETA       HORIZONTAL ANGLE (0,-) THETA VALUES COMPLETED        00000160
C    * PIXI        CRT INDICATOR   PLOTS CURVE WHEN NON-ZERO            00000170
C    * SPRL        LOCATION OF SPRING                                   00000180
C    * UK          SPRING VALUE  -  PHI DIRECTION                       00000190
C    * VK          DITTO  * * *  -  THETA DIRECTION                     00000200
C    * WK          DITTO  * * *  -  N DIRECTION                         00000210
C    * EMK         DITTO  * * *  -  MOMENT                              00000220
C    * TAU1        LENGTH OF FIRST TIME INTERVAL                        00000230
C    * ENT1        NO. OF INCREMENTS IN FIRST TIME INTERVAL             00000240
C    * PI1         PRINT INTERVAL. WILL ALWAYS PRINT LAST INTERVAL VALUES 00000250
C    * TAU2,ENT2,PI2    ** DITTO ** FOR THE 2ND TIME INTERVAL           00000260
C    * TAU3,ENT3,PI3    ** DITTO ** FOR THE 3RD TIME INTERVAL           00000270
C    * MASS        MASS DENSITY OF THE MATERIAL                         00000280
C    * CFE,CZ      COEFFICIENTS OF VISCOUS DAMPING AT EA. STATION       00000290
C    * SKFE,SKZ       SPRING CONSTANTS OF SHELL UNDER ELAST. RESTRAINT  00000300
C    * SUM         FOURIER SUMMING INCREMENT                            00000310
C      EN1         1. = OPEN SHELL    2. = CLOSED       SET IN GEOM    00000320
C      DEL         FINITE DIFFERENCE INTERVAL                           00000330
C    * TFI         TIME FUNCTION IND. (-)=CALL ACCN  (+)=TIME FUNCTIONS 00000340
C    * VIN         INITIAL IMPACT VELOCITY                              00000350
C    * H2          DEPTH SUBMERGED  (MUST BE RESET FOR MULTIPLE CASES.) 00000360
C      RESTRT      NON-ZERO, THIS IS A RESTART                          00000370
```

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C      PNCH        NON-ZERO, PUNCH CARDS FOR POSSIBLE RESTART                  00000380
C                                                                              00000390
C      R(I)        DISTANCE FROM AXIS (IN)  COMPUTED BY SUBR. GEOM             00000400
C      WTHD(I)     NON-DIMENSIONAL CURVATURE - THETA DIRECTION                 00000410
C      WFE(I)      DITTO  * * *  -  PHI DIRECTION                              00000420
C      GAMA(I)     RHO' /RHOX                                                  00000430
C      RHOX(I)     R /A0                                                       00000440
C      D(I)        MEMBRANE STIFFNESS (DIMENSIONLESS)                          00000450
C      EK(I)       BENDING STIFFNESS (DIM)                                     00000460
C      E1(I)       MODULUS OF ELASTICITY                                       00000470
C      ALF(I)      THERMAL EXPANSION COEFFICIENT        * * DITTO * *          00000480
C      DNA(I)      DISTANCE FROM NEUTRAL AXIS                                  00000490
C      T(I)        TEMPERATURE CHANGE                                          00000500
C      ENT(I)      TEMPERATURE LOAD (DIM)                                      00000510
C      EMT(I)      TEMPERATURE LOAD (DIM)                                      00000520
C      PFE(I)      FOURIER COMPONENT FOR LOAD  -  PHI DIRECTION                00000530
C      PTH(I)      DITTO    * * *              -  THETA DIRECTION              00000540
C      PN(I)       DITTO    * * *              -  N DIRECTION                  00000550
C      DZ0,VZ0,AZ0 COEF. OF INITIAL VALUES OF DISPLACEMENT, VELOCITY, LD.      00000560
C      DF0,VF0,AF0       ** DITTO **                                           00000570
C    * EM1(4,4)    DIAGONAL BOUNDARY FORCE MATRIX  (OMEGA)                     00000580
C    * EM3(4,4)    DIAGONAL BOUNDARY DISPLACEMENT MATRIX  (LAMBDA)             00000590
C    * EM5(4)      COLUMN BOUNDARY MATRIX  (L)                                 00000600
C    * EM1N(4,4)   DIAGONAL BOUNDARY FORCE MATRIX AT BOTTOM                    00000610
C    * EM3N(4,4)   DIAGONAL BOUNDARY DISPLACEMENT MATRIX AT BOTTOM             00000620
C    * EM5N(4)     COLUMN BOUNDARY MATRIX AT BOTTOM                            00000630
C      M0(I)       MASS PER UNIT AREA OF SHELL =  2.*DNA(I) * MASS             00000640
C      TDEL        TIME INCREMENT, CURRENT.  E.G. TAU1 /ENT1                   00000650
C      NJT         NUMBER OF TIME INCREMENTS DESIRED, CURRENT                  00000660
C      TIME        RUNNING TIME COUNT                                          00000670
C      PRNT        CURRENT PRINT INTERVAL                                      00000680
C                                                                              00000690
C    * PARAMETERS PRECEDED BY * ARE READ IN EXECUTIVE PROGRAM, OTHERS          00000700
C        ARE SET IN GEOM OR CRVFIT.                                            00000710
C                                                                              00000720
C                                                                              00000730
      DIMENSION   BCD(36), PN(200)                                             00000740
```

```
C                                                                       00000750
      REAL       MASS, LM11,LM22,LM33, MM11,MM22,MM33, NM11,NM22,NM33,  00000760
     1           MO                                                     00000770
      EQUIVALENCE      (DA(1),  EN   ),(DA(2),   AO   ),(DA(3),  HO   ),00000780
     1(DA(4),   EO   ),(DA(5),  SIGO ),(DA(6),  ENFO  ),(DA(7),  ENFL ),00000790
     2(DA(8),  POI   ),(DA(9), THETA ),(DA(10),  PIXI ),(DA(11), SPRL ),00000800
     3(DA(12),  UK   ),(DA(13),  VK  ),(DA(14),   WK  ),(DA(15),  EMK ),00000810
     4(DA(16),  TAU1 ),(DA(17),  ENT1),(DA(18),  PI1  ),(DA(19), TAU2 ),00000820
     5(DA(20),  ENT2 ),(DA(21),  PI2 ),(DA(22),  TAU3 ),(DA(23), ENT3 ),00000830
     6(DA(24),  PI3  ),(DA(25), MASS ),(DA(26),  CFE  ),(DA(27),  CZ  ),00000840
     7(DA(28),  SKFE ),(DA(29),  SKZ ),(DA(30),  SUM  ),(DA(31),  EN1 ),00000850
     8(DA(32),  DEL  ),(DA(33),  TFI ),(DA(34),  VIN  ),(DA(35),  RHO ),00000860
     9(DA(36), RESTRT),(DA(37), PNCH ),(DA(39),  DRW  )                 00000870
      EQUIVALENCE      (DA(40),  R   ),(DA(240), WTHD ),(DA(440), WFE ),00000880
     1(DA(640), GAMA ),(DA(840), RHOX),(DA(1040),  D  ),(DA(1240), EK  ),00000890
     2(DA(1440),  E1 ),(DA(1640), ALF),(DA(1840), DNA ),(DA(2040),  T  ),00000900
     3(DA(2240), ENT ),(DA(2440), EMT),(DA(2640),  PN ),(DA(2840), PFE),00000910
     4(DA(3040), PTH ),(DA(3240), DZO),(DA(3440), VZO ),(DA(3640), AZO),00000920
     5(DA(3840), DFO ),(DA(4040), VFO),(DA(4240), AFO ),(DA(4440), EM1),00000930
     6(DA(4456), EM3 ),(DA(4472), EM5),(DA(4476), EM1N),(DA(4492),EM3N),00000940
     7(DA(4508), EM5N)                                                  00000950
C                                                                       00000960
      COMMON   DA(4511), EM2(4,4), EM4(4,4), EM6(4), S1, S2, ELAM2,     00000970
     1  Z(4,200), X(4,200), A2(4,4), B2(4,4), C2(4,4), G2(4), E(4,4),   00000980
     2  F(4,4), GA(4,4), A(4,4), B(4,4), C(4,4), G(4), EC(4), DEL2,     00000990
     3  SL1, SL2, N, NTH, NTPR, NTPW, I, K, L,                          00001000
     4  S77, S78, BTA11, BTA33, MO(200), OMG2(200), ZP(3,200),          00001010
     5  Z2P(3,200), Z3P(3,200), TIMX, TDEL, PRNT, ENF, PRI, JT, NJT, WT 00001020
C                                                                       00001030
C                                        ZERO DATA AND SELECTED MATRICES 00001040
    1 DO   2     I = 1,4511                                             00001050
    2 DA(I)  =  0.                                                      00001060
      DO   4     K = 1,3                                                00001070
      DO   4     L = 1,200                                              00001080
      ZP(K,L)  =  0.                                                    00001090
      Z2P(K,L)  =  0.                                                   00001100
    4 Z3P(K,L)  =  0.                                                   00001110
```

```
C                                          READ AND PRINT TITLE CARDS      00001120
    5 READ          (5, 6) BCD                                             00001130
    6 FORMAT( 12A6 )                                                       00001140
      WRITE           (6, 7) BCD                                           00001150
    7 FORMAT(1H1 /(18X, 12A6 //) )                                         00001160
C     WT  =  WEIGHT OF BODY, LBS.                                          00001170
C     RHO = FLUID DENSITY, LBS/CU FT                                       00001180
C     VIN=INITIAL IMPACT VELOCITY,  FT/SEC                                 00001190
      READ(5,100) VIN,RHO,WT                                               00001200
  100 FORMAT(3E12.8)
      RHO=RHO/1728.                                                        00001210
      VIN=VIN*12.                                                          00001230
      SL2  =  1.                                                           00001240
      NTPW  =  9                                                           00001250
      NTPR  =  10                                                          00001260
   10 TIMX  =  0.                                                          00001270
      JT  =  1                                                             00001280
      REWIND  NTPW                                                         00001290
      REWIND  NTPR                                                         00001300
C                                                                          00001310
   12 CALL  DECRD( DA )                                                    00001320
C                                                                          00001330
      TDEL  =  TAU1 /ENT1                                                  00001340
      PRNT  =  PI1                                                         00001350
      ENF   =  ENF0                                                        00001360
      NJT   =  ENT1                                                        00001370
      PRI   =  PI1                                                         00001380
      NTH   =  0                                                           00001390
      ELAM  =  H0 /A0                                                      00001400
      ELAM2  =  ELAM **2                                                   00001410
      S1  =  1. - POI                                                      00001420
      S2  =  1. + POI                                                      00001430
      S77  =  A0/E0 * AC/H0                                                00001440
C                                                                          00001450
C                                                 GEOMETRY                 00001460
   20 CALL GECM                                                            00001470
C                                                                          00001480
```

```
   25 S78  =  2. * DEL /TDEL                                              00001490
      REWIND  8                                                           00001500
      TIMX  =  TIMX + TDEL                                                00001510
      IF(TFI .GE. 0.)  GO TO 30                                           00001520
      IF(TIMX .NE. TDEL)  GO TO 32                                        00001530
      V1  =  VIN                                                          00001540
C                                          COLUMN DATA SET-UP           00001550
   30 CALL  CRVFIT                                                        00001560
C                                          NORMAL PRESSURES             00001570
      IF(TFI .GE. 0.)  GO TO 40                                           00001580
   32 CALL  ACCN (PMAX, RMAX)                                             00001590
      WRITE( 6,33)  RMAX,        TIMX,          (I, PN(I),  I=1,N)       00001600
   33 FORMAT(1H1/// 37X, 33HLOADS OUTPUT FROM ACCN SUBROUTINE /// 26X,    00001610
     1 31HMAX RAD. OF PRESSURE PROFILE  =, 1PE12.4/                       00001620
     2           50X,7HTIME  =, E12.4/                                    00001630
     3                                  // 10X,21HNORMAL PRESSURES (PN)  00001640
     4  // 53X, 2HPN // (I48, E12.4) )                                    00001650
C                                             DEFLECTIONS               00001660
   40 CALL  DEFLTN                                                        00001670
C                                           WHERE NEXT                  00001680
   50 CALL  PATH                                                          00001690
      IF( SL1 )  5,60,25                                                  00001700
C                                             INTERNAL LOADS            00001710
   60 CALL  INTLDS                                                        00001720
C                                          FOURIER SUMMING              00001730
   70 CALL  SUMS                                                          00001740
      IF( SL1 )  5,25,72                                                  00001750
C                                                                         00001760
   72 IF(ENFL - ENF .GT. 1.E-2)  GO TO 10                                 00001770
      IF(PIXI .EQ. 0.)  GO TO 90                                          00001780
C                                             CRT OUTPUT                00001790
   80 CALL  PIX                                                           00001800
      GO  TO  5                                                           00001810
C                                                                         00001820
C **  SL1 = -1. WHEN HYDRO-DYNAMICS WAS ENTERED BEFORE PRINT. RETURN TO   00001830
C       STATEMENT 25.  WHEN SL1 = -2., TEST WHETHER 3RD INTERVAL IS       00001840
C       COMPLETE.  *YES, GO TO 72  *NO, GO TO 25.                         00001850
```

```
C                                                                       00001860
C                                                                       00001870
   90 IF(PNCH .EQ. 0.)  GO TO 5                                         00001880
C                                   PUNCH VALUES FOR RESTART            00001890
      PUNCH 95,  TIMX,  ((ZP(K,L), Z2P(K,L), Z3P(K,L), K=1,3), OMG2(L), 00001900
     1           L=1,N)                                                 00001910
   95 FORMAT( 1P5E14.7 )                                                00001920
      GO  TO  5                                                         00001930
      END                                                               00001940
```

```
$IBFTC MADD                                                          00001950
C      MATRIX ADD SUBROUTINE                    DECK NO. 8K-903      00001960
C                                                                    00001970
C  ARGUMENTS                                                         00001980
C      L  NO. OF ROWS                                                00001990
C      M  NO. OF COLS                                                00002000
C      A(I,J)      MRA                                               00002010
C      B(I,J)      MAD                                               00002020
C      C(I,J)      MSR                                               00002030
       SUBROUTINE MAD(L,M,A,B,C)                                     00002040
       DIMENSION   A(4,4), B(4,4), C(4,4)                            00002050
       DO 30 I=1,L                                                   00002060
       DO 30 J=1,M                                                   00002070
   30  C(I,J)=A(I,J)+B(I,J)                                          00002080
       RETURN                                                        00002090
       END                                                           00002100
```

```
$IBFTC MMPY                                                          00002270
C      MATRIX MULTIPLY SUBROUTINE                DECK NO. 8K-901     00002280
C                                                                    00002290
C  ARGUMENTS                                                         00002300
C      L  NO. OF ROWS X MATRIX                                       00002310
C      M  NO. OF COLS X MATRIX                                       00002320
C      N  NO. OF COLS Y MATRIX                                       00002330
C      X(I,K)   MRA                                                  00002340
C      Y(K,J)   MMY                                                  00002350
C      Z(I,J)   MSR                                                  00002360
       SUBROUTINE MMY(L,M,N,X,Y,Z)                                   00002370
       DIMENSION   X(4,4), Y(4,4), Z(4,4)                            00002380
       DO 30 I=1,L                                                   00002390
       DO 30 J=1,N                                                   00002400
       Z(I,J)=0.0                                                    00002410
       DO 30 K=1,M                                                   00002420
    30 Z(I,J)=Z(I,J)+X(I,K)*Y(K,J)                                   00002430
       RETURN                                                        00002440
       END                                                           00002450
```

```
$IBFTC GMTRY                                                                    00002660
C      GEOMETRY COMPUTATION SUBROUTINE                6J-157DR *LINK 1A         00002670
C                                                                               00002680
       SUBROUTINE  GEOM                                                         00002690
C                                                                               00002700
C  NOMENCLATURE                                                                 00002710
C         GMI    -  GEOMETRY INDICATOR                                          00002720
C                =  1.0  - CONE - CYLINDER                        **            00002730
C                =  2.0  - SPHERE - TOROID                        **            00002740
C                =  3.0  - GENERAL DISCRETE POINTS                **            00002750
C                =  4.0  - ARBITRARY FUNCTIONS                    **            00002760
C                                                                               00002770
C      EN          NO. OF POINTS /REGION                                        00002780
C      PFLAG       PRINT INDICATOR, NON-ZERO PRINTS ALL INPUT DATA              00002790
C                  **                                           **              00002800
C                       GMI = 1.0                                               00002810
C                  RA1    =    RADIUS AT STATION 1                             00002820
C                  AXL    =    AXIAL SURFACE LENGTH                            00002830
C                  ANX    =    ANGLE - GENERATOR AND AXIS OF REVOLUTION        00002840
C                  **                                           **              00002850
C                       GMI = 2.0                                               00002860
C                  RC     =    RADIUS OF CURVATURE                             00002870
C                  ROFF   =    OFFSET DISTANCE TO CENTER OF CURVATURE          00002880
C                  PHIO   =    INITIAL OPENING ANGLE FROM VERTICAL AXIS        00002890
C                  PHIN   =    FINAL OPENING ANGLE FROM VERTICAL AXIS          00002900
C                  **                                           **              00002910
C                       GMI = 3.0  (-3.0 DISCRETE ARCLENGTHS)                   00002920
C                  EM     =    NO. OF RIPT'S GIVEN                             00002930
C                  RIPT   =    DISCRETE RADII                                  00002940
C                  XIPT = DISCRETE XI'S  (OR ARCLENGTHS)                       00002950
C                  RCURV = RADIUS OF CURVATURE IN THE MERIDIONAL DIRECTION     00002960
C                  RCURZ = RAD. OF CURV. IN THE CIRCUMFERENTIAL DIRECTION      00002970
C                  **                                           **              00002980
C                                                                               00002990
      DIMENSION RIPT(200),  XIPT(200),  R(200),  XSI(200),  WTH(200),           00003000
     1 WFE(200),  RHOX(200),  GAMA(200),  SARB(200),  SURF(200),                00003010
     2 GDA(808), RCRV(200), RCRZ(200), RCURV(200), RCURZ(200), RR(200)          00003020
```

```
      DIMENSION XJ(400), RJ(400), DLR(400), RRJ(12)                          00003030
C                                                                            00003040
      EQUIVALENCE  (GDA( 1),        GMI),     (GDA( 2),          EN),       00003050
     1             (GDA( 3),      PFLAG),     (GDA( 4),      RA1,RC),      00003060
     2             (GDA( 5),  AXL, ROFF),     (GDA( 6),  ANX, PHI0),       00003070
     3             (GDA( 7),       PHIN),     (GDA( 8),         EM),       00003080
     4             (GDA( 9),       RIPT),     (GDA(209),       XIPT),      00003090
     5             (GDA(409),     RCURV),     (GDA(609),      RCURZ)       00003100
C                                                                            00003120
      REAL       MASS, LM11,LM22,LM33, MM11,MM22,MM33, NM11,NM22,NM33,      00003130
     1           M0                                                          00003140
      EQUIVALENCE      (DA(1),  ENS  ),(DA(2),   A0   ),(DA(3),   H0   ),00003150
     1(DA(4),   E0   ),(DA(5),  SIGO ),(DA(6),  ENF0  ),(DA(7),   ENFL ),00003160
     2(DA(8),  POI   ),(DA(9), THETA ),(DA(10),  PIXI ),(DA(11),  SPRL ),00003170
