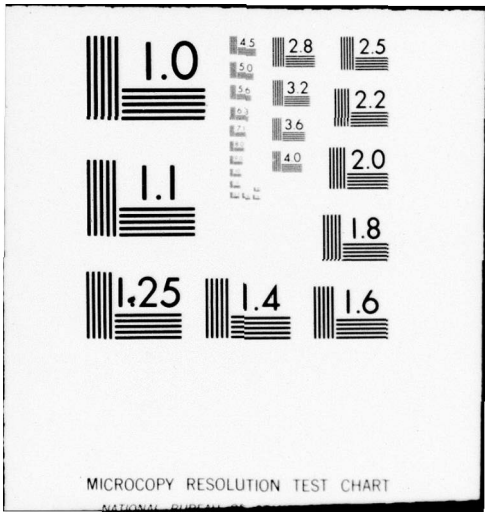
AD-A075 737 LOCKHEED-CALIFORNIA CO BURBANK F/G 13/12
GENERAL AVIATION AIRPLANE STRUCTURAL CRASHWORTHINESS PROGRAMMER--ETC(U)
JUN 79 W L LABARGE DOT-FA75WA-3707
UNCLASSIFIED LR-23683-REV FAA-RD-78-120-REV NL

1 OF 2
ADA 075737




1.0
1.1
1.25
1.4
1.6
1.8
2.0
2.2
2.5
2.8
3.2
3.6
4.0
4.5
5.0
5.6
MICROCOPY RESOLUTION TEST CHART

AD A075737

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FEDERAL AVIATION ADMINISTRATION
Systems Research & Development Service
Washington, D.C. 20590

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16. ABSTRACT

This document contains a description of program KRASH as modified under contract DOT-FA75WA-3707. Included in the Programmer's Manual are the following sections:

- Program KRASH System Requirements
- Input Data Deck
- Demonstration Problem

This Programmer's Manual is one of a series of operational documents for program KRASH. In this manual, pertinent information is supplied which will facilitate bringing the program to an operational status on the user's computer system. This manual has been established in such a manner that it can be updated as more data becomes available. The subject material contained within each section can be expanded or revised, as necessary, without affecting the other sections. Each section contains its own numbering system which facilitates the task of updating the document.

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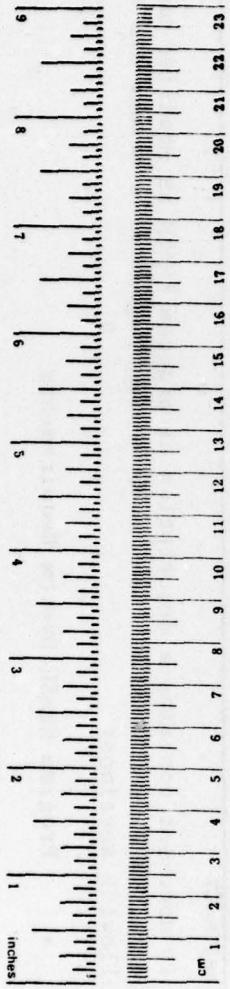
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METRIC CONVERSION FACTORS

Approximate Conversions to Metric Measures

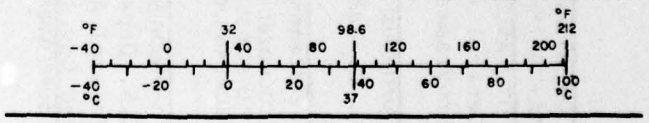
Symbol	When You Know	Multiply by	To Find	Symbol
	LENGTH			
in	inches	*2.5	centimeters	cm
ft	feet	30	centimeters	cm
yd	yards	0.9	meters	m
mi	miles	1.6	kilometers	km
	AREA			
in^2	square inches	6.5	square centimeters	cm^2
ft^2	square feet	0.09	square meters	m^2
yd^2	square yards	0.8	square meters	m^2
mi^2	square miles	2.6	square kilometers	km^2
	acres	0.4	hectares	ha
	MASS (weight)			
oz	ounces	28	grams	g
lb	pounds	0.45	kilograms	kg
	short tons (2000 lb)	0.9	tonnes	t
	VOLUME			
tsp	teaspoons	5	milliliters	ml
Tbsp	tablespoons	15	milliliters	ml
fl oz	fluid ounces	30	milliliters	ml
c	cups	0.24	liters	l
pt	pints	0.47	liters	l
qt	quarts	0.95	liters	l
gal	gallons	3.8	liters	l
ft^3	cubic feet	0.03	cubic meters	m^3
yd^3	cubic yards	0.76	cubic meters	m^3
	TEMPERATURE (exact)			
°F	Fahrenheit temperature	5/9 (after subtracting 32)	Celsius temperature	°C

*1 in = 2.54 (exactly). For other exact conversions and more detailed tables, see NBS Misc. Publ. 286, Units of Weights and Measures, Price $2.25, SD Catalog No. C13.10:286.