     3(DA(12),  UK   ),(DA(13),  VK  ),(DA(14),   WK  ),(DA(15),   EMK ),00003180
     4(DA(16),  TAU1 ),(DA(17),  ENT1),(DA(18),   PI1 ),(DA(19),  TAU2 ),00003190
     5(DA(20),  ENT2 ),(DA(21),  PI2 ),(DA(22),   TAU3),(DA(23),  ENT3 ),00003200
     6(DA(24),   PI3 ),(DA(25), MASS ),(DA(26),   CFE ),(DA(27),   CZ  ),00003210
     7(DA(28),  SKFE ),(DA(29),  SKZ ),(DA(30),   SUM ),(DA(31),   EN1 ),00003220
     8(DA(32),  DEL  )                                                       00003230
      EQUIVALENCE      (DA(40),   R   ),(DA(240),  WTH  ),(DA(440),  WFE ),00003240
     1(DA(640),  GAMA ),(DA(840),  RHOX),(DA(1040),  D   ),(DA(1240),  EK ),00003250
     2(DA(1440),  E1  ),(DA(1640),  ALF),(DA(1840),  DNA ),(DA(2040),   T ),00003260
     3(DA(2240),  ENT ),(DA(2440),  EMT),(DA(2640),   PN ),(DA(2840),  PFE),00003270
     4(DA(3040),  PTH ),(DA(3240),  DZ0),(DA(3440),  VZ0 ),(DA(3640),  AZ0),00003280
     5(DA(3840),  DF0 ),(DA(4040),  VF0),(DA(4240),  AF0 ),(DA(4440),  EM1),00003290
     6(DA(4456),  EM3 ),(DA(4472),  EM5),(DA(4476),  EM1N),(DA(4492), EM3N),00003300
     7(DA(4508),  EM5N)                                                      00003310
C                                                                            00003320
      COMMON   DA(4511), EM2(4,4), EM4(4,4), EM6(4), S1, S2, ELAM2,          00003330
     1  Z(4,200), X(4,200), A2(4,4), B2(4,4), C2(4,4), G2(4), E(4,4),        00003340
     2  F(4,4), GA(4,4), A(4,4), B(4,4), C(4,4), G(4), EC(4), DEL2,          00003350
     3  SL1, SL2, N, NTH, NTPR, NTPW, I, K, L,                              00003360
     4  S77, S78, BTA11, BTA33, M0(200), OMG2(200), ZP(3,200),              00003370
     5  Z2P(3,200), Z3P(3,200), TIME, TDEL, PRNT, ENF, PRI, JT, NJT, V1     00003380
C                                                                            00003390
      IF(SL2 .EQ. 0.) GO TO 1005                                             00003400
```

```
      DO   1      I = 1,408                                                  00003410
    1 GDA(I)  =  0.                                                        00003420
      CALL DECRD(GDA)                                                      00003430
      N = EN                                                               00003440
      NN = N - 1                                                           00003450
      ENS  =  EN                                                           00003460
C                                                                          00003480
      IF (GMI - 2.0) 20, 35, 50                                            00003490
C                                                                          00003500
C                    CONE - CYLINDER                          **           00003510
C                                                                          00003520
   20 IF (PFLAG .NE. 0.0) WRITE(6,22)          N, RA1, AXL, ANX            00003530
   22 FORMAT(1H1,31X,34HGEOMETRY DATA FOR CONE OR CYLINDER// 35X,22HNUMB00003540
     1ER OF STATIONS -  ,I4//6X,7HRA1   =,1PE13.4,7X,7HAXL   =,E13.4,7X,00003550
     2 7HANX   =,E13.4)                                                    00003560
C                                                                          00003570
      DEL =  AXL/(EN - 1.0)                                                00003580
      SINFI  = SIND(ANX)                                                   00003590
      COSFI  = COSD(ANX)                                                   00003600
      WTH(1) = A0 * COSFI/RA1                                              00003610
      WFE(1) = 0.0                                                         00003620
      RHOX(1) = RA1/A0                                                     00003630
      R(1) = RA1                                                           00003640
C                                                                          00003650
      DO 30 I = 2,N                                                        00003660
      R(I)  = R(I-1) + DEL * SINFI                                         00003670
      WTH(I) = A0 * COSFI /R(I)                                            00003680
      WFE(I) = 0.0                                                         00003690
   30 RHOX(I) = R(I)/A0                                                    00003700
      GO TO 150                                                            00003710
C                                                                          00003720
C                    SPHERE - TOROID                          **           00003730
C                                                                          00003740
   35 IF (PFLAG .NE. 0.0) WRITE (6,37) IRGN, N, RC, ROFF, PHI0, PHIN      00003750
   37 FORMAT(1H1,31X,24HGEOMETRY DATA FOR REGION, I3,18H (SPHERE - TOROI00003760
     XD) //                                                 35X,22HNUMB00003770
```

```
     1ER OF STATIONS -  ,I4//6X,7HRC     =,1PE13.4,7X,7HROFF   =,E13.4,7X,00003780
     2 7HPHIO  =,E13.4,7X,7HPHIN  =,E13.4 )                                00003790
      ANGSP = PHIN - PHIO                                                  00003800
C                                                                          00003810
      DEL =  ANGSP/(EN - 1.0)                                              00003820
      AM = 1.0                                                             00003830
      AMU = SIGN(AM,DEL)                                                   00003840
      BPHI = PHIO                                                          00003850
      BSINP = SIND(PHIO)                                                   00003860
      BCOSP = COSD(PHIO)                                                   00003870
      R(1) = RC * BSINP + ROFF                                             00003880
C                                                                          00003890
      DO 40 I = 1,NN                                                       00003900
      APHI = BPHI + DEL                                                    00003910
      ASINP = SIND(APHI)                                                   00003920
      ACOSP = COSD(APHI)                                                   00003930
      R(I+1) = R(I) + RC * (ASINP - BSINP)                                 00003940
      WFE(I) = AO/ RC * AMU                                                00003950
      IF(ROFF .EQ. 0.0) GO TO 38                                           00003960
      WTH(I) = AO * BSINP / R(I)                                           00003970
      GO TO 39                                                             00003980
   38 WTH(I)  =  WFE(I)                                                    00003990
   39 RHOX(I) = R(I)/AO                                                    00004000
      BPHI = APHI                                                          00004010
      BSINP = ASINP                                                        00004020
      BCOSP = ACOSP                                                        00004030
   40 CONTINUE                                                             00004050
      DEL = ABS(DEL)                                                       00004060
      WFE(N) = AO/RC * AMU                                                 00004070
      IF(ROFF .EQ. 0.0) GO TO 45                                           00004080
      WTH(N) =  AO * BSINP / R(N)                                          00004090
      GO TO 46                                                             00004100
   45 WTH(N)  =  WFE(N)                                                    00004110
   46 RHOX(N) = R(N)/AO                                                    00004120
      DEL = DEL * RC * 0.01745329                                          00004130
      GO TO 150                                                            00004140
C                                                                          00004150
```

```
   50 IF(GMI - 4.0) 75, 51, 51                                              00004160
C                                                                           00004170
   51 WRITE (6,55)                                                          00004180
   55 FORMAT (/// 5X, 44HARBITRARY FUNCTIONS AND CONICS NOT AVAILABLE )     00004190
C                                                                           00004200
      CALL  EXIT                                                            00004210
      STOP                                                                  00004220
C                                                                           00004230
C                    GENERAL DISCRETE POINTS                  **           00004240
   75 M  =  EM                                                              00004250
      MM = M - 1                                                            00004260
      MM2 = M- 2                                                            00004270
C                                                                           00004280
      IF (PFLAG .NE. 0.0) WRITE(6,76)IRGN,N, (RIPT(I), XIPT(I), I = 1,M)00004290
   76 FORMAT(1H1,31X,24HGEOMETRY DATA FOR REGION, I3,18H (DISCRETE POINT00004300
     1S) //35X,20HNUMBER OF STATIONS - ,I4//16X,1HR,16X,2HXI //          00004310
     2  (3X,1P2E20.7) )                                                  00004320
C                                                                           00004330
      SARB(1) = 0.0                                                         00004340
      IF (GMI) 92, 77, 77                                                   00004350
   77 DO 90 IL = 1,MM                                                       00004360
      SURB = 0.0                                                            00004370
      DLT = XIPT(IL+1) - XIPT(IL)                                           00004380
      K = 10                                                                00004390
      AK = K                                                                00004400
      DDL = DLT/AK                                                          00004410
      KP1 = K + 1                                                           00004420
      DO 80 JI = 1,KP1                                                      00004430
      AJI = JI - 1                                                          00004440
      XJ(JI) = XIPT(IL) + AJI * DDL                                         00004450
   80 CONTINUE                                                              00004460
C                                                                           00004470
      CALL CODIMA (KP1,XJ, RRJ, XIPT, RIPT, M, 1.0)                         00004480
      DO  84 I = 2,K                                                        00004490
   84 RJ(I) =  (RRJ(I-1) + RRJ(I) + RRJ(I+1) )/3.0                          00004500
      RJ(1) = RRJ(1)                                                        00004510
      RJ(KP1) = RRJ(KP1)                                                    00004520
```

```
C                                                                       00004530
      DO 86 JR = 1,K                                                    00004540
      DLR(JR) = RJ(JR+1) - RJ(JR)                                       00004550
      DLS     =  SQRT(DLR(JR)**2 + DDL**2)                              00004560
   86 SURB = SURB + DLS                                                 00004570
      SARB(IL+1) = SARB(IL) + SURB                                      00004580
   90 CONTINUE                                                          00004590
      GO TO 96                                                          00004600
   92 DO 94 I = 1,M                                                     00004610
   94 SARB(I) = XIPT(I)                                                 00004620
   96 DEL = SARB(M) /(EN - 1.0)                                         00004630
C                                                                       00004640
      SURF(1) = 0.0                                                     00004650
      DO 98 I = 1,NN                                                    00004660
   98 SURF(I+1) = SURF(I) + DEL                                         00004670
      CALL CODIMA(N, SURF,RCRV, SARB, RCURV, M, 1.0)                    00004680
      CALL CODIMA(N,SURF, RCRZ, SARB, RCURZ, M, 1.0)                    00004690
C                                                                       00004700
  100 CALL CODIMA (N,SURF, R, SARB, RIPT, M, 1.0)                       00004710
  105 MLN = N - 2                                                       00004720
      NSM = 1                                                           00004730
  110 DO   115   I = 3,MLN                                              00004740
      RR(I) = (-3.*R(I-2) + 12.*R(I-1) + 17.*R(I) + 12.*R(I+1) - 3. *   00004750
     1 R(I+2) )/ 35.0                                                   00004760
  115 CONTINUE                                                          00004770
      RR(NN) = R(NN)                                                    00004780
      RR(2) = R(2)                                                      00004790
      RR(N) = R(N)                                                      00004800
      RR(1) = R(1)                                                      00004810
      IF (NSM .EQ. 25) GO TO 125                                        00004820
      NSM = NSM + 1                                                     00004830
      DO 120 I = 1,N                                                    00004840
  120 R(I) = RR(I)                                                      00004850
      GO TO 110                                                         00004860
  125 RHOX(1) = RR(1)/A0                                                00004870
      DELSQ = DEL * DEL                                                 00004880
      DO   130   I = 1,NN                                               00004890
```

```
  130 RHOX(I+1) = RR(I+1) /A0                                                    00004900
      GO TO 200                                                                  00004910
C                                                                                00004920
C                    COMPUTE GAMA                                    **          00004930
C                                                                                00004940
  150  DEL = DEL/ A0                                                             00004950
       DELSQ = DEL * DEL                                                         00004960
       DO 175 I = 1,N                                                            00004970
      DENM = 12. * RHOX(I) * DEL                                                 00004980
      DENMP= 2. * RHOX(I) * DEL                                                  00004990
      IF(RHOX(I) .EQ. 0.)  GO TO 155                                             00005000
      IF (I .NE. 1) GO TO 160                                                    00005010
      GAMA(I) = (3.*(RHOX(I+1) - RHOX(I)) + RHOX(I+1) - RHOX(I+2))/DENMP         00005020
      GO TO 175                                                                  00005030
  155 GAMA(I)  =  1.E+10                                                         00005040
      GO  TO  175                                                                00005050
  160 IF (I .EQ. N) GO TO 170                                                    00005060
      IF (I .EQ. 2) GO TO 165                                                    00005070
      IF (I .EQ. N-1) GO TO 165                                                  00005080
      GAMA(I) = (RHOX(I-2) - 8. *(RHOX(I-1) -      RHOX(I+1))- RHOX(I+2)         00005090
     1 )/DENM                                                                    00005100
      GO TO 175                                                                  00005110
  165 GAMA(I) = (RHOX(I+1) - RHOX(I-1)) /DENMP                                   00005120
      GO TO 175                                                                  00005130
  170 GAMA(I) =(3.*(RHOX(I)-RHOX(I-1)) + RHOX(I-2) - RHOX(I-1)) /DENMP           00005140
  175 CONTINUE                                                                   00005150
       GO TO 220                                                                 00005160
C                                                                                00005170
  200 DO 210 I = 1,N                                                             00005180
      WFE(I) = A0/RCRV(I)                                                        00005190
      WTH(I) = A0/RCRZ(I)                                                        00005200
      IF (RHOX(I) .EQ. 0.0) GO TO  205                                           00005210
      PRO = (RHOX(I) * WTH(I)) **2                                               00005220
      IF (PRO .GT. 1.0) GO TO  208                                               00005230
      GAMA(I) = SQRT(1.-PRO)/RHOX(I)                                             00005240
      GO TO 210                                                                  00005250
  205 GAMA(I) = 1.E+10                                                           00005260
```

```
      GO TO 210                                                          00005270
  208 GAMA(I) = 0.0                                                      00005280
  210 CONTINUE                                                           00005290
C                                                                        00005300
  220 IF (PFLAG .EQ. 0.0) GO TO 1000                                     00005310
C                                                                        00005320
      WRITE (6,230) (I, R(I),          WTH(I), WFE(I), RHOX(I), GAMA(I), 00005330
     1 I = 1,N)                                                          00005340
  230 FORMAT (1H-,9X,1HI,9X,4HR(I),              10X,8HW(THETA),11X,     00005350
     1 5HW(XI),11X,7HRHOX(I),10X,7HGAMA(I) //(I11,1P5E17.7) )            00005360
C                                                                        00005370
 1000 DEL2  =  2. * DEL                                                  00005380
      BTA11  =  -S77 * CFE * DEL                                         00005390
      BTA33  =  -S77 * CZ * DEL                                          00005400
C                                                                        00005410
      EN1  =  1.                                                         00005420
 1005 IF(R(I) .NE. 0.)  GO TO 2000                                       00005430
C                                                                        00005440
      EN1  =  2.                                                         00005450
      DO   1010  I = 1,4                                                 00005460
      EM6(I)  =  0.                                                      00005470
      DO   1010  J = 1,4                                                 00005480
      EM2(I,J)  =  0.                                                    00005490
 1010 EM4(I,J)  =  0.                                                    00005500
C             FORM UPPER BOUNDARY MATRICES FOR CLOSED SHELL              00005510
      EM4(1,1)  =  1.                                                    00005520
      IF(ENF - 1.) 1120,1130,1140                                        00005530
 1120 EM2(4,4)  =  1. /DEL                                               00005540
 1121 EM2(3,3)  =  1. /DEL                                               00005550
      EM4(2,2)  =  1.                                                    00005560
      GO  TO   2000                                                      00005570
 1130 EM2(2,1)  =  1. /DEL                                               00005580
      EM4(1,2)  =  1.                                                    00005590
 1135 EM4(3,3)  =  1.                                                    00005600
      EM4(4,4)  =  1.                                                    00005610
      GO  TO  2000                                                       00005620
 1140 IF(ENF .NE. 2.)  GO TO 1150                                        00005630
```

```
      EM4(4,3)  =  1.                                              00005640
      GO  TO  1121                                                 00005650
 1150 EM4(2,2)  =  1.                                              00005660
      GO  TO  1135                                                 00005670
C                                                                  00005680
 2000 RETURN                                                       00005690
      END                                                          00005700
```

```
$IBFTC CF3P                                                                    00005710
C      PARABOLIC CURVE FITTING SUBROUTINE  (THREE POINTS)                      00005720
C                                                                              00005730
       SUBROUTINE CODIMA (N1, X, Y, XI, YI, N2, SHAPE)                         00005740
C                                                                              00005750
C   ARGUMENTS                                                                  00005760
C      N1          NO. OF POINTS TO ITERPOLATE                                 00005770
C      X           LOCATION OF POINTS TO BE INTERPOLATED                       00005780
C      Y           ANSWERS                                                     00005790
C      XI          INDEPENDENT ARGUMENT                                        00005800
C      YI          DEPENDENT ARGUMENT                                          00005810
C      N2          NO. OF ARGUMENTS                                            00005820