Approximate Conversions from Metric Measures

Symbol	When You Know	Multiply by	To Find	Symbol
	LENGTH			
mm	millimeters	0.04	inches	in
cm	centimeters	0.4	inches	in
m	meters	3.3	feet	ft
m	meters	1.1	yards	yd
km	kilometers	0.6	miles	mi
	AREA			
cm^2	square centimeters	0.16	square inches	in^2
m^2	square meters	1.2	square yards	yd^2
km^2	square kilometers	0.4	square miles	mi^2
ha	hectares (10,000 m^2)	2.5	acres	
	MASS (weight)			
g	grams	0.035	ounces	oz
kg	kilograms	2.2	pounds	lb
t	tonnes (1000 kg)	1.1	short tons	
	VOLUME			
ml	milliliters	0.03	fluid ounces	fl oz
l	liters	2.1	pints	pt
l	liters	1.06	quarts	qt
l	liters	0.26	gallons	gal
m^3	cubic meters	35	cubic feet	ft^3
m^3	cubic meters	1.3	cubic yards	yd^3
	TEMPERATURE (exact)			
°C	Celsius temperature	9/5 (then add 32)	Fahrenheit temperature	°F

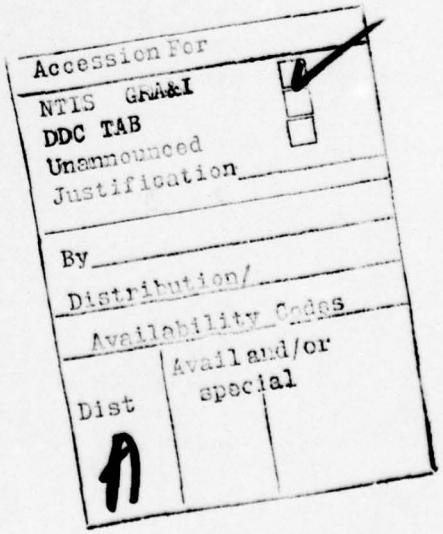


FOREWORD

This report was prepared by the Lockheed-California Company under contract DOT-FA75-WA-3707. The report contains a partial description of the effort performed as Task II of a three task effort. Task II covers the period from January 1978 to November 1978. The work was administered under the direction of the Federal Aviation Administration with H. Spicer as Technical Monitor.

The project leader was Gil Wittlin, of the Lockheed-California Company. Important contributions were made to the program by the Cessna Aircraft Company under the direction of D.J. Ahrens and W.B. Bloedel. W.L. LaBarge, of the Lockheed-California Company, prepared the Programmer's Manual with the assistance of G. Wittlin, M.S. Gamon, H. Weinberger and D. Seiki.

The Lockheed effort was performed under the supervision of J.E. Wignot (Dynamic Loads Group).



SUMMARY

This document contains a description of program KRASH as modified under contract DOT-FA75-WA-3707. Included in the Programmer's Manual are the following sections:

- Program KRASH System Requirements
- Input Data Deck
- Demonstration Problem

This Programmer's Manual is one of a series of operational documents for program KRASH. In this manual, pertinent information is supplied which will facilitate bringing the program to an operational status on the user's computer system. This manual has been established in such a manner that it can be updated as more data becomes available. The subject material contained within each section can be expanded or revised, as necessary, without affecting the other sections. Each section contains its own numbering system which facilitates the task of updating the document.

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SECTION 1

INTRODUCTION

Program KRASH is a digital computer program which predicts the structural response of vehicles to multidirectional crash environments. The program computes the time histories of N interconnected masses, each allowed six degrees of freedom, defined by internal coordinates X_i, Y_i, Z_i and Eulerian angles ϕ_i, θ_i, X_i, when i = 1,2,...N. Euler's equations of motion are written for each mass. The equations of motion are integrated numerically to obtain velocities, displacements, and rotations. Gravitational forces, internal forces and moments, and external forces are computed. For small deflections, a linear analysis is obtained, and for large deflections, general plastic deformation is allowed. The program provides for unloading and subsequent reloading along a linear elastic line.