C      SHAPE       0 = FITS END WITH STRAIGHT LINE   1 = CURVE,LAST 3 PTS.     00005830
C                                                                              00005840
       DIMENSION X(1),Y(1),XI(1),YI(1),D(2),A(2),B(2),C(2)                     00005850
C                                                                              00005860
   100 IN = 0                                                                  00005870
       XK = SHAPE                                                              00005880
C                                                                              00005890
       DO 800 N = 1,N1                                                         00005900
C                                                                              00005910
       IF (N2-2) 110,115,120                                                   00005920
   110 Y(N) = YI(N2)                                                           00005930
       GO TO 800                                                               00005940
C                                                                              00005950
   115 Y(N) = (YI(2)-YI(1))/(XI(2)-XI(1))*  (X(N)-XI(1))+YI(1)                 00005960
       GO TO 800                                                               00005970
C                                                                              00005980
   120 J = 1                                                                   00005990
   125 IF(XI(J)-X(N)) 130,140,150                                              00006000
   140 Y(N) = YI(J)                                                            00006010
       GO TO 800                                                               00006020
C                                                                              00006030
   130 J = J+1                                                                 00006040
       IF(J-N2) 125,125,145                                                    00006050
   145 Y(N) = (YI(N2)-YI(N2-1))/(XI(N2)-XI(N2-1))*(X(N)-XI(N2-1))              00006060
      1        + YI(N2 - 1)                                                    00006070
```

```
      GO TO 800                                                          00006080
C                                                                        00006090
  150 IF(J-2) 115,155,160                                                00006100
  155 K = 3                                                              00006120
      JJ = 1                                                             00006130
      GO TO 185                                                          00006140
  160 IF(J-N2) 170,165,145                                               00006150
  165 K = N2-1                                                           00006160
      JJ = 2                                                             00006170
      GO TO 185                                                          00006180
  170 IF(J-IN) 180,300,180                                               00006190
  180 JJ = 3                                                             00006200
      K = J                                                              00006210
C                                                                        00006220
  185 DO 200 M = 1,2                                                     00006230
      X1 = XI(K-1)-XI(K)                                                 00006240
      X2 = XI(K)-XI(K-2)                                                 00006250
      X3 = XI(K-2)-XI(K-1)                                               00006260
      Y1 = YI(K-1)-YI(K)                                                 00006270
      Y2 = YI(K)-YI(K-2)                                                 00006280
      Y3 = YI(K-2)-YI(K-1)                                               00006290
      XX1 = XI(K-2)**2                                                   00006300
      XX2 = XI(K-1)**2                                                   00006310
      XX3 = XI(K)**2                                                     00006320
      D(M) = XX1*X1 +XX2*X2+ XX3*X3                                      00006330
      A(M) = (YI(K-2)*X1 +YI(K-1)*X2+ YI(K)*X3)/D(M)                     00006340
      B(M) = (XX1*Y1 + XX2*Y2+XX3*Y3)/D(M)                               00006350
      C(M) = YI(K-2)- A(M)*XX1 -B(M)*XI(K-2)                             00006360
  200 K = K+1                                                            00006370
  300 P1 = X(N)*(A(1)*X(N)+B(1)) +C(1)                                   00006380
      P2 = X(N)*(A(2)*X(N)+B(2)) +C(2)                                   00006390
      AL = (X(N)-XI(J-1))/(XI(J)-XI(J-1))                                00006400
      S  = YI(J)*AL + YI(J-1)*(1.0-AL)                                   00006410
      GO TO (320,330,350),JJ                                             00006420
C                                                                        00006430
  320 P2 = P1                                                            00006440
      AL = (X(N)-XI(1))/(XI(2)-XI(1))                                    00006450
```

```
      S = AL*YI(2) + (1.0-AL)*YI(1)                                          00006460
      IF (SHAPE) 321,322, 322                                                00006470
  321 XM1 = ABS (YI(2) - YI(1)) / (XI(2) - XI(1))                            00006480
      XM2 = ABS (YI(3) - YI(2)) / (XI(3) - XI(2))                            00006490
      XK = 1. - ABS (XM1 -XM2) / (XM1 + XM2)                                 00006500
  322 P1 = S + XK *(P2-S)                                                    00006510
      GO TO 350                                                              00006520
C                                                                            00006530
  330 P1 = P2                                                                00006540
      AL = (X(N)-XI(N2-1))/ (XI(N2)-XI(N2-1))                                00006550
      S = AL* YI(N2) +(1.0-AL)*YI(N2-1)                                      00006560
      IF (SHAPE) 331,332, 332                                                00006570
  331 XM1 = ABS (YI(N2 - 1) - YI(N2)) /(XI(N2 -1) - XI(N2))                  00006580
      XM2 = ABS (YI(N2 -2) - YI(N2 -1)) / (XI(N2 -2) - XI(N2 -1))            00006590
      XK = 1. - ABS (XM1 -XM2) / (XM1 + XM2)                                 00006600
  332 P2 = S + XK*(P1-S)                                                     00006610
C                                                                            00006620
  350 E1 = ABS (P1-S)                                                        00006630
      E2 = ABS (P2-S)                                                        00006640
      IN = J                                                                 00006650
      IF(E1+E2) 700,700,750                                                  00006660
  700 Y(N) = S                                                               00006670
      GO TO 800                                                              00006680
  750 YNUM = E1 * AL * P2 + (1. - AL) * E2 * P1                              00006690
      YDEN = E1 * AL + (1. - AL) * E2                                        00006700
      Y(N) = YNUM / YDEN                                                     00006710
  800 CCNTINUE                                                               00006720
C                                                                            00006730
  900 RETURN                                                                 00006740
      END                                                                    00006750
```

```
$IBFTC CDAFIT                                                                   00006770
C      CURVE FIT SUBROUTINE                                    6J-157DR         00006780
C                                                                               00006790
       SUBROUTINE CRVFIT                                                        00006800
C                                                                               00006810
C      THE NOMENCLATURE IS VERY SIMILAR  TO THAT IN THE DA DATA REGION          00006820
C          AS EXPLAINED IN THE EXECUTIVE PROGRAM.  THE SUFFIX TB (TABLE)        00006830
C          HAS BEEN ADDED TO EACH PARAMETER.                                    00006840
C                                                                               00006850
C      THE TABLES ARE SET UP AS FOLLOWS                                         00006860
C          TAB(1)     NO. OF STATIONS GIVEN                                     00006870
C          TAB(2)     STATION NO. = 1.                                          00006880
C          TAB(3)     PARAMETER VALUE AT STATION 1.                             00006890
C          TAB(4)FF   STATIONS AND VALUES INTERLACED.                           00006900
C      THE LAST STATION MUST BE N BECAUSE CODIMA WILL NOT EXTRAPOLATE           00006910
C                                                                               00006920
       REAL    MASS, MO                                                         00006930
C                                                                               00006940
       DIMENSION  CDA(697), DTB(41), EKTB(41), E1TB(41), ALFTB(41),             00006950
      1  DNATB(41), TTB(41), ENTB(41), EMTB(41), PNTB(41), PFETB(41),           00006960
      2  PTHTB(41), DZOTB(41), VZOTB(41), QZOTB(41), DFOTB(41),                 00006970
      3  VFOTB(41), QFOTB(41),                                                  00006980
      4  D(200), EK(200), E1(200), ALF(200), DNA(200), T(200), ENT(200),        00006990
      5  EMT(200), PN(200), PFE(200), PTH(200), DZO(200), VZO(200),             00007000
      6  AZO(200), DFO(200), VFO(200), AFO(200), X(200),                        00007010
      7  STA(20), VAL(20)                                                       00007020
C                                                                               00007030
       EQUIVALENCE           (CDA(1),     DTB),   (CDA(42),    EKTB),         00007040
      1(CDA(83),    E1TB),   (CDA(124),  ALFTB),   (CDA(165),  DNATB),         00007050
      2(CDA(206),    TTB),   (CDA(247),   ENTB),   (CDA(288),   EMTB),         00007060
      3(CDA(329),   PNTB),   (CDA(370),  PFETB),   (CDA(411),  PTHTB),         00007070
      4(CDA(452),  DZOTB),   (CDA(493),  VZOTB),   (CDA(534),  QZOTB),         00007080
      5(CDA(575),  DFOTB),   (CDA(616),  VFOTB),   (CDA(657),  QFOTB)          00007090
C                                                                               00007100
       EQUIVALENCE      (DA(1),  EN   ),(DA(25),  MASS ),(DA(1040),  D  ),00007120
      1(DA(1240),  EK ),(DA(1440), E1 ),(DA(1640), ALF ),(DA(1840), DNA),00007130
      2(DA(2040),  T  ),(DA(2240), ENT),(DA(2440), EMT ),(DA(2640), PN ),00007140
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     3(DA(2840), PFE ),(DA(3040), PTH),(DA(3240), DZO ),(DA(3440), VZO),00007150
     4(DA(3640), AZO ),(DA(3840), DFO),(DA(4040), VFO ),(DA(4240), AFO),00007160
     5(DA(3),   HO   ),(DA(4),   EO   ),(DA(8),   POI   ),(DA(6), ENFO  ),00007170
     6(DA(36), RESTRT)                                                    00007180
C                                                                         00007190
      COMMON   DA(4511), EM2(4,4), EM4(4,4), EM6(4), S1, S2, ELAM2,       00007200
     1  Z(4,200),XX(4,200), A2(4,4), B2(4,4), C2(4,4), G2(4), E(4,4),     00007210
     2  F(4,4), GA(4,4), A(4,4), B(4,4), C(4,4), G(4), EC(4), DEL2,       00007220
     3  SL1, SL2, N, NTH, NTPR, NTPW, I, K, L,                           00007230
     4  S77, S78, BTA11, BTA33, MO(200), OMG2(200), ZP(3,200),           00007240
     5  Z2P(3,200), Z3P(3,200), TIMX, TDEL, PRNT, ENF, PRI, JT           00007250
C                                                                         00007260
      N  =  EN                                                            00007270
      S3  =  EO * HO *(1. - POI **2)                                      00007280
      DO  50      I = 1,697                                               00007290
   50 CDA(I)  =  0.                                                       00007300
C                                                                         00007310
      CALL DECRD ( CDA )                                                  00007320
C                                                                         00007330
      IF(RESTRT .EQ. 0.)  GO TO 65                                        00007340
C                                                                         00007350
      READ ( 5,55)  TIMX,  ((ZP(K,L), Z2P(K,L), Z3P(K,L), K=1,3),         00007360
     1            OMG2(L), L=1,N)                                       00007370
   55 FORMAT( 1P5E14.7 )                                                  00007380
      TIMX  =  TIMX + TDEL                                                00007390
      JT  =  TIMX /TDEL + 0.01                                            00007400
      PRNT  =  JT                                                         00007410
C                                        PRINT TABLES ON NEG. IND.        00007420
   65 IF(DTB .EQ. 0.)  GO TO 90                                           00007430
C                                                                         00007440
      WRITE ( 6,70)  (I, DTB(I), EKTB(I), E1TB(I), ALFTB(I), DNATB(I),    00007450
     1               TTB(I), ENTB(I), EMTB(I),  I = 1,41)                00007460
   70 FORMAT(///10X, 16HCURVE FIT TABLES ///14X,3HDTB, 8X,4HEKTB, 8X,     00007470
     1 4HE1TB, 8X,5HALFTB, 7X,5HDNATB, 8X,3HTTB, 8X,4HENTB, 8X,4HEMTB //00007480
     2     (I8, 1P8E12.3)  )                                              00007490
C                                                                         00007500
      WRITE ( 6,72)  (I, PNTB(I), PFETB(I), PTHTB(I), DZOTB(I),           00007510
```

```
     1    VZOTB(I), QZOTB(I), DFOTB(I), VFOTB(I), QFOTB(I),  I = 1,41)  00007520
    72 FORMAT(/// 11X,4HPNTB, 6X,5HPFETB, 6X,5HPTHTB, 6X,5HDZOTB, 6X,    00007530
     1  5HVZOTB, 6X,5HQZOTB, 6X,5HDFOTB, 6X,5HVFOTB, 6X,5HQFOTB //        00007540
     2       (I6, 1P9E11.2)  )                                           00007550
C                                                FORM COL. OF STATION NOS.  00007560
   90 DO   92     I = 1,N                                                 00007570
   92 X(I)  =  I                                                          00007580
C                                                                         00007590
  100 IF(DTB .NE. 1.E+10)  GO TO 120                                      00007600
      DO  105     I = 1,N                                                 00007610
  105 D(I)  =  DTB(2)                                                     00007620
      GO  TO  200                                                         00007630
C                                                                         00007640
  120 IF(DTB .EQ. 0.)  GO TO 600                                          00007650
      NOSTA  =  DTB                                                       00007660
      ICDA  =  1                                                          00007670
      IDA   =  1040                                                       00007680
      IXX   =  1                                                          00007690
      GO  TO   2000                                                       00007700
C                                                                         00007710
  200 IF(EKTB .NE. 1.E+10) GO TO 220                                      00007720
      DO   205    I = 1,N                                                 00007730
  205 EK(I)  =  EKTB(2)                                                   00007740
      GO  TO  300                                                         00007750
C                                                                         00007760
  220 NOSTA  =  EKTB                                                      00007770
      ICDA  =  42                                                         00007780
      IDA   =  1240                                                       00007790
      IXX   =  2                                                          00007800
      GO TO    2000                                                       00007810
C                                                                         00007820
  300 IF(E1TB .NE. 1.E+10) GO TO 320                                      00007830
      DO   305    I = 1,N                                                 00007840
  305 E1(I)  =  E1TB(2)                                                   00007850
      GO  TO  400                                                         00007860
C                                                                         00007870
  320 NOSTA  =  E1TB                                                      00007880
```

```
      ICDA   =  83                                                    00007890
      IDA    =  1440                                                  00007900
      IXX    =  3                                                     00007910
      GO  TO  2000                                                    00007920
C                                                                     00007930
  400 IF(ALFTB .NE. 1.E+10) GO TO 420                                 00007940
      DO   405    I = 1,N                                             00007950
  405 ALF(I)  =  ALFTB(2)                                             00007960
      GO  TO  500                                                     00007970
C                                                                     00007980
  420 IF(ALFTB .EQ. 0.)  GO TO 500                                    00007990
      NOSTA  =  ALFTB                                                 00008000
      ICDA   =  124                                                   00008010
      IDA    =  1640                                                  00008020
      IXX    =  4                                                     00008030
      GO  TO  2000                                                    00008040
C                                                                     00008050
  500 IF(DNATB .NE. 1.E+10) GO TO 520                                 00008060
      DO   505    I = 1,N                                             00008070
      DNA(I)  =  DNATB(2)                                             00008080
  505 MO(I)  =  MASS * D(I) /E1(I) * S3                               00008090
      GO  TO  600                                                     00008100
C                                                                     00008110
  520 NOSTA  =  DNATB                                                 00008120
      ICDA   =  165                                                   00008130
      IDA    =  1840                                                  00008140
      IXX    =  5                                                     00008150
      GO  TO  2000                                                    00008160
C                                                                     00008170
  580 DO  582     I = 1,N                                             00008180
  582 MO(I)  =  MASS * D(I) /E1(I) * S3                               00008190
C                                                                     00008200
  600 IF(TTB .NE. 1.E+10) GO TO 620                                   00008210
      DO  605     I = 1,N                                             00008220
  605 T(I)  =  TTB(2)                                                 00008230
      GO  TO  700                                                     00008240
C                                                                     00008250
```

```
  620 IF( TTB )      622,900,630                                    00008260
  622 NOSTA  = -TTB                                                 00008270
      ICDA   =  206                                                 00008280
      IDA    =  2040                                                00008290
      IXX    =  6                                                   00008300
      GO  TO  2000                                                  00008310
C                                                                   00008320
  630 DO  632     I = 1,N                                           00008330
  632 T(I)  =  ENTERP( X(I), TTB)                                   00008340
C                                                                   00008350
  700 IF(ENTB .NE. 1.E+10) GO TO 720                                00008360
      DO  705     I = 1,N                                           00008370
  705 ENT(I)  =  ENTB(2)                                            00008380
      GO  TO  800                                                   00008390
C                                                                   00008400
  720 IF( ENTB )   722,800,730                                      00008410
  722 NOSTA  = -ENTB                                                00008420
      ICDA   =  247                                                 00008430
      IDA    =  2240                                                00008440
      IXX    =  7                                                   00008450
      GO  TO  2000                                                  00008460
C                                                                   00008470
  730 DO  732     I = 1,N                                           00008480
  732 ENT(I)  =  ENTERP( X(I), ENTB)                                00008490
C                                                                   00008500