Program KRASH describes the interaction between a series of massless interconnecting structural elements and concentrated rigid body masses to which the structural elements are attached at their ends with the appropriate end fixity (pinned, fixed). The structural elements can be connected between node points which are offset from, and rigidly attached to, selected mass points. The interconnecting elements represent the stiffness characteristics of the structure between the masses. The masses can translate and rotate in all directions under the influence of the external forces (i.e., gravity, aerodynamic, impact), as well as the constraining internal element forces. The movement of the masses results in changes in the relative distortion of the structural elements and, in turn, results in a new set of element forces acting throughout the system.

Computer Program KRASH has the capability to:

- Define the response of six degrees of freedom (DOF) at each representative location, including three translations and three rotations.
- Determine mass accelerations, velocities, and displacements and internal member loads and deformations at each time interval.
- Provide for general nonlinear stiffness properties in the plastic regime, including different types of load-limiting devices, and determine the amount of permanent deformation.
- Define how and when rupture of an element takes place and redistribute the loading over the structural elements involved.
- Define mass penetration into an occupiable volume.
- Define the volume change due to structural deformations of an occupiable volume.
- Provide for ground contact by external structure including sliding friction and a nonrigid ground surface.
- Include internal structural damping.
- Include a measure of injury potential to the occupants; for instance, the probability of spinal injury indicated by the Dynamic Response Index (DRI).
- Determine the distribution of kinetic and potential energy by mass item, the distribution of strain and damping energy by beam element, and the crushing and sliding friction energy associated with each external spring.
- Determine the vehicle response to an initial condition that includes linear and angular velocity about three axes and any arbitrary vehicle attitude and position.
- Provide a measure of the airplane cg velocity by means of translational momentum relationships.
- Analyze an impact into a horizontal ground and/or an inclined slope.
- Provide a measure of the internal stress state of internal beam elements.
- Analyze a mathematical model containing up to 80 masses and 150 internal beam elements.
- Treat up to 180 nonlinear element degrees of freedom.

A comprehensive discussion of the theoretical development of program KRASH is presented in Reference (1). A discussion of program KRASH input-output formats as well as modeling techniques and applications are included in Reference (2). Reference (3) provides a discussion of design guidelines which can be used in conjunction with program KRASH in the structural crashworthiness analysis of general aviation airplanes.

The last in the series of operational documentation for program KRASH is this Programmer's Manual. In this manual, pertinent information is supplied which will facilitate bringing the program to an operational status on the user's computer system. The manual contains a discussion of the program's system requirements, functional organization, and a demonstration problem which can be used to verify the operation of the program.

SECTION 2

PROGRAM KRASH SYSTEM REQUIREMENTS

The basic control card deck consists of the necessary job control cards, the program KRASH source cards, and the data input card deck. Here, "card deck" and "cards" are to be interpreted in their broadest sense. They include any medium by which instructions are transmitted to the computing system, e.g., physical cards, tape, remote terminal instructions, etc.

2.1 JOB CONTROL DECK

Due to the wide variety of computer systems available and individual computer installation requirements, a complete and detailed listing of all possible job control language (JCL) cards is not feasible. Format details of the JCL instructions will have to satisfy the requirements of the specific computing system in use. Irrespective of the details, the JCL cards must provide for the following program KRASH requirements:

- Using the overlay structure illustrated in Figure 2-1, a core space equivalent to 600K bytes of IBM 360 core. (Note that the IBM 360 is a 32-bit word machine with 4 bytes per word).
- The temporary logical data storage units discussed in Section 2.2.
- A permanent data storage unit. See Section 2.2.
- The compile and link instructions necessary to execute a FORTRAN IV source deck. For the examples shown in this manual, a FORTRAN H compiler (level 21.8) with an optimization level of 2 (OPT 22) has been used.

2.2 LOGICAL UNITS

Calls to the eleven logical storage units listed in Table 2-1 can be made from program KRASH. Of the units listed, all but units 5, 6, and 21 are

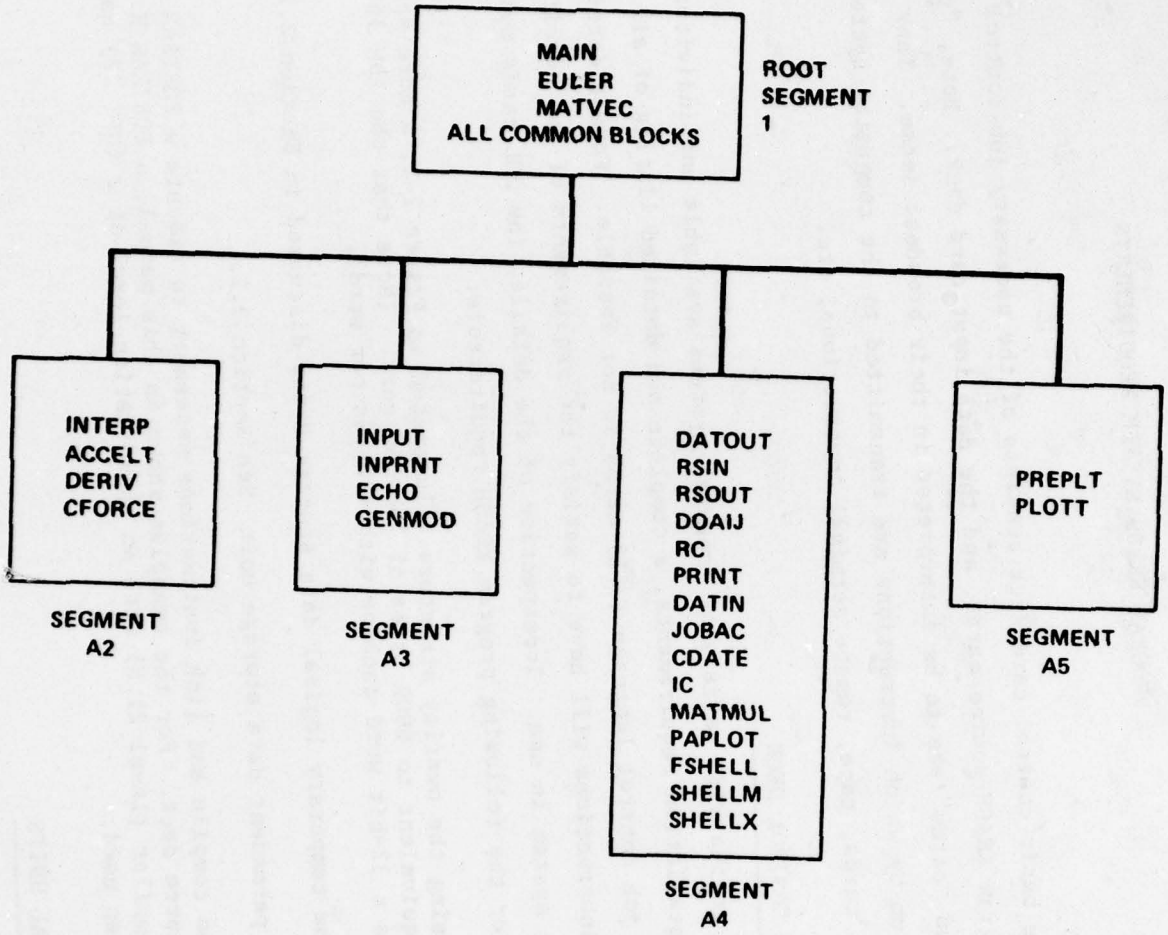


Figure 2-1. Overlay Map

TABLE 2-1. LOGICAL UNIT SUMMARY

Logical Unit No.	Using Subroutine		Data Stored On Unit
	Write Call	Read Call	
1	PRINT	PREPLT	Mass plot history data
2	PRINT	PREPLT	Node plot history data
3	PRINT	PREPLT	Beam force plot history data
4	PRINT	PREPLT	Beam deflection plot history data
5	-	INPUT, PREPLT	Program input
6	(1)	-	Program print output
7	(2)	-	Card punch output
8	PRINT	PREPLT	External spring plot history data
9	PRINT	PREPLT	DRI plot history data
10	PRINT	PREPLT	Vehicle cg velocity plot history data
11	(2)	-	
12	PREPLT	PREPLT	Temporary storage for plot history data
13	PRINT	PREPLT	Beam stress plot history data
21 (3)	DATOUT	DATIN	Check point/restart data

(1) Write calls are made throughout program KRASH

(2) Reserved for future use

(3) Tape storage unit used for permanent storage

considered temporary data storage devices. Of the temporary units, unit 10 is required for each run. The remaining temporary units are required only when summary plots are requested. See Section 2.1 of Reference (2). Units 5 and 6 are standard stored input and output units. Unit 21 is a permanent data storage unit and is called whenever the restart option is exercised (see Section 3.3).

2.3 INPUT DATA DECK

The input data required to run program KRASH consists of a series of cards which control the operation of the program, set the initial conditions of the analyses, and define the structural characteristics of the model. A complete description of the cards which make up this deck is presented in Section 2 of Reference (2). All of the data supplied on the cards of this deck are read from unit 5.