  800 IF(EMTB .NE. 1.E+10) GO TO 820                                00008510
      DO  805     I = 1,N                                           00008520
  805 EMT(I)  =  EMTB(2)                                            00008530
      GO  TO  900                                                   00008540
C                                                                   00008550
  820 IF( EMTB )    822,900,830                                     00008560
  822 NOSTA  = -EMTB                                                00008570
      ICDA   =  288                                                 00008580
      IDA    =  2440                                                00008590
      IXX    =  8                                                   00008600
      GO  TO  2000                                                  00008610
C                                                                   00008620
```

```
  830 DO  832     I = 1,N                                          00008630
  832 EMT(I)  =  ENTERP( X(I), EMTB)                               00008640
C                                                                  00008650
  900 IF(PNTB .NE. 1.E+10) GO TO 920                               00008660
      DO  905     I = 1,N                                          00008670
  905 PN(I)  =  PNTB(2)                                            00008680
      GO  TO  1000                                                 00008690
C                                                                  00008700
  920 IF( PNTB )    922,1000,930                                   00008710
  922 NOSTA  = -PNTB                                               00008720
      ICDA   =  329                                                00008730
      IDA    =  2640                                               00008740
      IXX    =  9                                                  00008750
      GO  TO  2000                                                 00008760
C                                                                  00008770
  930 DO  932     I = 1,N                                          00008780
  932 PN(I)  =  ENTERP( X(I), PNTB)                                00008790
C                                                                  00008800
 1000 IF(PFETB .NE. 1.E+10) GO TO 1020                             00008810
      DO  1005    I = 1,N                                          00008820
 1005 PFE(I)  =  PFETB(2)                                          00008830
      GO  TO  1100                                                 00008840
C                                                                  00008850
 1020 IF( PFETB )    1022,1100,1030                                00008860
 1022 NOSTA  =  -PFETB                                             00008870
      ICDA   =  370                                                00008880
      IDA    =  2840                                               00008890
      IXX    =  10                                                 00008900
      GO  TO  2000                                                 00008910
C                                                                  00008920
 1030 DO  1032    I = 1,N                                          00008930
 1032 PFE(I)  =  ENTERP( X(I), PFETB)                              00008940
C                                                                  00008950
 1100 IF(PTHTB .NE. 1.E+10) GO TO 1120                             00008960
      DO  1105    I = 1,N                                          00008970
 1105 PTH(I)  =  PTHTB(2)                                          00008980
      GO  TO 1200                                                  00008990
```

```
C                                                                       00009000
 1120 IF( PTHTB )    1122,1200,1130                                     00009010
 1122 NOSTA  =  -PTHTB                                                  00009020
      ICDA   =  411                                                     00009030
      ICA    =  3040                                                    00009040
      IXX    =  11                                                      00009050
      GO  TO  2000                                                      00009060
C                                                                       00009070
 1130 DO  1132   I = 1,N                                                00009080
 1132 PTH(I)  =  ENTERP( X(I), PTHTB)                                   00009090
C                                                                       00009100
 1200 IF(DZOTB .NE. 1.E+10) GO TO 1220                                  00009110
      DO  1205   I = 1,N                                                00009120
 1205 DZO(I)  =  DZOTB(2)                                               00009130
      GO  TO  1300                                                      00009140
C                                                                       00009150
 1220 IF( DZOTB )    1222,2100,1230                                     00009160
 1222 NOSTA  =  -DZOTB                                                  00009170
      ICDA   =  452                                                     00009180
      IDA    =  3240                                                    00009190
      IXX    =  12                                                      00009200
      GO  TO  2000                                                      00009210
C                                                                       00009220
 1230 DO  1232   I = 1,N                                                00009230
 1232 DZO(I)  =  ENTERP( X(I), DZOTB)                                   00009240
C                                                                       00009250
 1300 IF(VZOTB .NE. 1.E+10) GO TO 1320                                  00009260
      DO  1305   I = 1,N                                                00009270
 1305 VZO(I)  =  VZOTB(2)                                               00009280
      GO  TO  1400                                                      00009290
C                                                                       00009300
 1320 IF( VZOTB )    1322,1400,1330                                     00009310
 1322 NOSTA  =  -VZOTB                                                  00009320
      ICDA   =  493                                                     00009330
      IDA    =  3440                                                    00009340
      IXX    =  13                                                      00009350
      GO  TO  2000                                                      00009360
```

```
C
 1330 DO  1332   I = 1,N                                              00009370
 1332 VZO(I)  =  ENTERP( X(I), VZOTB)                                 00009380
C                                                                     00009390
 1400 IF(QZOTB .NE. 1.E+10) GO TO 1420                                00009400
      DO  1405   I = 1,N                                              00009410
 1405 AZO(I)  =  QZOTB(2) /MO(I)                                      00009420
      GO  TO  1500                                                    00009430
C                                                                     00009440
 1420 IF( QZOTB )    1422,1500,1430                                   00009450
 1422 NOSTA   =  -QZOTB                                               00009460
      ICDA    =  534                                                  00009470
      IDA     =  3640                                                 00009480
      IXX     =  14                                                   00009490
      GO  TO  2000                                                    00009500
C                                                                     00009510
 1430 DO  1432   I = 1,N                                              00009520
      QZO  =  ENTERP( X(I), QZOTB)                                    00009530
 1432 AZO(I)  =  QZO /MO(I)                                           00009540
      GO  TO  1500                                                    00009550
C                                                                     00009560
 1480 DO  1482   I = 1,N                                              00009570
 1482 AZO(I)  =  AZO(I) /MO(I)                                        00009580
C                                                                     00009590
 1500 IF(DFOTB .NE. 1.E+10) GO TO 1520                                00009600
      DO  1505   I = 1,N                                              00009610
 1505 DFO(I)  =  DFOTB(2)                                             00009620
      GO  TO  1600                                                    00009630
C                                                                     00009640
 1520 IF( DFOTB )    1522,1600,1530                                   00009650
 1522 NOSTA   =  -DFOTB                                               00009660
      ICDA    =  575                                                  00009670
      IDA     =  3840                                                 00009680
      IXX     =  15                                                   00009690
      GO  TO  2000                                                    00009700
C                                                                     00009710
 1530 DO  1532   I = 1,N                                              00009720
                                                                      00009730
```

```
 1532 DFO(I)  =  ENTERP( X(I), DFOTB)                                  00009740
C                                                                      00009750
 1600 IF(VFOTB .NE. 1.E+10) GO TO 1620                                 00009760
      DO  1605   I = 1,N                                               00009770
 1605 VFO(I)  =  VFOTB(2)                                              00009780
      GO  TO  1700                                                     00009790
C                                                                      00009800
 1620 IF( VFOTB )    1622,1700,1630                                    00009810
 1622 NOSTA  =  -VFOTB                                                 00009820
      ICDA   =  616                                                    00009830
      IDA    =  4040                                                   00009840
      IXX    =  16                                                     00009850
      GO  TO  2000                                                     00009860
C                                                                      00009870
 1630 DO  1632   I = 1,N                                               00009880
 1632 VFO(I)  =  ENTERP( X(I), VFOTB)                                  00009890
C                                                                      00009900
 1700 IF(QFOTB .NE. 1.E+10) GO TO 1720                                 00009910
      DO  1705   I = 1,N                                               00009920
 1705 AFO(I)  =  QFOTB(2) /MO(I)                                       00009930
      GO  TO  2100                                                     00009940
C                                                                      00009950
 1720 IF( QFOTB )    1722,2100,1730                                    00009960
 1722 NOSTA  =  -QFOTB                                                 00009970
      ICDA   =  657                                                    00009980
      IDA    =  4240                                                   00009990
      IXX    =  17                                                     00010000
      GO  TO  2000                                                     00010010
C                                                                      00010020
 1730 DO  1732   I = 1,N                                               00010030
      QFO  =  ENTERP( X(I), QFOTB)                                     00010040
 1732 AFO(I)  =  QFO /MO(I)                                            00010050
      GO  TO  2100                                                     00010060
C                                                                      00010070
 1780 DO  1782   I = 1,N                                               00010080
 1782 AFO(I)  =  AFO(I) /MO(I)                                         00010090
      GO  TO  2100                                                     00010100
```

```
C                                                                       00010110
 2000 K0  =  0                                                          00010120
      K2  =  2 * NOSTA                                                  00010130
      DO  2005   I = 2,K2,2                                             00010140
      K0  =  K0 + 1                                                     00010150
      KX  =  ICDA + I - 1                                               00010160
      STA(K0)  =  CDA(KX)                                               00010170
 2005 VAL(K0)  =  CDA(KX+1)                                             00010180
      CALL CODIM4  (N,X,DA(IDA),  STA,VAL,NOSTA,  1.)                   00010190
C                                                                       00010200
      GO TO (200, 300, 400, 500, 580, 700, 800, 900, 1000, 1100, 1200,  00010210
     1  1300, 1400, 1480, 1600, 1700, 1780), IXX                        00010220
C                                                                       00010230
 2100 IF(TIMX .NE. TDEL)  GO TO 3050                                    00010240
      IF(ENF .NE. ENF0) GO TO 5000                                      00010250
      TDEL2  =  TDEL **2                                                00010260
      DO   2110  I = 1,N                                                00010270
      OMG2(I)  =  S77 * M0(I) * S78                                     00010280
      ZP(1,I)  =  DF0(I)                                                00010290
      ZP(3,I)  =  DZ0(I)                                                00010300
      Z2P(1,I)  =  AF0(I) * TDEL2 + 2. * DF0(I)                         00010310
      Z2P(3,I)  =  AZ0(I) * TDEL2 + 2. * DZ0(I)                         00010320
      Z3P(1,I)  =  6. * (AF0(I)*TDEL2 + VF0(I)*TDEL) + 9. * DF0(I)      00010330
 2110 Z3P(3,I)  =  6. * (AZ0(I)*TDEL2 + VZ0(I)*TDEL) + 9. * DZ0(I)      00010340
C                                          PRINT INITIAL CONDITIONS     00010350
      WRITE (6,3000)  (DA(I), I=1,32), DA(4441), DA(4477), (I, D(I),    00010360
     1  EK(I), E1(I), ALF(I), DNA(I), T(I), ENT(I), EMT(I), I = 1,N)     00010370
 3000 FORMAT( 1H1//10X, 12HINITIAL DATA// 6X,7HEN    =,1PE12.3, 8X,     00010380
     1  7HA0    =,E12.3, 8X,7HH0    =,E12.3, 8X,7HE0    =,E12.3// 6X,   00010390
     2  7HSIG0  =,E12.3, 8X,7HENF0  =,E12.3, 8X,7HENFL  =,E12.3, 8X,    00010400
     3  7HPOI   =,E12.3// 6X,7HTHETA =,E12.3, 8X,7HPIXI  =,E12.3, 8X,   00010410
     4  7HSPRL  =,E12.3, 8X,7HUK    =,E12.3// 6X,7HVK    =,E12.3, 8X,   00010420
     5  7HWK    =,E12.3, 8X,7HEMK   =,E12.3, 8X,7HTAU1  =,E12.3 // 6X,  00010430
     6  7HENT1  =,E12.3, 8X,7HPI1   =,E12.3, 8X,7HTAU2  =,E12.3,  8X,   00010440
     7  7HENT2  =,E12.3// 6X,7HPI2  =,E12.3, 8X,7HTAU3  =,E12.3, 8X,    00010450
     8  7HENT3  =,E12.3, 8X,7HPI3   =,E12.3// 6X,7HMASS  =,E12.3, 8X,   00010460
     9  7HCFE   =,E12.3, 8X,7HCZ    =,E12.3, 8X,7HSKFE  =,E12.3// 6X,   00010470
```

```
     X  7HSKZ    =,E12.3, 8X,7HSUM    =,E12.3, 8X,7HEN1    =,E12.3 , 8X,    00010480
     1  7HDEL    =,E12.3// 6X,7HBCITP =,E12.3, 8X,7HBCIBM =,E12.3/// 15X,00010490
     2  1HD, 10X,2HEK, 10X,2HE1, 10X,3HALF, 9X,3HDNA, 10X,1HT, 10X,      00010500
     3  3HENT, 9X,3HEMT // (I8, 8E12.3) )                                00010510
      WRITE (6,3005) (I, PN(I), PFE(I), PTH(I), DZO(I), VZO(I),          00010520
     1                      AZO(I) , DFO(I), VFO(I), AFO(I),  I = 1,N)  00010530
 3005 FORMAT(/// 12X,2HPN, 8X,3HPFE, 8X,3HPTH, 8X,3HDZO, 8X,3HVZO, 8X,  00010540
     1  3HAZO, 8X,3HDFO, 8X,3HVFO, 8X,3HAFO // (I6, 1P9E11.2) )          00010550
                                                                         00010560
C                                                                        00010570
      GO  TO  5000                                                       00010580
 3050 WRITE(6,3052)TIMX,(I, T(I), ENT(I), EMT(I), PFE(I), PTH(I), PN(I),00010590
     1                  I = 1,N)                                        00010600
 3052 FORMAT(///10X, 9HAT TIME =,1PE10.3,15H THE LOADS WERE // 5X,1HI,  00010610
     1  11X,1HT, 14X,3HENT, 13X,3HEMT, 13X,3HPFE, 13X,3HPTH, 14X,2HPN// 00010620
     2  (I6,6E16.3) )                                                   00010630
C                                                                        00010640
 5000 RETURN                                                             00010650
      END
```

```
$IBFTC CODS                                                                    00010660
C      PARABOLIC CURVE FITTING SUBROUTINE  (THREE POINTS)                      00010670
C                                                                              00010680
       SUBROUTINE CODIM4 (N1, X, Y, XI, YI, N2, SHAPE)                         00010690
C                                                                              00010700
C  ARGUMENTS                                                                   00010710
C      N1          NO. OF POINTS TO ITERPOLATE                                 00010720
C      X           LOCATION OF POINTS TO BE INTERPOLATED                       00010730
C      Y           ANSWERS                                                     00010740
C      XI          INDEPENDENT ARGUMENT                                        00010750
C      YI          DEPENDENT ARGUMENT                                          00010760
C      N2          NO. OF ARGUMENTS                                            00010770
C      SHAPE       0 = FITS END WITH STRAIGHT LINE   1 = CURVE,LAST 3 PTS.     00010780
C                                                                              00010790
       DIMENSION X(1),Y(1),XI(1),YI(1),D(2),A(2),B(2),C(2)                     00010800
C                                                                              00010810
  100  IN = 0                                                                  00010820
       XK = SHAPE                                                              00010830
C                                                                              00010840
       DO 800 N = 1,N1                                                         00010850
C                                                                              00010860
       IF (N2-2) 110,115,120                                                   00010870
  110  Y(N) = YI(N2)                                                           00010880
       GO TO 800                                                               00010890
C                                                                              00010900
  115  Y(N) = (YI(2)-YI(1))/(XI(2)-XI(1))*  (X(N)-XI(1))+YI(1)                 00010910
       GO TO 800                                                               00010920
C                                                                              00010930
  120  J = 1                                                                   00010940
  125  IF(XI(J)-X(N)) 130,140,150                                              00010950
  140  Y(N) = YI(J)                                                            00010960
       GO TO 800                                                               00010970
C                                                                              00010980
  130  J = J+1                                                                 00010990
       IF(J-N2) 125,125,145                                                    00011000
  145  Y(N) = (YI(N2)-YI(N2-1))/(XI(N2)-XI(N2-1))*(X(N)-XI(N2-1))              00011010
     1       + YI(N2 - 1)                                                      00011020
```

```
      GO TO 800                                                          00011030
C                                                                        00011040
  150 IF(J-2) 115,155,160                                                00011050
  155 K = 3                                                              00011060
      JJ = 1                                                             00011070
      GO TO 185                                                          00011080
  160 IF(J-N2) 170,165,145                                               00011090
  165 K = N2-1                                                           00011100
      JJ = 2                                                             00011110
      GO TO 185                                                          00011120
  170 IF(J-IN) 180,300,180                                               00011130
  180 JJ = 3                                                             00011140
      K = J                                                              00011150
C                                                                        00011160
  185 DO 200 M = 1,2                                                     00011170
      X1 = XI(K-1)-XI(K)                                                 00011180
      X2 = XI(K)-XI(K-2)                                                 00011190
      X3 = XI(K-2)-XI(K-1)                                               00011200
      Y1 = YI(K-1)-YI(K)                                                 00011210
      Y2 = YI(K)-YI(K-2)                                                 00011230
      Y3 = YI(K-2)-YI(K-1)                                               00011240
      XX1 = XI(K-2)**2                                                   00011250
      XX2 = XI(K-1)**2                                                   00011260
      XX3 = XI(K)**2                                                     00011270
      D(M) = XX1*X1 +XX2*X2+ XX3*X3                                      00011280
      A(M) = (YI(K-2)*X1 +YI(K-1)*X2+ YI(K)*X3)/D(M)                     00011290
      B(M) = (XX1*Y1 + XX2*Y2+XX3*Y3)/D(M)                               00011300
      C(M) = YI(K-2)- A(M)*XX1 -B(M)*XI(K-2)                             00011310
  200 K = K+1                                                            00011320
  300 P1 = X(N)*(A(1)*X(N)+B(1)) +C(1)                                   00011330
      P2 = X(N)*(A(2)*X(N)+B(2)) +C(2)                                   00011340
      AL = (X(N)-XI(J-1))/(XI(J)-XI(J-1))                                00011350
      S  = YI(J)*AL + YI(J-1)*(1.0-AL)                                   00011360
      GO TO (320,330,350),JJ                                             00011370
C                                                                        00011380
  320 P2 = P1                                                            00011390
      AL = (X(N)-XI(1))/(XI(2)-XI(1))                                    00011400
```

```
      S = AL*YI(2) + (1.0-AL)*YI(1)                                    00011410
      IF (SHAPE) 321,322, 322                                          00011420
  321 XM1 = ABS (YI(2) - YI(1)) / (XI(2) - XI(1))                      00011430
      XM2 = ABS (YI(3) - YI(2)) / (XI(3) - XI(2))                      00011440
      XK = 1. - ABS (XM1 -XM2) / (XM1 + XM2)                           00011450
  322 P1 = S + XK *(P2-S)                                              00011460
      GO TO 350                                                        00011470
C                                                                      00011480
  330 P1 = P2                                                          00011490
      AL = (X(N)-XI(N2-1))/ (XI(N2)-XI(N2-1))                          00011500
      S = AL* YI(N2) +(1.0-AL)*YI(N2-1)                                00011510
      IF (SHAPE) 331,332, 332                                          00011520
  331 XM1 = ABS (YI(N2 - 1) - YI(N2)) /(XI(N2 -1) - XI(N2))            00011530
      XM2 = ABS (YI(N2 -2) - YI(N2 -1)) / (XI(N2 -2) - XI(N2 -1))      00011540
      XK = 1. - ABS (XM1 -XM2) / (XM1 + XM2)                           00011550
  332 P2 = S + XK*(P1-S)                                               00011560
C                                                                      00011570
  350 E1 = ABS (P1-S)                                                  00011580
      E2 = ABS (P2-S)                                                  00011590
      IN = J                                                           00011600
      IF(E1+E2) 700,700,750                                            00011610
  700 Y(N) = S                                                         00011620
      GO TO 800                                                        00011630
  750 YNUM = E1 * AL * P2 + (1. - AL) * E2 * P1                        00011640
      YDEN = E1 * AL + (1. - AL) * E2                                  00011650
      Y(N) = YNUM / YDEN                                               00011660
  800 CONTINUE                                                         00011670
C                                                                      00011680
  900 RETURN                                                           00011690
      END                                                              00011700
```

```
$IBFTC ENTP                                                                    00011710
C      LINEAR  INTERPOLATION  SUBROUTINE **ENTERP**              6J-997       00011720
C                                                                             00011730
C      SELECTS THE VALUE AT EITHER END OF TABLE WHEN ARGUMENT EXCEEDS         00011740
C      LIMIT, THEN CONTINUES                                                  00011750
C                                                                             00011760
C  SUBROUTINE ARGUMENTS                                                       00011770
C      X           VALUE TO LOOK UP IN TABLE                                  00011780
C      TAB(1)      NO. OF PAIRS OF ARGUMENTS AND VALUES IN TABLE              00011790
C      TAB(2),ETC ARGUMENTS AND FUNCTIONS INTERLACED                          00011800
C                                                                             00011810
       FUNCTION ENTERP (X,TAB)                                                00011820
C                                                                             00011830
       DIMENSION TAB(101)                                                     00011840
       IF (TAB) 9,9,8                                                         00011850
     9 ENTERP = - TAB                                                         00011860
       RETURN                                                                 00011870
     8 N = TAB                                                                00011880
       DO 5 I=1,N                                                             00011890
     1 IF (TAB(2*I)-X) 5,4,3                                                  00011900
     3 IF (I-1) 6,6,7                                                         00011910
     7 ENTERP = TAB(2*I-1) + (X-TAB(2*I-2)) * (TAB(2*I+1) - TAB(2*I-1))       00011920
      V   / (TAB(2*I) - TAB(2*I-2))                                           00011930
       RETURN                                                                 00011940
     4 ENTERP = TAB(2*I+1)                                                    00011950
       RETURN                                                                 00011960
     5 CONTINUE                                                               00011970
       M = 2*N+1                                                              00011980
       K = M                                                                  00011990
   105 WRITE ( 6,10)   X, TAB(K)                                              00012000
    10 FORMAT (// 10X, 39HLIMITS OF TABLE EXCEEDED BY ARGUMENT = 1PE12.4      00012010
      1 / 10X, E12.4, 24H = VALUE USED FROM TABLE  )                          00012020
       ENTERP = TAB(K)                                                        00012030
       RETURN                                                                 00012040
     6 M = 2*N+1                                                              00012050
       K = 3                                                                  00012060
       GO TO 105                                                              00012070
       END                                                                    00012080
```

```
$IBFTC ACCN1                                                                    00012100
C      CALCULATION OF HYDRO PRESSURE PROFILES BY USING LAMBS SOLUTIONS          00012110
C                                                                               00012120
       SUBROUTINE ACCN (PMAX, RMAX)                                             00012130
C                                                                               00012140
       DIMENSION    PM(200), RHOX(200)                                          00012150
       EQUIVALENCE       (DA(32),  DEL ),(DA(34),  VIN  ),(DA(35),  RHO ),00012160
      1(DA(440), WFE  ),(DA(2640), PM ),(DA(840),  RHOX)                        00012170
C                                                                               00012180
       COMMON   DA(8520), T, TDEL, PRNT(5), WT                                  00012190
C                                                                               00012200
C      DEL=ARC INCREMENT                                                        00012210
C                                                                               00012220
C      R=OUTER RADIUS OF SPHERE =1/WFE                                          00012230
       R=1.0/WFE                                                                00012240
C                                                                               00012250
       RMAX  =  SQRT(2. * T * R * VIN)                                          00012260
       ALPHA  =  4.0 /3.0                                                       00012270
       BAF  = 1.0 + ALPHA * RHO * RMAX **3 /WT                                  00012280
       A1  =  2. * R * VIN **2 * RHO /(3.1415927 * RMAX * 32.2 * 12.0           00012290
      1          * BAF **2)                                                    00012300
       A3  =  ALPHA * RHO * RMAX **3 /WT                                        00012310
       N  =        RMAX /DEL                                                    00012320
       NP=N+1                                                                   00012330
C                                                                               00012340
       DO 10 I=1,NP                                                             00012350
       ROC  = FLOAT(I-1) * DEL /RMAX                                            00012360
       PM(I)  = A1 *(1. - A3*(2. - 3.*ROC **2)) / SQRT(1. - ROC **2)            00012370
 10    CONTINUE                                                                 00012380
C                                                                               00012390
       A  =  2. * RHO * RMAX **3 /WT                                            00012400
       B  =  A1 * RMAX * (1.0 - 4.0 * A /3.0)                                   00012410
       X  = (FLOAT(N) + 0.5) * DEL                                              00012420
C                                                                               00012430
       IF(RMAX .GT. X)  GO TO 20                                                00012440
C                                                                               00012450
C      CASE I  (X .GE.      RMAX .GT. N*DEL)                                    00012460
```

```
      PM(NP)   = B *(PMAXL(      RMAX, RMAX, A) - PMAXL(X-DEL, RMAX, A))   00012470
     1         /DEL                                                        00012480
      GO  TO  30                                                         00012490
C                                                                        00012500
C     CASE II    (      RMAX .GT. X)                                     00012510
   20 PM(NP+1)   = B *(PMAXL(      RMAX, RMAX, A) - PMAXL(X, RMAX, A))    00012520
     1          /DEL                                                     00012530
C                                                                        00012540
   30 RETURN                                                             00012550
      END                                                                00012560
```

```
$IBFTC PMAXX                                                          00012570
C                                                                     00012580
      FUNCTION  PMAXL(R, RMAX, A)                                     00012590
C                                                                     00012600
      RORM  =  R /RMAX                                                00012610
      PMAXL  =  (1. + A) * ARSIN(RORM) - A*RORM * SQRT(1. - RORM **2) 00012620
C                                                                     00012630
      RETURN                                                          00012640
      END                                                             00012650
```

```
$IBFTC 157DR1                                                                  00012670
C     6J-157DR                                          COMPUTES DEFLECTIONS   00012680
C                                                                              00012690
      SUBROUTINE   DEFLTN                                                      00012700
C                                                                              00012710
      DIMENSION   R(200), D(200), EK(200), ENT(200), EMT(200), PFE(200),00012720
     1  PTH(200), PN(200), WFE(200), ALF(200), DNA(200), WTHD(200),           00012730
     2  RHOX(200), GAMA(200), E1(200), T(200), P(4,4,200), EM1(4,4),          00012740
     3  EM3(4,4), EM5(4), EM1N(4,4), EM3N(4,4), EM5N(4)                       00012750
C                                                                              00012760
      REAL        MASS, LM11,LM22,LM33, MM11,MM22,MM33, NM11,NM22,NM33,      00012770
     1            M0                                                         00012780
C                                                                              00012790
      EQUIVALENCE       (DA(1),  EN   ),(DA(2),   AO   ),(DA(3),  HO   ),00012800
     1(DA(4),   EO   ),(DA(5),  SIGO ),(DA(6),  ENFO ),(DA(7),  ENFL ),00012810
     2(DA(8),  POI   ),(DA(9), THETA ),(DA(10),  PIXI ),(DA(11), SPRL ),00012820
     3(DA(12),  UK   ),(DA(13),  VK  ),(DA(14),   WK  ),(DA(15),  EMK ),00012830
     4(DA(16),  TAU1 ),(DA(17),  ENT1),(DA(18),  PI1  ),(DA(19), TAU2 ),00012840
     5(DA(20),  ENT2 ),(DA(21),  PI2 ),(DA(22),  TAU3 ),(DA(23), ENT3 ),00012850
     6(DA(24),   PI3 ),(DA(25), MASS ),(DA(26),  CFE  ),(DA(27),  CZ  ),00012860
     7(DA(28),  SKFE ),(DA(29),  SKZ ),(DA(30),  SUM  ),(DA(31),  EN1 ),00012870
     8(DA(32),  DEL  ),(DA(36),RESTRT)                                        00012880
      EQUIVALENCE       (DA(40),  R   ),(DA(240), WTHD ),(DA(440), WFE ),00012890
     1(DA(640), GAMA ),(DA(840), RHOX),(DA(1040),  D  ),(DA(1240), EK ),00012900
     2(DA(1440),  E1 ),(DA(1640), ALF),(DA(1840), DNA ),(DA(2040),  T ),00012910
     3(DA(2240), ENT ),(DA(2440), EMT),(DA(2640),  PN ),(DA(2840), PFE),00012920
     4(DA(3040), PTH ),(DA(3240), DZ0),(DA(3440), VZ0 ),(DA(3640), AZ0),00012930
     5(DA(3840), DF0 ),(DA(4040), VF0),(DA(4240), AF0 ),(DA(4440), EM1),00012940
     6(DA(4456), EM3 ),(DA(4472), EM5),(DA(4476), EM1N),(DA(4492),EM3N),00012950
     7(DA(4508), EM5N)                                                        00012960
C                                                                              00012970
      COMMON   DA(4511), EM2(4,4), EM4(4,4), EM6(4), S1, S2, ELAM2,          00012980
     1  Z(4,200), X(4,200), A2(4,4), B2(4,4), C2(4,4), G2(4), E(4,4),        00012990
     2  F(4,4), GA(4,4), A(4,4), B(4,4), C(4,4), G(4), EC(4), DEL2,          00013000
     3  SL1, SL2, N, NTH, NTPR, NTPW, I, K, L,                               00013010
     4  S77, S78, BTA11, BTA33, M0(200), OMG2(200), ZP(3,200),               00013020
     5  Z2P(3,200), Z3P(3,200), TIME, TDEL, PRNT, ENF, PRI, JT, NJT, V1      00013030
```

```
C
C
      N2  =  SPRL
      DO   300   I = 1,N
      WTH  =  WTHD(I)
      GAM  =  GAMA(I)
      RHO  =  RHOX(I)
      S4   =  ELAM2 * EK(I) * S1
      S6   =  3. * WFE(I) - WTH
      S7  =  3. * WTH - WFE(I)
      S80  =  -4. * OMG2(I)
      S79  =  -5. * OMG2(I)
      LM11  =  S79  +  6. * BTA11
      LM22  =  S79
      LM33  =  S79  +  6. * BTA33
      MM11  =  -(S80  +  3. * BTA11)
      MM22  =  - S80
      MM33  =  -(S80  +  3. * BTA33)
      NM11  =  -OMG2(I)  +  .66666667 * BTA11
      NM22  =  -OMG2(I)
      NM33  =  -OMG2(I)  +  .66666667 * BTA33
      IF(I - 1)100, 2,100
    2 IF(EN1 .GE. 2.)  GO TO 95
C                                                   I = 1, OPEN APEX
      BP    =  (-D(3) + 4.*D(2) - 3.*D) /DEL2
      WFEP  =  (-WFE(3) + 4.*WFE(2) - 3.* WFE) /DEL2
      TTP   =  (-ENT(3) + 4.*ENT(2) - 3.*ENT) /DEL2
      DP    =  (-EK(3) + 4.*EK(2) - 3.*EK) /DEL2
      EMTP  =  (-EMT(3) + 4.*EMT(2) - 3.*EMT) /DEL2
      IBCX  =  0
      IF(EM1 .NE. 1.E+10) GO TO 20
      IBCX  =  EM1(2,1)
      IBM  =  4439
C                                           OPEN TOP OR BOTTOM BOUND
   20 S9  =  ENF /RHO
      S3  =  GAM * D(I)
      S5  =  D(I) /2. * S9
```

```
      S8  =  S4 * S9 /8. * S6 * S7                                    00013420
      S15  =  S4 * S9 /2.                                             00013430
      S9  =  S9 **2                                                   00013440
      S10  =  S4 *(S2 * GAM**2 * WFE(I) + S9/2. * S6)                 00013450
      S11  =  S4 * S5 /D(I)                                           00013460
      IF(IBCX .EQ. 0) GO TO 83                                        00013470
      DO  22     K = 1,32                                             00013480
      IX  =  IBM + K                                                  00013490
   22 DA(IX)  =  0.                                                   00013500
      GO  TO (31, 32, 33, 34, 35), IBCX                               00013510
C                                          FREE  BOUNDARY           00013520
   31 DA(IBM+1) =  1.                                                 00013530
      DA(IBM+6) =  1.                                                 00013540
      DA(IBM+11)=  1.                                                 00013550
      DA(IBM+32)=  1.                                                 00013560
      GO  TO  83                                                      00013570
C                                          ROLLER  BOUNDARY         00013580
   32 DA(IBM+1) =  1.                                                 00013590
      DA(IBM+22)=  1.                                                 00013600
      DA(IBM+27)=  1.                                                 00013610
      DA(IBM+32)=  1.                                                 00013620
      GO  TO  83                                                      00013630
C                                          FIXED OR CLAMPED  BOUNDARY 00013640
   33 DA(IBM+16)=  1.                                                 00013650
      DA(IBM+17)=  1.                                                 00013660
      DA(IBM+22)=  1.                                                 00013670
      DA(IBM+27)=  1.                                                 00013680
      GO  TO  83                                                      00013690
C                                          SIMPLY SUPPORTED (HINGED)  00013700
   34 DA(IBM+17)=  1.                                                 00013710
      DA(IBM+22)=  1.                                                 00013720
      DA(IBM+27)=  1.                                                 00013730
      DA(IBM+32)=  1.                                                 00013740
      GO  TO  83                                                      00013750
C                                          COMPLETE (CLOSED)          00013760
   35 DA(IBM+11)=  1.                                                 00013770
      DA(IBM+16)=  1.                                                 00013780
```

```
      DA(IBM+17)=  1.                                                    00013790
      DA(IBM+22)=  1.                                                    00013800
C                                                                        00013810
   83 DO   84     K = 1,4                                                00013820
      EM6(K)  =  0.                                                      00013830
      DO   84     L = 1,4                                                00013840
      EM2(K,L)  =  0.                                                    00013850
   84 EM4(K,L)  =  0.                                                    00013860
C                                                                        00013870
   85 EM2(1,1)  =  D(I) /DEL                                             00013880
      EM4(1,1)  =  POI * S3                                              00013890
      EM4(1,2)  =  POI * ENF / RHO    * D(I)                             00013900
      EM4(1,3)  =  D(I) * (WFE(I) + POI*WTH)                             00013910
      EM4(2,1)  =  -S5 * S1 - S8                                         00013920
      EM2(2,2)  =  D(I)*S1/2. + S4/8. * S7**2                            00013930
      EM4(2,2)  =  -  GAM   * EM2(2,2)                                   00013940
      EM2(2,2)  =  EM2(2,2) /DEL                                         00013950
      EM2(2,3)  =  S15 * S7                                              00013960
      EM4(2,3)  =  -  GAM   * EM2(2,3)                                   00013970
      EM2(2,3)  =  EM2(2,3) /DEL                                         00013980
      EM4(3,1)  =  - S10                                                 00013990
      EM2(3,2)  =  S11 * S7 /DEL                                         00014000
      EM4(3,2)  =  -S11 * GAM *(S7 + 2.*S2*WTH)                          00014010
      EM2(3,3)  =  S4 * (2.*S9 + S2 * GAM **2) /DEL                      00014020
      EM4(3,3)  =  -S4 *(3. + POI) *  GAM * S9                           00014030
      EM2(3,4)  =  ELAM2 /DEL                                            00014050
      EM4(3,4)  =  ELAM2 * S1 * GAM                                      00014060
      EM2(4,3)  =  - 1. /DEL                                             00014070
      EM4(4,1)  =  WFE(I)                                                00014080
      EM6(1)  =  - ENT(I)                                                00014090
      EM6(3)  =  ELAM2 *  GAM   * S1 * EMT(I)                            00014100
      DO  90      K = 1,4                                                00014110
      DO  90      L = 1,4                                                00014120
   90 EM2(K,L)  =  - EM2(K,L) /2.                                        00014130
      GO  TO  121                                                        00014140
C                                          TOP BOUNDARY, CLOSED          00014150
   95 IF(RESTRT .NE. 0.) GO TO 94                                        00014160
```

```