Special attention is directed to cards 5 and 6 of the input data deck of program KRASH. See Figure 2-1 of reference (2). The data supplied on these cards are used when the restart option is exercised. The restart option requires a check point run to be made during which state vector data are saved on unit 21 at specified times. In subsequent runs the data can be retrieved from unit 21 and the program restarted at any one of the times used in the check point run. A description of the data management details related to the storage and retrieval of these data is presented in Section 3.3.

2.4 RUNNING PROGRAM KRASH

2.4.1 Program KRASH Execution

Figure 2-2 presents a copy of the program deck used at the Lockheed California Company to compile, link, and execute program KRASH. The program deck assumes that program KRASH source is on an unlabeled 9-track tape with card image records (i.e. RECFM = F, LRECL = 80, BLKSIZE = 80); note that this is the standard format of the KRASH source tape as released by the Lockheed California Company. If the program KRASH source is on cards, then changes to the example program deck will be necessary to reflect this fact.

2.4.2 Restart Tape Initiation

Before the restart option of program KRASH can be exercised, a save tape must be reserved and initialized as described in Section 3.3. The program deck shown in Figure 2-3 has been used at the Lockheed California Company to initialize a restart tape. The tape in the example is an IBM Standard Label tape.

```
//KRASH JOB NNNN,NAME,REGION=600K,TIME=15
//C EXEC PGM=IEKAA00,PARM='MAP,BCD,NODECK,OPT=2,ID'
//SYSPRINT DD SYSOUT=A
//SYSPUNCH DD SYSOUT=B
//SYSLIN DD DSNAME=&COMP,SPACE=(3200,(100,50)),UNIT=3330,
//    DCB=(RECFM=FB,LRECL=80,BLKSIZE=3200),DISP=(NEW,PASS)
//SYSUT2  DD  UNIT=3330,SPACE=(TRK,(5,3))
//SYSABEND DD SYSOUT=A,DCB=(BLKSIZE=800)
//*****************************************************************
//*                                                               *
//*  THE KRASH SOURCE TAPE AS RELEASED IS AN UNLABELED            *
//*  9-TRACK TAPE WITH CARD IMAGE RECORDS.                        *
//*                                                               *
//*****************************************************************
//SYSIN DD UNIT=2400,LABEL=(,NL),DCB=(RECFM=F,LRECL=80,BLKSIZE=80)
// DISP=(OLD,KEEP)
//L EXEC PGM=IEWL,PARM='LIST,MAP,OVLY',COND=(5,LT,C),TIME=4
//SYSPRINT DD SYSOUT=A
//COMPILE DD DSNAME=&COMP,DISP=(OLD,DELETE)
//SYSUT1 DD DCB=(BLKSIZE=7294),SPACE=(7294,(40,20)),UNIT=3330
//SYSLIB DD DSNAME=SYS1.FORTLIB,DISP=SHR
//SYSLMOD DD DSNAME=&TEMP(GOMODULE),DISP=(NEW,PASS),
// UNIT=3330,SPACE=(7294,(40,20,1)),DCB=(BLKSIZE=7294)
//SYSLIN DD *
 INCLUDE COMPILE
 ENTRY MAIN
 OVERLAY A
   INSERT DERIV,ACCELT,INTERP,CFORCE
 OVERLAY A
   INSERT GENMOD,INPUT,INPRNT,ECHO
 OVERLAY A
   INSERT RSOUT,DATIN,RSIN,DATOUT
   INSERT JOBAC,CDATE
   INSERT RC,DOAIJ,IC,MATMUL,PRINT
   INSERT PAPLT,FSHELL,SHELLM,SHELLX
 OVERLAY A
   INSERT PREPLT,PLOTT
//G EXEC PGM=*.L.SYSLMOD,COND=((5,LT,C),(5,LT,L)),REGION=600K,TIME=10
//FT01F001 DD DCB=(RECFM=VB,BLKSIZE=800,LRECL=796),
//  UNIT=3330,SPACE=(TRK,(10,5))
//FT02F001 DD DCB=(RECFM=VB,BLKSIZE=800,LRECL=796),
//  UNIT=3330,SPACE=(TRK,(10,5))
//FT03F001 DD DCB=(RECFM=VB,BLKSIZE=800,LRECL=796),
//  UNIT=3330,SPACE=(TRK,(10,5))
//FT04F001 DD DCB=(RECFM=VB,BLKSIZE=800,LRECL=796),
//  UNIT=3330,SPACE=(TRK,(10,5))
//FT06F001 DD SYSOUT=A
//FT07F001 DD SYSOUT=B
//FT08F001 DD DCB=(RECFM=VB,BLKSIZE=800,LRECL=796),
//  UNIT=3330,SPACE=(TRK,(10,5))
```