      IF(TIME .NE. TDEL) GO TO 97                                        00014170
   94 DO   96     K = 1,4                                                00014180
      DO   96     L = 1,4                                                00014190
      EM1(K,L)  =  EM2(K,L)                                              00014200
   96 EM3(K,L)  =  EM4(K,L)                                              00014210
      RESTRT  =  0.                                                      00014220
   97 DO   98     K = 1,4                                                00014230
      G2(K)  =  0.                                                       00014240
      DO   98     L = 1,4                                                00014250
      A2(K,L)  =  2. * EM1(K,L)                                          00014260
      C2(K,L)  =  - .25 * A2(K,L)                                        00014270
   98 EM1(K,L) =  1.5 * EM1(K,L)                                         00014280
      CALL MSU  (4,4, EM3,EM1,B2)                                        00014290
      GO TO   300                                                        00014300
  100 IF(I - N) 102,101,102                                              00014310
  101 BP  =  (D(N-2) - 4.*D(N-1) + 3.*D(N)) /DEL2                        00014320
      WFEP  =  (WFE(N-2) - 4.*WFE(N-1) + 3.*WFE(N)) /DEL2                00014330
      DP  =  (EK(N-2) - 4.*EK(N-1) + 3.*EK(N)) /DEL2                     00014340
      TTP  =  (ENT(N-2) - 4.*ENT(N-1) + 3.*ENT(N)) /DEL2                 00014350
      EMTP  =  (EMT(N-2) - 4.*EMT(N-1) + 3.*EMT(N)) /DEL2                00014360
      IBCX  =  0                                                         00014370
      IF(EM1N .NE. 1.E+10) GO TO 20                                      00014380
      IBCX  =  EM1N(2,1)                                                 00014390
      IBM  =  4475                                                       00014400
      GO  TO  20                                                         00014410
C                                                                        00014420
  102 BP  =  (D(I+1) - D(I-1)) /DEL2                                     00014430
      WFEP  =  (WFE(I+1) - WFE(I-1)) /DEL2                               00014440
      DP  =  (EK(I+1) - EK(I-1)) /DEL2                                   00014450
      TTP  =  (ENT(I+1) - ENT(I-1)) /DEL2                                00014460
      EMTP  =  (EMT(I+1) - EMT(I-1)) /DEL2                               00014470
C                                                ALL EXCEPT CLOSED APEX  00014480
  120 S3  =  GAM * D(I)                                                  00014490
      S5  =  D(I) /2. * ENF /RHO                                         00014500
      S8  =  S4 * ENF /8. /RHO * S6 * S7                                 00014510
      S9  =  (ENF /RHO) **2                                              00014520
      S10 =  S4 * (S2 * GAM**2 * WFE(I) + S9/2. * S6)                    00014530
```

```
      S11 =  S4 * S5 /D(I)                                                  00014540
C                                                                           00014550
  121 DO  125     K = 1,4                                                   00014560
      DO  125     L = 1,4                                                   00014570
  125 E(K,L)  =  0.                                                         00014580
      E(1,1)  =  D(I) /DEL                                                  00014590
      F(1,1)  =  S3 + BP                                                    00014600
      S12  =  WTH * WFE(I)                                                  00014610
      GAM2  =    GAM **2                                                    00014620
      GA(1,1)  =  POI * BP * GAM - D(I)*(POI*S12 + GAM2 + S1*S9 /2.)        00014630
     1  - S4 *(S2*GAM2*WFE(I)**2 + S6**2 *S9 /8.)                          00014640
      F(1,2)  =  S2 * S5 + S8                                               00014650
      GA(1,2)  =  POI*ENF/ RHO * BP - (3. - POI)*S5*GAM    - S11*2.         00014660
     1 * GAM   *(S6*S7/8. + S2*S12)                                         00014670
      F(1,3)  =  D(I)*(WFE(I) + POI*WTH) + S10                              00014680
      GA(1,3)  =  D(I)*(WFEP +   GAM *(WFE(I)-WTH))+ BP*(WFE(I) + POI*      00014690
     1 WTH) - S4*S9 * GAM  *(S6/2. + S2*WFE(I))                             00014700
      F(1,4)  =  ELAM2 * WFE(I)                                             00014710
      GA(1,4)  =  F(1,4) * S1 * GAM                                         00014720
      F(2,1)  =  - F(1,2)                                                   00014730
      GA(2,1)  =  -S5*GAM *(3.-POI) - S1*ENF/2. * BP /RHO + S11 * 2.        00014740
     1 *( -S2 * GAM *S12 +   GAM /8. *(6.*S12 - 7.*WFE(I)**2 - 3.*WTH       00014750
     2 **2) - WFEP/4. *(5.*WTH - 3.*WFE(I)) ) - S11*DP/EK(I)/4.*S6*S7       00014760
      E(2,2)  = (D(I)/2.*S1 + S4/8. * S7**2) /DEL                           00014770
      F(2,2)  =  S1/2. *( GAM * D(I) + BP) - S4/8.*S7 *(2.*WFEP - GAM       00014780
     1 *(5.*WFE(I) - 3.*WTH)) + ELAM2/8.*DP*S1 *S7**2                       00014790
      GA(2,2)  =  - GAM * F(2,2) + D(I) *(S1/2.*S12 - S9) - S4 *(S2*S9      00014800
     1 *WTH**2 - S12/8. * S7**2)                                            00014810
      E(2,3)  =  S11 * S7 /DEL                                              00014820
      F(2,3)  =  S11 *(2.*S2* GAM  *WTH - WFEP + 3.* GAM  *(WFE(I) -        00014830
     1 WTH)) + S11/EK(I)*DP * S7                                            00014840
      GA(2,3)  =  - S5*2. *(WTH + POI*WFE(I)) + S4*S5 /D(I) *(GAM *         00014850
     1 WFEP - 2.*GAM2*WFE(I) - 2.*S2*S9*WTH + S7 *(GAM2 + S12)) - S11/      00014860
     2 EK(I)*DP *   GAM  * S7                                               00014870
      GA(2,4)  =  -POI * ELAM2 * WTH * ENF /RHO                             00014880
      F(2,4)  =  0.                                                         00014890
      F(3,1)  =  - F(1,3)                                                   00014900
```

```
      S13  =  WTH + POI*WFE(I)                                                  00014910
      GA(3,1)  =  -D(I)* GAM * S13 + ELAM2*EK(I)*S1 *( GAM * S2 *(GAM2          00014920
     1 *WFE(I) - GAM  * WFEP - WFE(I) *(S9 - 2.*S12)) + S9/2. *(GAM             00014930
     2 *(WFE(I) - WTH) - 3.*WFEP)) - ELAM2*DP*S1 *(S2*GAM2*WFE(I) + S9          00014940
     3 /2. * S6)                                                               00014950
      E(3,2)  =  E(2,3)                                                         00014960
      F(3,2)  =  S11 *( GAM   *( WFE(I)*3. -WTH*(5. + 2.*POI)) - WFEP)          00014970
     1 + S11*DP/EK(I) * S7                                                     00014980
      GA(3,2)  =  -D(I)*ENF /RHO * S13 + S11 *(2.*S2 *(S12*WTH - GAM2 *         00014990
     1 (WFE(I) - 2.*WTH) - S9*WTH) +  GAM * WFEP + 3.*GAM2*(WTH - WFE(I)       00015000
     2 ) + S12*S7) - S11*DP/EK(I) *( GAM   *(2.*S2*WTH + S7) )                  00015010
      E(3,3)  =  S4 *(2.*S9 + S2*GAM2) /DEL                                     00015020
      F(3,3)  = -S4*(S2*GAM *(2.*S12 + GAM2) + 2.*GAM * S9) + ELAM2             00015030
     1 *DP*S1 *(S2*GAM2 + 2.*S9)                                               00015040
      GA(3,3)  =  -D(I) *(WFE(I)**2 + 2.*POI*S12+WTH**2)+S4*S9*(S2*(S12-        00015050
     1 S9 + 2.*GAM2) + 2.*(GAM2 + S12)) - S1*S9*DP*ELAM2 *(3.+POI)*GAM          00015060
      E(3,4)  =  ELAM2 /DEL                                                     00015070
      F(3,4)  =  ELAM2 * GAM *(2. - POI)                                        00015080
      GA(3,4)  =  - ELAM2 * (S1*S12 + POI*S9)                                   00015090
      F(4,1)  =  EK(I) * WFE(I)                                                 00015100
      GA(4,1)  =  EK(I) *(WFEP + POI*GAM*WFE(I))                                00015110
      GA(4,2)  =  EK(I) * POI*ENF*WTH /RHO                                      00015120
      E(4,3)  =  -EK(I) /DEL                                                    00015130
      F(4,2)  =  0.                                                             00015140
      F(4,3)  =  -EK(I) * POI * GAM                                             00015150
      F(4,4)  =  0.                                                             00015160
      GA(4,3)  =  EK(I) * POI * S9                                              00015170
  140 GA(1,1)  =  GA(1,1) - S77 * SKFE                                          00015180
      GA(3,3)  =  GA(3,3) - S77 * SKZ                                           00015190
      IF(I .NE. N2) GO TO 142                                                   00015200
      S3  =  A0 /E0 * A0 /H0                                                    00015210
      GA(1,1)  =  GA(1,1) - UK * S3                                             00015220
      GA(2,2)  =  GA(2,2) - VK * S3                                             00015230
      GA(3,3)  =  GA(3,3) - WK * S3                                             00015240
      S3  =  S3 /A0 * EMK * WFE(I)                                              00015250
      F(1,3)  =  F(1,3) - S3                                                    00015260
      GA(1,1)  =  GA(1,1) + S3 * WFE(I)                                         00015270
```

```
142 GA(4,4)  =  - 1.                                                          00015280
    G (1)  =  (-PFE(I) + TTP - ELAM2 *S1*GAM*WFE(I)*EMT(I)) * DEL2            00015290
    G (2)  =  (-PTH(I) - ENF/RHO*(ENT(I)+ ELAM2*S1*WTH*EMT(I) ))*DEL2         00015300
    G (3)  =  (-PN(I) - (WFE(I) + WTH)*ENT(I) - ELAM2*S1 *(GAM*EMTP           00015310
   1 - EMT(I) * (S12 - S9) )) * DEL2                                          00015320
    G (4)  =  EMT(I) * DEL2                                                   00015330
    DO  150    K = 1,4                                                        00015340
    DO  150    L = 1,4                                                        00015350
150 E(K,L)  =  2. * E(K,L)                                                    00015360
    CALL MAD  (4,4,  E,F,A)                                                   00015370
    CALL MSU  (4,4,  E,F,C)                                                   00015380
    DO  160    K = 1,4                                                        00015390
    DO  160    L = 1,4                                                        00015400
    E(K,L)  =  - 2. * E(K,L)                                                  00015410
160 GA(K,L)  =  DEL2 * GA(K,L)                                                00015420
    CALL MAD  (4,4,  E,GA,B)                                                  00015430
    DO   162   K = 1,4                                                        00015440
    G(K)  =  G(K) * TDEL                                                      00015450
    DO   162   L = 1,4                                                        00015460
    A(K,L)  =  A(K,L) * TDEL                                                  00015470
    B(K,L)  =  B(K,L) * TDEL                                                  00015480
162 C(K,L)  =  C(K,L) * TDEL                                                  00015490
    IF(JT - 2) 163,164,165                                                    00015500
163 S79  = -6. * OMG2(I)                                                      00015510
    S80  =  6.                                                                00015520
    GO  TO  166                                                               00015530
164 LM11  =  S80 + 5.3333333 * BTA11                                          00015540
    LM22  =  S80                                                              00015550
    LM33  =  S80 + 5.3333333 * BTA33                                          00015560
165 S79  =  -2. * OMG2(I)                                                     00015570
    S80  =  11. /3.                                                           00015580
166 B(1,1)  =  B(1,1) + S79 + S80 * BTA11                                     00015590
    B(2,2)  =  B(2,2) + S79                                                   00015600
    B(3,3)  =  B(3,3) + S79 + S80 * BTA33                                     00015610
    G(1)    =  G(1) + LM11*ZP(1,I) + MM11*Z2P(1,I) + NM11*Z3P(1,I)            00015620
    G(2)    =  G(2) + LM22*ZP(2,I) + MM22*Z2P(2,I) + NM22*Z3P(2,I)            00015630
    G(3)    =  G(3) + LM33*ZP(3,I) + MM33*Z2P(3,I) + NM33*Z3P(3,I)            00015640
```

```
      IF(I - 2) 210,170,169                                              00015650
  169 IF(I - N) 185,200,185                                              00015660
C                                                    I  =  2           00015670
  170 CALL INV  (4, C, PI, IERR)                                         00015680
      CALL MMY  (4,4,4, B2,C,EM4)                                        00015690
      CALL MMY  (4,4,4, EM4,B,B2)                                        00015700
      CALL MSU  (4,4,  B2,A2,B2)                                         00015710
      CALL INV  (4, B2, PI, IERR)                                        00015720
      IF(EN1 - 2.) 176,172,172                                           00015730
  172 CALL MMY  (4,4,4, EM4,A,A2)                                        00015740
      CALL MSU  (4,4,  A2,C2,A2)                                         00015750
      CALL MMY  (4,4,4, B2,A2,P(1,1,2))                                  00015760
      GO  TO  178                                                        00015770
  176 CALL MMY  (4,4,4, B2,EM4,A2)                                       00015780
      CALL MMY  (4,4,4, A2,A,P(1,1,2))                                   00015790
  178 CALL MMY  (4,4,1, EM4,G,EM6)                                       00015800
      CALL MSU  (4,1,  EM6,G2,G2)                                        00015810
      CALL MMY  (4,4,1, B2,G2,X(1,2))                                    00015820
C                          I  =  2 **PRESERVE  A, B, C, G MATRICES     00015830
      DO  180    K = 1,4                                                 00015840
      G2(K)  =  G(K)                                                     00015850
      DO  180    L = 1,4                                                 00015860
      A2(K,L)  =  A(K,L)                                                 00015870
      B2(K,L)  =  B(K,L)                                                 00015880
  180 C2(K,L)  =  C(K,L)                                                 00015890
      GO TO   300                                                        00015900
  185 CALL MMY  (4,4,4, C,P(1,1,I-1),EM4)                                00015910
      CALL MSU  (4,4,  B,EM4,EM4)                                        00015920
      CALL INV  (4, EM4, PI, IERR)                                       00015930
      CALL MMY  (4,4,1, C,X(1,I-1),EM6)                                  00015940
      CALL MSU  (4,1,  G,EM6,EM6)                                        00015950
      IF(I - N) 190,220,190                                              00015960
  190 CALL MMY  (4,4,4, EM4,A,P(1,1,I))                                  00015970
      CALL MMY  (4,4,1, EM4,EM6,X(1,I))                                  00015980
      GO TO   300                                                        00015990
C                                                    I  =  N           00016000
  200 CALL INV  (4, A, PI, IERR)                                         00016010
```

```
  217 E(K,L)   =  0.                                                    00016400
      GO  TO  300                                                       00016410
  220 CALL MMY  (4,4,1, EM4,EM6,Z(1,N))                                 00016420
  300 CONTINUE                                                          00016430
C                                                   DEFLECTIONS       00016440
      DO   305   I = 1,N                                                00016450
      IZ  =  N - I                                                      00016460
      IF(IZ - 1) 304,310,304                                            00016470
  304 CALL MMY  (4,4,1, P(1,1,IZ),Z(1,IZ+1),EM6)                        00016480
  305 CALL MSU  (4,1,  X(1,IZ),EM6,Z(1,IZ))                             00016490
C                                                   I  =  1           00016500
  310 CALL MMY  (4,4,1, B2,Z(1,2),EM6)                                  00016510
      CALL MSU  (4,1,  G2,EM6,G2)                                       00016520
      CALL MMY  (4,4,1, A2,Z(1,3),EM6)                                  00016530
      CALL MSU  (4,1,  G2,EM6,G2)                                       00016540
      CALL MMY  (4,4,1, C2,G2,Z(1,1))                                   00016550
C                                                                       00016560
 1000 RETURN                                                            00016570
      END                                                               00016580
```

```
$IBFTC MSUB                                                          00002110
C      MATRIX SUBTRACT SUBROUTINE                  DECK NO. 8K-904   00002120
C                                                                    00002130
C  ARGUMENTS                                                         00002140
C      L  NO. OF ROWS                                                00002150
C      M  NO. OF COLS                                                00002160
C      A(I,J)   MRA                                                  00002170
C      B(I,J)   MSU                                                  00002180
C      C(I,J)   MSR                                                  00002190
       SUBROUTINE MSU(L,M,A,B,C)                                     00002200
       DIMENSION   A(4,4), B(4,4), C(4,4)                            00002210
       DO 30 I=1,L                                                   00002220
       DO 30 J=1,M                                                   00002230
    30 C(I,J)=A(I,J)-B(I,J)                                          00002240
       RETURN                                                        00002250
       END                                                           00002260
```

```
$IBFTC INVRS                                                          00016590
C      MATRIX INVERSION SUBROUTINE                    DECK NO. 8K-900 00016600
C                                                                     00016610
C           MODIFICATION OF F1,48444 BY D.J.HALLMAN,DEPT. 56,LA       00016620
C                                                                     00016630
C  ARGUMENTS                                                          00016640
C     IOM     INDICATOR OF ORDER (N) OF MATRIX A   COMPILED FOR 4 X 4 00016650
C     IERROR  INDICATOR OF ERROR RETURN       =1,NORMAL.   NOT=1,ERR 00016660
C                                                                     00016670
C  MATRICES                                                           00016680
C     A(I,J)  INPUT MATRIX                          N,N       I,J     00016690
C     LR(M)   MATRIX OF LOCATIONS OF MAX ROW        M,1               00016700
C     LC(M)   MATRIX OF LOCATIONS OF MAX COL        1,M               00016710
C                                                                     00016720
C  SUBSCRIPTS                                                         00016730
C     I       ROW OF A                                              00016740
C     J       COL OF A                                              00016750
C     MI      LOCATION OF PIVOT BEFORE INTERCHANGE,ROW OF MAX       00016760
C     MJ      LOCATION OF PIVOT BEFORE INTERCHANGE,COL OF MAX       00016770
C     M       LOCATION OF PIVOT,ROW AND COL                         00016780
C     N       ORDER OF MATRIX                                       00016790
C                                                                     00016800
C  VARIABLES                                                          00016810
C     P       PIVOT ELEMENT,MAX ELEMENT BEFORE INTERCHANGE          00016820
C     PI      PI PRODUCT OF P(M) =VALUE OF DETERMINANT              00016830
C                                                                     00016840
C  TEMPORARY                                                          00016850
C     TEMP    INTERCHANGE AND REORDERING OF ELEMENTS OF A           00016860
C                                                                     00016870
C              *          *          *          *          *         00016880
C                                                                     00016890
      SUBROUTINE INV(IOM,A,PI,IERROR)                                 00016900
      DIMENSION   A(4,4), LR(4), LC(4)                                00016910
C     SETUP                                                         00016920
      M=1                                                             00016930
      N=IOM                                                           00016940
      PI=1.0                                                          00016950
```

```
C       SEARCH REDUCED ARRAY FOR MAXIMUM ELEMENT                        00016960
 1000   P=0.0                                                           00016970
        DO 1010 I=M,N                                                   00016980
        DO 1010 J=M,N                                                   00016990
        IF( ABS(P) - ABS( A(I,J) ) ) 1005,1010,1010                     00017000
 1005   P=A(I,J)                                                        00017010
        MI=I                                                            00017020
        MJ=J                                                            00017030
 1010   CONTINUE                                                        00017040
        LR(M)=MI                                                        00017050
        LC(M)=MJ                                                        00017060
C       INTERCHANGE MAXIMUM ROW WITH PIVOT ROW                          00017070
 2000   IF(MI-M)2100,2200,2100                                          00017080
 2100   DO 2110 J=1,N                                                   00017090
        TEMP=A(MI,J)                                                    00017100
        A(MI,J)=-A(M,J)                                                 00017120
 2110   A(M,J)=TEMP                                                     00017130
C       INTERCHANGE MAXIMUM COL WITH PIVOT COL                          00017140
 2200   IF(MJ-M)2205,3000,2205                                          00017150
 2205   DO 2210 I=1,N                                                   00017160
        TEMP=A(I,MJ)                                                    00017170
        A(I,MJ)=-A(I,M)                                                 00017180
 2210   A(I,M)=TEMP                                                     00017190
C       DIVIDE PIVOT COL BY PIVOT ELEMENT                               00017200
 3000   DO 3010 I=1,N                                                   00017210
        IF(I-M)3005,3010,3005                                           00017220
 3005   A(I,M)=-A(I,M)/P                                                00017230
 3010   CONTINUE                                                        00017240
C       ELIMINATE                                                       00017250
 4000   DO 4210 I=1,N                                                   00017260
        IF(I-M)4005,4210,4005                                           00017270
 4005   DO 4110 J=1,N                                                   00017280
        IF(J-M)4105,4110,4105                                           00017290
 4105   A(I,J)=A(I,M)*A(M,J)+A(I,J)                                     00017300
 4110   CONTINUE                                                        00017310
 4210   CONTINUE                                                        00017320
C       DIVIDE PIVOT ROW BY PIVOT ELEMENT                               00017330
```

```
 5000 DO 5010 J=1,N                                              00017340
      IF(J-M)5005,5010,5005                                      00017350
 5005 A(M,J)=A(M,J)/P                                            00017360
 5010 CONTINUE                                                   00017370
C     FORM DETERMINANT                                           00017380
      PI=P*PI                                                    00017390
      A(M,M)=1.0/P                                               00017400
      M=M+1                                                      00017410
      IF(M-N)1000,5020,5999                                      00017420
 5020 P=A(M,M)                                                   00017430
      GO TO 3000                                                 00017440
 5999 M=N-1                                                      00017450
 6000 MI=LC(M)                                                   00017460
      MJ=LR(M)                                                   00017470
C     RE-ORDER ROWS OF INVERSE                                   00017480
      IF(MI-M)6005,6200,6005                                     00017490
 6005 DO 6010 J=1,N                                              00017500
      TEMP=A(M,J)                                                00017510
      A(M,J)=-A(MI,J)                                            00017520
 6010 A(MI,J)=TEMP                                               00017530
C     RE ORDER COLS OF INVERSE                                   00017540
 6200 IF(MJ-M)6205,7000,6205                                     00017550
 6205 DO 6210 I=1,N                                              00017560
      TEMP=A(I,M)                                                00017570
      A(I,M)=-A(I,MJ)                                            00017580
 6210 A(I,MJ)=TEMP                                               00017590
 7000 M=M-1                                                      00017600
      IF(M)9002,9001,6000                                        00017610
 9001 IERROR=1                                                   00017620
      GO TO 9999                                                 00017630
C     M IS LESS THAN ZERO                                        00017640
 9002 IERROR=2                                                   00017650
 9999 RETURN                                                     00017660
           END                                                   00017670
```

```
$IBFTC WHERE                                                                    00017690
C     6J-157DR                                  DETERMINES PROGRAM FLOW         00017700
C                                                                               00017710
      SUBROUTINE   PATH                                                         00017720
C                                                                               00017730
      DIMENSION    ZDOT(3,200), Z2DOT(3,200), PFE(200), PN(200)                 00017740
C                                                                               00017750
      REAL         MASS, LM11,LM22,LM33, MM11,MM22,MM33, NM11,NM22,NM33,       00017760
     1             MO                                                         00017770
      EQUIVALENCE       (DA(1),  EN   ),(DA(2),   AO   ),(DA(3),   HO   ),00017780
     1(DA(4),   EO   ),(DA(5),  SIGO ),(DA(6),  ENFO ),(DA(7),  ENFL ),00017790
     2(DA(8),   POI  ),(DA(9), THETA ),(DA(10),  PIXI ),(DA(11), SPRL ),00017800
     3(DA(12),  UK   ),(DA(13),  VK  ),(DA(14),   WK  ),(DA(15),  EMK ),00017810
     4(DA(16),  TAU1 ),(DA(17),  ENT1),(DA(18),  PI1  ),(DA(19), TAU2 ),00017820
     5(DA(20),  ENT2 ),(DA(21),  PI2 ),(DA(22),  TAU3 ),(DA(23), ENT3 ),00017830
     6(DA(24),  PI3  ),(DA(25), MASS ),(DA(26),  CFE  ),(DA(27),  CZ  ),00017840
     7(DA(28),  SKFE ),(DA(29),  SKZ ),(DA(30),  SUM  ),(DA(31),  EN1 ),00017850
     8(DA(32),  DEL  ),(DA(39),  DRW )                                  00017860
      EQUIVALENCE       (DA(40),  R   ),(DA(240), WTHD ),(DA(440), WFE ),00017870
     1(DA(640), GAMA ),(DA(840), RHOX),(DA(1040),  D  ),(DA(1240), EK ),00017880
     2(DA(1440),  E1 ),(DA(1640), ALF),(DA(1840), DNA ),(DA(2040),  T ),00017890
     3(DA(2240), ENT ),(DA(2440), EMT),(DA(2640),  PN ),(DA(2840), PFE),00017900
     4(DA(3040), PTH ),(DA(3240),ZDOT),(DA(3440), VZO ),(DA(3640), AZO),00017910
     5(DA(3840),Z2DOT),(DA(4040), VFO),(DA(4240), AFO ),(DA(4440), EM1),00017920
     6(DA(4456), EM3 ),(DA(4472), EM5),(DA(4476), EM1N),(DA(4492),EM3N),00017930
     7(DA(4508), EM5N)                                                  00017940
C                                                                               00017950
      COMMON   DA(4511), EM2(4,4), EM4(4,4), EM6(4), S1, S2, ELAM2,             00017960
     1  Z(4,200), X(4,200), A2(4,4), B2(4,4), C2(4,4), G2(4), E(4,4),           00017970
     2  F(4,4), GA(4,4), A(4,4), B(4,4), C(4,4), G(4), EC(4), DEL2,             00017980
     3  SL1, SL2, N, NTH, NTPR, NTPW, I, K, L,                                  00017990
     4  S77, S78, BTA11, BTA33, MO(200), OMG2(200), ZP(3,200),                  00018000
     5  Z2P(3,200), Z3P(3,200), TIMX, TDEL, PRNT, ENF, PRI, JT, NJT             00018010
C                                                                               00018020
      IPRNT  =  PRNT                                                            00018030
      SL1  =  0.                                                                00018040
      IF(IPRNT .EQ. JT) GO TO 90                                                00018050
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      IF(JT .EQ. NJT)  GO TO  90                                        00018060
      SL1  =  1.                                                        00018070
      IF(DRW .EQ. 0.)  GO TO 50                                         00018080
      SL1  =  -1.                                                       00018090
      GO  TO  90                                                        00018100
C                                                                       00018110
   50 JT  =  JT + 1                                                     00018120
      DO  60      I = 1,N                                               00018130
      DO  60      J = 1,3                                               00018140
      Z3P(J,I)  =  Z2P(J,I)                                             00018150
      Z2P(J,I)  =  ZP(J,I)                                              00018160
   60 ZP(J,I)   =  Z(J,I)                                               00018170
C                                                                       00018180
   80 RETURN                                                            00018190
C                                  COMPUTE VELOCITIES, ACCELER.         00018200
   90 S3  =  11.                                                        00018210
      S4  =  18.                                                        00018220
      S5  =   2.                                                        00018230
      S6  =   5.                                                        00018240
      S9=9.                                                             00018250
      S10=2.                                                            00018260
      S11=4.                                                            00018270
      S12=1.                                                            00018280
      IF(JT - 2) 100,110,120                                            00018290
  100 S3=6.                                                             00018300
      S4=6.                                                             00018310
      S9=0.                                                             00018320
      S10=0.                                                            00018330
      S5=0.                                                             00018340
      S6=0.                                                             00018350
      S11=0.                                                            00018360
      S12=0.                                                            00018370
      GO  TO  120                                                       00018380
  110 S3=6.                                                             00018390
      S4=6.                                                             00018400
      S9=0.                                                             00018410
      S10=0.                                                            00018420
```

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      S5=1.                                                              00018430
      S6=2.                                                              00018440
      S11=1.                                                             00018450
      S12=0.                                                             00018460
  120 S7  =  6. * TDEL                                                   00018470
      TDEL2  =  TDEL **2                                                 00018480
      DO   150   L = 1,N                                                 00018490
      DO   150   K = 1,3                                                 00018500
      ZDOT(K,L)  =  (S3 * Z(K,L) - S4 * ZP(K,L) + S9 * Z2P(K,L) -        00018510
     1               S10* Z3P(K,L)) /S7                                  00018520
  150 Z2DOT(K,L)  =  (S5 * Z(K,L) - S6 * ZP(K,L) + S11* Z2P(K,L) -       00018530
     1           S12* Z3P(K,L)) /TDEL2                                   00018540
      IF(JT.GT.1) GO TO 170                                              00018550
      DO 160 L=1,N                                                       00018560
      Z2DOT(1,L)= ZDOT(1,L)         /TDEL                                00018570
      Z2DOT(2,L)=0.                                                      00018580
  160 Z2DOT(3,L)= ZDOT(3,L)         /TDEL                                00018590
  170 CONTINUE                                                           00018600
C                                                                        00018610
      IF(SL1 .LT. 0.)  GO TO 300                                         00018620
      IF(JT .EQ. NJT)  GO TO 200                                         00018630
      PRNT  =  PRNT + PRI                                                00018640
      GO  TO  50                                                         00018650
C                                          SET UP NEW INTERVAL           00018660
  200 IF(TAU1 + TAU2 - TIMX .LE. 1.E-8)  GO TO 210                       00018670
C                                                        SECOND          00018680
      TDEL  =  TAU2 /ENT2                                                00018690
      PRNT  =  PI2                                                       00018700
      NJT   =  ENT2                                                      00018710
      PRI   =  PI2                                                       00018720
      TIMX  =  TAU1                                                      00018730
      GO  TO  220                                                        00018740
C                                                          THIRD         00018750
  210 IF(TAU1 + TAU2 + TAU3 - TIMX .LE. 1.E-8)  GO TO 50                 00018760
      TDEL  =  TAU3 /ENT3                                                00018770
      PRNT  =  PI3                                                       00018780
      NJT   =  ENT3                                                      00018790
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      PRI    =  PI3                                                    00018800
      TIMX   =  TAU2 + TAU1                                            00018810
C                                                                      00018820
  220 JT   =  1                                                        00018830
      TDEL2  =  TDEL **2                                               00018840
      DO    250    K = 1,3                                           00018850
      DO    250    I = 1,N                                           00018860
      IF(K - 2) 231,232,233                                          00018870
  231 S8   =  PFE(I) /MO(I)                                          00018880
      GO  TO  240                                                    00018890
  232 S8   =  0.                                                     00018900
      GO  TO  240                                                    00018910
  233 S8   =  PN(I) /MO(I)                                           00018920
  240 ZP(K,I)  =  Z(K,I)                                             00018930
      Z2P(K,L)  =  S8 * TDEL2 + 2. * Z(K,L)                          00018940
  250 Z3P(K,L)  =  6. *(S8*TDEL2 + ZDOT(K,L)*TDEL) + 9.*Z(K,L)       00018950
      GO  TO  80                                                     00018960
C                                                                      00018970
  300 WRITE (6,310) ((ZDOT(K,L), K=1,3), (Z2DOT(K,L), K=1,3), L=1,N)  00018980
  310 FORMAT(///10X,28HVELOCITIES AND ACCELERATIONS // 15X,6HVEL(U),  00018990
     1  10X,6HVEL(V), 10X,6HVEL(W), 10X,6HACC(U), 10X,6HACC(V), 10X,  00019000
     2  6HACC(W) // (6X, 1P6E16.3) )                                  00019010
C                                                                      00019020
      GO  TO  50                                                     00019030
      END                                                            00019040
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$IBFTC 157DR2                                                                   00019250
C     6J-157DR                                  COMPUTES INTERNAL LOADS         00019260
C                                                                               00019270
      SUBROUTINE  INTLDS                                                        00019280
C                                                                               00019290
      DIMENSION   R(200), D(200), EK(200), ENT(200), EMT(200), PFE(200),00019300
     1  PTH(200), PN(200), WFE(200), ALF(200), DNA(200), WTHD(200),      00019310
     2  RHOX(200), GAMA(200), E1(200), T(200), FETH(200)                 00019320
      DIMENSION  USUM(200), VSUM(200), WSUM(200), EMFE(200), EMTH(200), 00019330
     1  EMFT(200), ENFE(200), ENTH(200), ENFT(200), SIGFE(200),          00019340
     2  SIGTH(200), SIGFT(200), QFE(200), QTH(200)                       00019350
C                                                                               00019360
      REAL        MASS, LM11,LM22,LM33, MM11,MM22,MM33, NM11,NM22,NM33,  00019370
     1            MO                                                      00019380
C                                                                               00019390
      EQUIVALENCE       (DA(1),  EN   ),(DA(2),   AO   ),(DA(3),  HO   ),00019400
     1(DA(4),   EO   ),(DA(5),  SIGO ),(DA(6),  ENFO ),(DA(7),  ENFL ),00019410
     2(DA(8),  POI   ),(DA(9), THETA ),(DA(10),  PIXI ),(DA(11), SPRL ),00019420
     3(DA(12),  UK   ),(DA(13),  VK  ),(DA(14),   WK  ),(DA(15),  EMK ),00019430
     4(DA(16),  TAU1 ),(DA(17),  ENT1),(DA(18),  PI1  ),(DA(19), TAU2 ),00019440
     5(DA(20),  ENT2 ),(DA(21),  PI2 ),(DA(22),  TAU3 ),(DA(23), ENT3 ),00019450
     6(DA(24),  PI3  ),(DA(25), MASS ),(DA(26),  CFE  ),(DA(27),  CZ  ),00019460
     7(DA(28),  SKFE ),(DA(29),  SKZ ),(DA(30),  SUM  ),(DA(31),  ENI ),00019470
     8(DA(32),  DEL  )                                                  00019480
      EQUIVALENCE       (DA(40),  R   ),(DA(240), WTHD ),(DA(440), WFE ),00019490
     1(DA(640), GAMA ),(DA(840), RHOX),(DA(1040),  D  ),(DA(1240), EK ),00019500
     2(DA(1440),  E1 ),(DA(1640), ALF),(DA(1840), DNA ),(DA(2040),  T ),00019510
     3(DA(2240), ENT ),(DA(2440), EMT),(DA(2640),  PN ),(DA(2840), PFE),00019520
     4(DA(3040), PTH ),(DA(3240), DZO),(DA(3440), VZO ),(DA(3640), AZO),00019530
     5(DA(3840), DFO ),(DA(4040), VFO),(DA(4240), AFO ),(DA(4440), EM1),00019540
     6(DA(4456), EM3 ),(DA(4472), EM5),(DA(4476), EM1N),(DA(4492),EM3N),00019550
     7(DA(4508), EM5N)                                                  00019560
C                                                                               00019570
      COMMON   DA(4511), EM2(4,4), EM4(4,4), EM6(4), S1, S2, ELAM2,     00019580
     1  Z(4,200), X(4,200), A2(4,4), B2(4,4), C2(4,4), G2(4), E(4,4),   00019590
     2  F(4,4), GA(4,4), A(4,4), B(4,4), C(4,4), G(4), EC(4), DEL2,     00019600
     3  SL1, SL2, N, NTH, NTPR, NTPW, I, K, L,                          00019610
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     4  S77, S78, BTA11, BTA33, M0(200), OMG2(200), ZP(3,200),          00019620
     5  Z2P(3,200), Z3P(3,200), TIMX, TDEL, PRNT, ENF, PRI, JT, NJT, V1 00019630
      COMMON                                                           00019640
     1 USUM, VSUM, WSUM, EMFE, EMTH, EMFT, ENFE, ENTH, ENFT, SIGFE,    00019650
     2 SIGTH, SIGFT, QFE, QTH                                          00019660
C                                                                      00019670
C                                        COMPUTE INTERNAL LOADS        00019680
 490 S3   =  1. - POI **2                                              00019690
     S4   =  S1 /2.                                                   00019700
     S12  =  SIGO /EO /S3                                             00019710
     S20  =  (H0 /A0) **2                                             00019720
     IF(EN1 - 2.) 496,497,497                                         00019730
 496 L1   =  1                                                        00019740
     GO  TO  498                                                      00019750
 497 L1   =  2                                                        00019760
     WP   =  (-Z(3,3) + 4.*Z(3,2) - 3.*Z(3,1)) /DEL2                  00019770
     FETH(1)  =  ENF * WP + WTHD * Z(2,1)                             00019780
 498 DO   500   I = L1,N                                              00019790
 500 FETH(I)  =  ENF /RHOX(I) * Z(3,I) + WTHD(I) * Z(2,I)             00019800
 502 DO   1000  I = 1,N                                               00019810
     IF(I - 1)  520,504,520                                           00019820
 504 IF(EN1 - 2.) 510,506,506                                         00019830
 506 ENFEX  =  D(1) *((S2*(Z(1,2) - Z(1,1)) + ENF*POI*(Z(2,2) - Z(2,1))00019840
    1 ) /DEL + WFE * S2 * Z(3,1)) - ENT                               00019850
     S6   =  2. - ENF **2                                             00019860
     ENTHX  =  2. * ENFEX /S6                                         00019870
     ENFTX  =  ENF * ENFEX /S6                                        00019880
     EMFTX  =  ENF * Z(4,1) /S6                                       00019890
     EMTHX  =  2.0 * Z(4,1) /S6                                       00019900
     GO TO   552                                                      00019910
C                                                      I = 1          00019920
 510 ROP = (-RHOX(3) + 4. * RHOX(2) - 3. * RHOX) /DEL2                00019930
     WP = (-Z(3,3)   + 4. * Z(3,2)  - 3. * Z(3,1)) /DEL2              00019940
     FETHP = (-FETH(3) + 4.*FETH(2) - 3. * FETH(1)) /DEL2             00019950
     VP = (-Z(2,3)   + 4. * Z(2,2)  - 3. * Z(2,1)) /DEL2              00019960
     UP = (-Z(1,3)   + 4. * Z(1,2)  - 3. * Z(1,1)) /DEL2              00019970
     EM6(4) = (-Z(4,3) + 4. * Z(4,2) - 3. * Z(4,1)) /DEL2             00019980