Figure 2-2. Example Compile, Link, and Execute Card Deck (Sheet 1 of 2)

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```
//FT09F001 DD DCB=(RECFM=VB,BLKSIZE=800,LRECL=796),
//  UNIT=3330,SPACE=(TRK,(10,5))
//FT10F001 DD DCB=(RECFM=VB,BLKSIZE=800,LRECL=796),
//  UNIT=3330,SPACE=(TRK,(10,5))
//FT11F001 DD DCB=(RECFM=VB,BLKSIZE=800,LRECL=796),
//  UNIT=3330,SPACE=(TRK,(10,5))
//FT12F001 DD DCB=(RECFM=VB,BLKSIZE=800,LRECL=796),
//  UNIT=3330,SPACE=(TRK,(10,5))
//FT13F001 DD DCB=(RECFM=VB,BLKSIZE=800,LRECL=796),
//  UNIT=3330,SPACE=(TRK,(10,5))
//*****************************************************************
//*                                                               *
//*   THE KRASH CHECKPOINT/RESTART TAPE IS TO BE MOUNTED ON       *
//*   UNIT 21.  DATA SET NAME IS 'KRASH.DATA'; TAPE NUMBER IS     *
//*   402512.                                                     *
//*                                                               *
//*****************************************************************
//FT21F001 DD UNIT=2400,DCB=(LRECL=1004,BLKSIZE=5024,RECFM=VB),
// VOL=SER=402512,LABEL=(,SL),DISP=OLD,DSN=KRASH.DATA
//SYSUDUMP DD SYSOUT=A
//FT05F001 DD *

          (DATA CARD DECK)
```

Figure 2-2. Example Compile, Link, and Execute Card Deck (Sheet 2 of 2)

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```
//INITTAPE JOB NNNN,NAME,REGION=160K,TIME=2
//*****************************************************************
//*                                                               *
//*  THIS IS A SAMPLE JOB OF HOW THE KRASH CHECKPOINT/RESTART     *
//*  TAPE CAN BE INITIALIZED.  IBM STANDARD LABEL ASSUMED.        *
//*  NOTE THAT THE TAPE IS A 9-TRACK TAPE.                        *
//*                                                               *
//*****************************************************************
//C EXEC PGM=IEKAA00,REGION=160K,PARM='MAP,BCD,NODECK,OPT=1,ID',TIME=1
//SYSPRINT DD SYSOUT=A
//SYSPUNCH DD SYSOUT=B
//SYSLIN DD DSNAME=&COMP,SPACE=(3200,(100,50)),UNIT=3330,
//    DCB=(RECFM=FB,LRECL=80,BLKSIZE=3200),DISP=(NEW,PASS)
//SYSUT2  DD  UNIT=3330,SPACE=(TRK,(5,3))
//SYSABEND DD SYSOUT=A,DCB=(BLKSIZE=800)
//SYSIN DD *
      END FILE 4
      STOP
      END
//L EXEC PGM=IEWL,PARM='LIST,MAP',COND=(5,LT,C),REGION=160K,TIME=1
//SYSPRINT DD SYSOUT=A
//COMPILE DD DSNAME=&COMP,DISP=(OLD,DELETE)
//SYSUT1 DD DCB=(BLKSIZE=7294),SPACE=(7294,(40,20)),UNIT=3330
//SYSLIB DD DSNAME=SYS1.FORTLIB,DISP=SHR
//SYSLMOD DD DSNAME=&TEMP(GOMODULE),DISP=(NEW,PASS),
// UNIT=3330,SPACE=(7294,(40,20,1)),DCB=(BLKSIZE=7294)
//SYSLIN DD *
 INCLUDE COMPILE
 ENTRY MAIN
//G EXEC PGM=*.L.SYSLMOD,COND=((5,LT,C),(5,LT,L)),REGION=160K,TIME=1
//*****************************************************************
//*                                                               *
//*    THE KRASH CHECKPOINT/RESTART TAPE IS TO BE MOUNTED ON      *
//*    UNIT 4.  DATA SET NAME IS 'KRASH.DATA'. TAPE NUMBER IS     *
//*    402512.                                                    *
//*                                                               *
//*****************************************************************
//FT04F001 DD DSN=KRASH.DATA,UNIT=2400,DISP=(NEW,KEEP),
// DCB=(RECFM=VB,LRECL=1004,BLKSIZE=5024),VOL=SER=402512,LABEL=(,SL)
//FT06F001 DD SYSOUT=A
//SYSUDUMP DD SYSOUT=A
//
```

Figure 2-3. Example Restart Tape Initialization Card Deck

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SECTION 3

PROGRAM KRASH FUNCTIONAL ORGANIZATION

Program KRASH is divided into three basic functional blocks: computational analysis and data processing; internal data storage and transfer; and external data storage and retrieval. Each of these blocks is discussed in the following sections of this manual.