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  515 EM6(2)  =  VP                                                    00019990
      EM6(3)  =  WP                                                    00020000
      EM6(1)  =  UP                                                    00020010
      GO  TO  550                                                      00020020
  520 IF(I - N) 540,530,540                                            00020030
C                                                        I  =  N       00020040
  530 WP  =  (Z(3,N-2) - 4.*Z(3,N-1) + 3.*Z(3,N)) /DEL2                00020050
      FETHP  =  (FETH(N-2) - 4.*FETH(N-1) + 3.*FETH(N)) /DEL2          00020060
      VP  =  (Z(2,N-2) - 4.*Z(2,N-1) + 3.*Z(2,N)) /DEL2                00020070
      UP  =  (Z(1,N-2) - 4.*Z(1,N-1) + 3.*Z(1,N)) /DEL2                00020080
      EM6(4)  =  (Z(4,N-2) - 4.*Z(4,N-1) + 3.*Z(4,N)) /DEL2            00020090
      ROP = (RHOX(N-2) - 4.*RHOX(N-1) + 3.*RHOX(N)) /DEL2              00020100
      GO  TO  515                                                      00020110
C                                                  I NOT 1 NOR N       00020120
  540 WP  =  (Z(3,I+1) - Z(3,I-1)) /DEL2                               00020130
      FETHP  = (FETH(I+1) - FETH(I-1)) /DEL2                           00020140
      ROP  =  (RHOX(I+1) - RHOX(I-1)) /DEL2                            00020150
      VP  =  (Z(2,I+1) - Z(2,I-1)) /DEL2                               00020160
      UP  =  (Z(1,I+1) - Z(1,I-1)) /DEL2                               00020170
      EM6(4)  =  (Z(4,I+1) - Z(4,I-1)) /DEL2                           00020180
      GO  TO  515                                                      00020190
  550 FEFE  =  - WP + WFE(I) * Z(1,I)                                  00020200
      X(3,I)  =  FEFE                                                  00020210
      S11  =  ENF /RHOX(I)                                             00020220
      S5  =  S11*Z(2,I) + GAMA(I)*Z(1,I) + WTHD(I)*Z(3,I)              00020230
      S6  =  UP + WFE(I)*Z(3,I)                                        00020240
      EKTH  =  S11 * FETH(I) + GAMA(I) * FEFE                          00020250
      ENFEX  =  D(I) *(S6 + POI*S5) - ENT(I)                           00020260
      EMTHX  =  POI*Z(4,I) + EK(I)*S3*EKTH - S1*EMT(I)                 00020270
      ENTHX  =  D(I) *(S5 + POI*S6) - ENT(I)                           00020280
      ENFTX  =  D(I)*S4 *(VP - GAMA(I)*Z(2,I) - S11*Z(1,I))            00020290
      EMFTX  =  EK(I)*S4 *(-S11*FEFE + FETHP - GAMA(I)*FETH(I) + .5 *  00020300
     1 (WTHD(I) - WFE(I)) * (S11*Z(1,I) + VP + GAMA(I)*Z(2,I)) )       00020310
  552 S15  =  DNA(I) /A0                                               00020320
      S7  =  S15 * S3                                                  00020330
      S9  =  E1(I) * ALF(I) * T(I) /S1                                 00020340
      S8  =  S12 * E1(I)                                               00020350
```

```
      S10  =  S8 * S15 * EMT(I) /EK(I)                                  00020360
      IF(RHOX(I)) 551,555,551                                           00020370
  551 IF(I - 1) 554,553,554                                             00020380
  553 S13  =  2.                                                        00020390
      GO  TO  559                                                       00020400
  554 S13  =  1.                                                        00020410
      GO  TO  559                                                       00020420
  555 S6  =  S15 /EK(1) *(Z(4,1) + EMT(1))                              00020430
      S11  =  (Z(2,2) - Z(2,1)) /DEL                                    00020440
      S13  =  (Z(1,2) - Z(1,1)) /DEL                                    00020450
      IF(ENF - 1.) 556,557,558                                          00020460
  556 G(1)  =  S8 *(S2 *(S13 + WFE * Z(3,1)) + S6) - S9                 00020470
      G(2)  =  G(1)                                                     00020480
      G(3)  =  0.                                                       00020490
      GO  TO  578                                                       00020500
  557 G(1)  =  S8 *(POI * S11 + S6) - S9                                00020510
      G(2)  =  S8 *(S11 + S6 /POI) - S9                                 00020520
      G(3)  =  0.                                                       00020530
      GO  TO  578                                                       00020540
  558 G(1)  =  S8 *(S2*S13 + POI*ENF*S11 + S6) - S9                     00020550
      G(2)  =  S8 *(S2*S13 + ENF*S11 + S6 /POI) - S9                    00020560
      G(3)  =  S8*ENF *(S15 /(2.-ENF**2) * Z(4,1) /EK(1) - S13 * S1/2.) 00020570
      GO  TO  578                                                       00020580
  559 S6  =  S4 * (S15/2. *(3. * WTHD(I) - WFE(I)) + 1.)                00020590
      QFEX  =  S20 *(GAMA(I) *(Z(4,I) - EMTHX) + EM6(4) + ENF/RHOX(I) * 00020600
     1 EMFTX * S13)                                                     00020610
  565 DO   560   K = 1,3                                                00020620
      DO   560  L = 1,4                                                 00020630
  560 EM4(K,L)  =  0.                                                   00020640
      EM4(1,1)  =  S8                                                   00020650
      EM4(2,1)  =  POI * S8                                             00020660
      EM4(2,3)  =  - S7  * GAMA(I) * S8                                 00020670
      EM4(3,2)  =  S6 * S8                                              00020680
      EM4(3,3)  =  S15 * S1 * S11 * S8                                  00020690
      G2(1)  =  S10 - S9                                                00020700
      G2(2)  =  POI * S10 - S9                                          00020710
      G2(3)  =  0.                                                      00020720
```

```
      B2(1,1)  =  POI * GAMA(I) * S8                                    00020730
      B2(1,2)  =  POI * S11 * S8                                        00020740
      B2(1,3)  = (WFE(I) + POI * WTHD(I) ) * S8                         00020750
      B2(1,4)  =  S15 /EK(I) * S8                                       00020760
      B2(2,1)  =  GAMA(I) * (1. + S7*WFE(I)) * S8                       00020770
      B2(2,2)  =  S8 * S11 *(1. + S7*WTHD(I))                           00020780
      B2(2,3)  =  S8 *(WTHD(I) + POI*WFE(I) + S7 * S11 **2)             00020790
      B2(2,4)  =  B2(1,4) * POI                                         00020800
      B2(3,1)  =  S8 * S4 * S11 *(S15/2. *(WTHD(I) - 3.*WFE(I)) - 1.)   00020810
      B2(3,2)  =  - EM4(3,2) * GAMA(I)                                  00020820
      B2(3,3)  =  - S8 * S1 * S11 * S15 * GAMA(I)                       00020830
      B2(3,4)  =  0.                                                    00020840
      CALL MMY  (3,4,1,EM4,EM6,G)                                       00020850
      CALL MMY  (3,4,1,B2,Z(1,I),EC)                                    00020860
      CALL MAD  (3,1,G,EC,G)                                            00020870
      CALL MAD  (3,1,G,G2,G)                                            00020880
C                                    SAVE FOURIER COEFFICIENTS          00020890
  578 USUM(I)  =  Z(1,I)                                                00020900
      VSUM(I)  =  Z(2,I)                                                00020910
      WSUM(I)  =  Z(3,I)                                                00020920
      EMFE(I)  =  Z(4,I)                                                00020930
      EMTH(I)  =  EMTHX                                                 00020940
      EMFT(I)  =  EMFTX                                                 00020950
      ENFE(I)  =  ENFEX                                                 00020960
      ENTH(I)  =  ENTHX                                                 00020970
      ENFT(I)  =  ENFTX                                                 00020980
      SIGFE(I) =  G(1)                                                  00020990
      SIGTH(I) =  G(2)                                                  00021000
      SIGFT(I) =  G(3)                                                  00021010
      QFE(I)   =  QFEX                                                  00021020
      X(1,I)   =  2. * ROP * EMFTX - ENF * EMTHX                        00021030
      X(2,I)   =  EMFTX                                                 00021040
 1000 CONTINUE                                                          00021050
      DO   599   I = 1,N                                                00021060
      IF(I .NE. 1)  GO TO 593                                           00021070
      EMFTP  =  (EMFT(2) - EMFT(1)) /DEL                                00021080
      IF( RHOX(I) ) 596,592,596                                         00021090
```

```
C                                                    I = 1, CLOSED APEX     00021100
  592 EMFEP  =  (EMFE(2) - EMFE(1)) /DEL                                    00021110
      EMTHP  =  (EMTH(2) - EMTH(1)) /DEL                                    00021120
      QFE(1)  =  ELAM2 * (EMFEP + ENF * EMFTP)                              00021130
      QTH(1)  =  ELAM2 * (EMFTP - ENF * EMTHP)                              00021140
      GO TO  599                                                            00021150
  593 IF(I - N) 595,594,595                                                 00021160
  594 EMFTP  =  (EMFT(N) - EMFT(N-1)) /DEL                                  00021170
      GO  TO  596                                                           00021180
  595 EMFTP  =  (EMFT(I+1) - EMFT(I-1)) /DEL2                               00021190
  596 QTH(I)  =  ELAM2 /RHOX(I) *(X(1,I) + RHOX(I) * EMFTP)                 00021200
  599 CONTINUE                                                              00021210
  700 WRITE     (8)  (USUM(I), I = 1,2800)                                  00021230
      RETURN                                                                00021240
      END                                                                   00021250
```

```
$IBFTC FSUMS                                                                    00021270
C      6J-157DR                                    FOURIER SUMMING              00021280
C                                                                               00021290
       SUBROUTINE  SUMS                                                         00021300
C                                                                               00021310
       DIMENSION   R(200), D(200), EK(200), ENT(200), EMT(200), PFE(200),       00021320
      1  PTH(200), PN(200), WFE(200), ALF(200), DNA(200), WTHD(200),            00021330
      2  RHOX(200), GAMA(200), E1(200), T(200), FETH(200)                       00021340
       DIMENSION  USUM(200), VSUM(200), WSUM(200), EMFE(200), EMTH(200),        00021350
      1  EMFT(200), ENFE(200), ENTH(200), ENFT(200), SIGFE(200),                00021360
      2  SIGTH(200), SIGFT(200), QFE(200), QTH(200), SUMN(2800),                00021370
      3  ZDOT(3,200), Z2DOT(3,200)                                              00021380
C                                                                               00021390
       REAL        MASS, LM11,LM22,LM33, MM11,MM22,MM33, NM11,NM22,NM33,       00021400
      1            MO                                                         00021410
C                                                                               00021420
       EQUIVALENCE       (DA(1),  EN   ),(DA(2),   AO   ),(DA(3),  HO   ),00021430
      1(DA(4),   EO   ),(DA(5),  SIGO ),(DA(6),  ENFO ),(DA(7),  ENFL ),00021440
      2(DA(8),  POI   ),(DA(9), THETA ),(DA(10),  PIXI ),(DA(11), SPRL ),00021450
      3(DA(12),   UK  ),(DA(13),  VK  ),(DA(14),   WK  ),(DA(15),  EMK ),00021460
      4(DA(16),  TAU1 ),(DA(17),  ENT1),(DA(18),  PI1  ),(DA(19), TAU2 ),00021470
      5(DA(20),  ENT2 ),(DA(21),  PI2 ),(DA(22),  TAU3 ),(DA(23), ENT3 ),00021480
      6(DA(24),   PI3 ),(DA(25), MASS ),(DA(26),  CFE  ),(DA(27),  CZ  ),00021490
      7(DA(28),  SKFE ),(DA(29),  SKZ ),(DA(30),  SUM  ),(DA(31),  EN1 ),00021500
      8(DA(32),  DEL  ),(DA(39),  DRW )                                      00021510
       EQUIVALENCE       (DA(40),  R   ),(DA(240), WTHD ),(DA(440), WFE ),00021520
      1(DA(640), GAMA ),(DA(840), RHOX),(DA(1040),  D  ),(DA(1240), EK ),00021530
      2(DA(1440),  E1 ),(DA(1640), ALF),(DA(1840), DNA ),(DA(2040),  T ),00021540
      3(DA(2240), ENT ),(DA(2440), EMT),(DA(2640),  PN ),(DA(2840), PFE),00021550
      4(DA(3040), PTH ),(DA(3240),ZDOT),(DA(3440), VZO ),(DA(3640), AZO),00021560
      5(DA(3840),Z2DOT),(DA(4040), VFO),(DA(4240), AFO ),(DA(4440), EM1),00021570
      6(DA(4456), EM3 ),(DA(4472), EM5),(DA(4476), EM1N),(DA(4492),EM3N),00021580
      7(DA(4508), EM5N)                                                      00021590
C                                                                               00021600
       COMMON   DA(4511), EM2(4,4), EM4(4,4), EM6(4), S1, S2, ELAM2,            00021610
      1  Z(4,200), X(4,200), A2(4,4), B2(4,4), C2(4,4), G2(4), E(4,4),          00021620
      2  F(4,4), GA(4,4), A(4,4), B(4,4), C(4,4), G(4), EC(4), DEL2,            00021630
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     3  SL1, SL2, N, NTH, NTPR, NTPW, I, K, L,                                00021840
     4  S77, S78, BTA11, BTA33, MO(200), OMG2(200), ZP(3,200),                00021650
     5  Z2P(3,200), Z3P(3,200), TIMX, TDEL, PRNT, ENF, PRI, JT, NJT, V1       00021660
      COMMON                                                                 00021670
     1 USUM, VSUM, WSUM, EMFE, EMTH, EMFT, ENFE, ENTH, ENFT, SIGFE,          00021680
     2 SIGTH, SIGFT, QFE, QTH                                               00021690
C                                                                           00021700
  705 S5  =  ENF * THETA                                                    00021710
      COSNT  =  COS( S5 )                                                   00021720
      SINNT  =  SIN( S5 )                                                   00021730
  710 DO  720    I = 1,N                                                    00021740
      USUM(I)  =  USUM(I) * COSNT                                           00021750
      VSUM(I)  =  VSUM(I) * SINNT                                           00021760
      WSUM(I)  =  WSUM(I) * COSNT                                           00021770
      EMFE(I)  =  EMFE(I) * COSNT                                           00021780
      EMTH(I)  =  EMTH(I) * COSNT                                           00021790
      EMFT(I)  =  EMFT(I) * SINNT                                           00021800
      ENFE(I)  =  ENFE(I) * COSNT                                           00021810
      ENTH(I)  =  ENTH(I) * COSNT                                           00021820
      ENFT(I)  =  ENFT(I) * SINNT                                           00021830
      SIGFE(I) =  SIGFE(I) * COSNT                                          00021840
      SIGTH(I) =  SIGTH(I) * COSNT                                          00021850
      SIGFT(I) =  SIGFT(I) * SINNT                                          00021860
      QFE(I)   =  QFE(I) * COSNT                                            00021870
  720 QTH(I)   =  QTH(I) * SINNT                                            00021880
      IF( SUM ) 755,755,758                                                 00021890
C                                                                           00021900
  730 WRITE           (6, 733)  TIMX, (I, USUM(I), VSUM(I), WSUM(I),        00021910
     1 EMFE(I), EMTH(I), EMFT(I), QFE(I), QTH(I), I = 1,N)                  00021920
  733 FORMAT(1H1,28X, 39HDEFLECTIONS AND INTERNAL LOADS,  TIME =,1PE12.4    00021930
     1 /// 3X,1HI, 5X,4HU(I), 9X,4HV(I), 9X,4HW(I), 8X,6HM(PHI), 6X,       00021940
     2 8HM(THETA), 3X,12HM(PHI,THETA), 4X,6HQ(PHI), 6X,8HQ(THETA) //        00021950
     3 (I4, 8E13.4) )                                                       00021960
      WRITE           (6, 735) (I, ENFE(I), ENTH(I), ENFT(I), SIGFE(I),    00021970
     1 SIGTH(I), SIGFT(I),                          I = 1,N)                00021980
  735 FORMAT(1H1,2X,1HI, 4X,6HN(PHI), 6X,8HN(THETA), 3X,12HN(PHI,THETA),    00021990
     1 3X,8HSIG(PHI), 4X,10HSIG(THETA), 2X,13HSG(PHI,THETA) //              00022000
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     2 (I4, 1P6E13.4) )                                                    00022010
      WRITE (6,738) ((ZDOT(K,L), K=1,3), (Z2DOT(K,L), K=1,3), L=1,N)       00022020
  738 FORMAT(///10X,28HVELOCITIES AND ACCELERATIONS // 15X,6HVEL(U),       00022030
     1  10X,6HVEL(V), 10X,6HVEL(W), 10X,6HACC(U), 10X,6HACC(V), 10X,       00022040
     2  6HACC(W) // (6X, 1P6E16.3) )                                       00022050
C                                                                          00022060
  740 IF( SUM ) 880,860,750                                                00022070
  750 NTH  =  NTH - 1                                                      00022080
      IF( NTH ) 753,888,753                                                00022090
C                                                                          00022100
  753 READ  (NTPW) TIMX, THETA, (USUM(I), I = 1,2800)                      00022110
  755 S13  =  A0 * SIG0 /E0                                                00022120
      S14  =  SIG0 * H0 **3 /A0                                            00022130
      S16  =  SIG0 * H0                                                    00022140
      DO    756  I = 1,N                                                   00022150
      USUM(I)  =  S13 * USUM(I)                                            00022160
      VSUM(I)  =  S13 * VSUM(I)                                            00022170
      WSUM(I)  =  S13 * WSUM(I)                                            00022180
      EMFE(I)  =  S14 * EMFE(I)                                            00022190
      EMTH(I)  =  S14 * EMTH(I)                                            00022200
      EMFT(I)  =  S14 * EMFT(I)                                            00022210
      QFE(I)   =  S16 * QFE(I)                                             00022220
      QTH(I)   =  S16 * QTH(I)                                             00022230
      ENFE(I)  =  S16 * ENFE(I)                                            00022240
      ENTH(I)  =  S16 * ENTH(I)                                            00022250
  756 ENFT(I)  =  S16 * ENFT(I)                                            00022260
      GO  TO  730                                                          00022270
C                                                                          00022280
  758 IF( SL2 ) 810,820,810                                                00022290
  810 NTH  =  NTH + 1                                                      00022300
  815 WRITE (NTPW) TIMX, THETA, (USUM(I), I = 1,2800)                      00022310
      GO  TO  860                                                          00022320
C                                                                          00022330
  820 READ  (NTPR) TIMX, THETA, (USUM(I), I = 1,2800)                      00022340
      DO   830   I = 1,2800                                                00022350
  830 USUM(I)  =  USUM(I) + SUMN(I)                                        00022360
      GO  TO  815                                                          00022370
```

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  860 CALL  DECRD( DA )                                                  00022380
      IF( THETA ) 880,880,865                                            00022390
  865 REWIND  8                                                          00022400
      READ    (8)  (USUM(I), I = 1,2800)                                 00022410
      GO  TO  705                                                        00022420
  880 SL2  =  0.0                                                        00022430
      IF(TAU1 + TAU2 + TAU3 - TIMX .GT. 1.E-8)   GO TO 890               00022440
      REWIND  NTPW                                                       00022450
      IF(ENFL - ENF .LE. 1.E-2)  GO TO 900                               00022460
  887 NX  =  NTPR                                                        00022470
      NTPR  =  NTPW                                                      00022480
      NTPW  =  NX                                                        00022490
  888 SL1  =  1.                                                         00022500
C                                                                        00022510
  890 IF(DRW .NE. 0.)  SL1 = -2.                                         00022520
      RETURN                                                             00022530
C                                                                        00022540
  900 IF( SUM ) 888,888,753                                              00022550
      END                                                                00022560
```

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$IBFTC LNK6                                                          00022580
C       6J-148     ** LINK6                  PSEUDO  CRT  SUBROUTINE 00022590
C                                                                    00022600
        SUBROUTINE  PIX                                              00022610
C                                                                    00022620
        LO  =  0                                                     00022630
        RETURN                                                       00022640
        END                                                          00022650
```