3.1 COMPUTATIONAL ANALYSIS AND DATA PROCESSING

The computational analysis and processing of data is accomplished by program KRASH as illustrated in the flow chart shown in Figure 3-1. The rectangular blocks represent calls to functional subroutines. All other blocks represent functional operations and logical branching controlled within the MAIN segment of the program.

3.1.1 Subroutine Call Cross Reference

Calls to various subroutines are made throughout program KRASH. A cross-reference map identifying the calling routine or subroutine and the called subroutine is shown in Table 3-1. Included in the map are the IBM 360 core requirements for each of the routines listed. Attention is drawn to the fact that these size requirements are applicable only when the H version (OPT = 2) of the FORTRAN compiler is used. The use of other compiler versions or options will result in different size requirements.

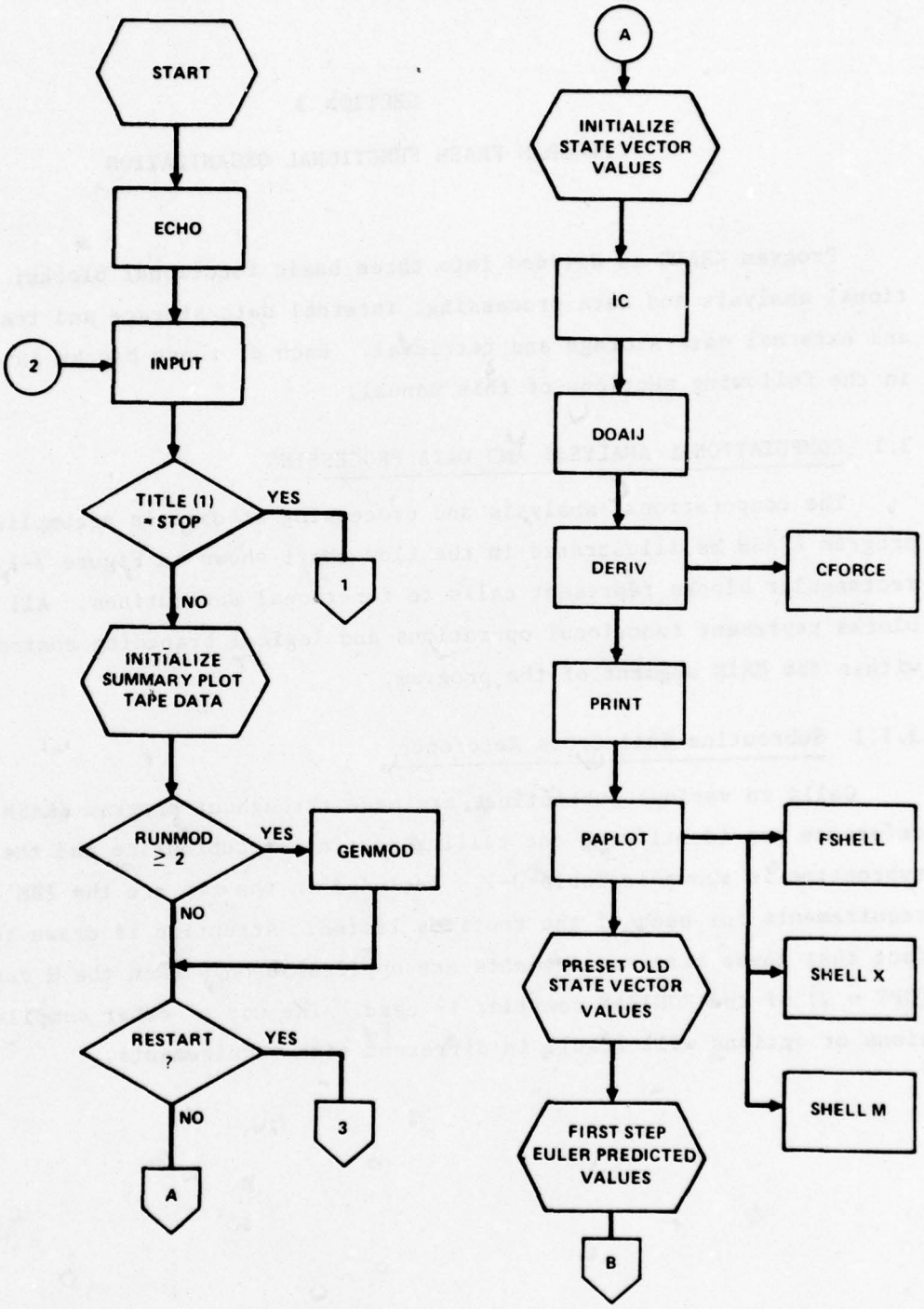


Figure 3-1. KRASH Flow Chart (Sheet 1 of 3)

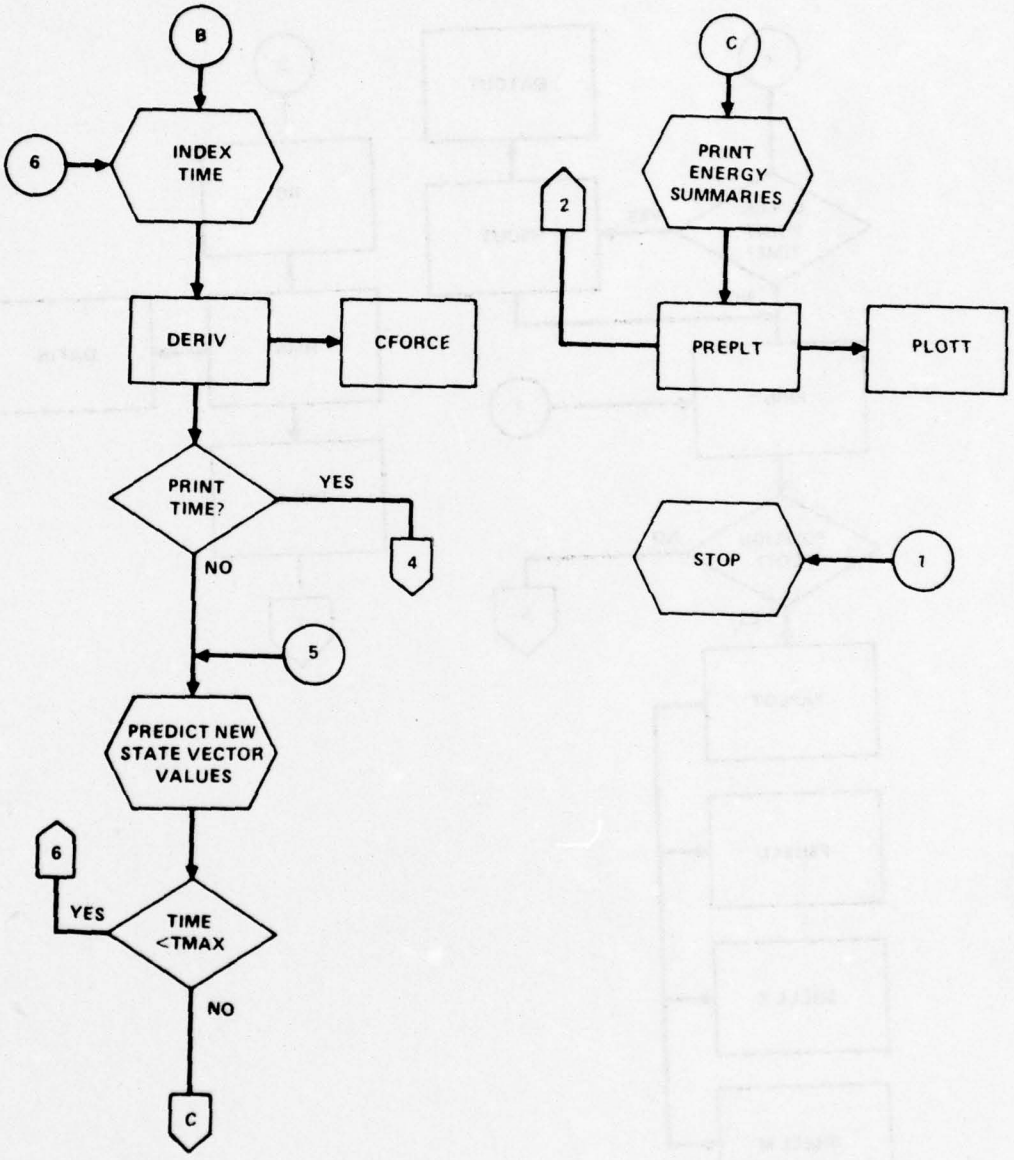


Figure 3-1. KRASH Flow Chart (Sheet 2 of 3)

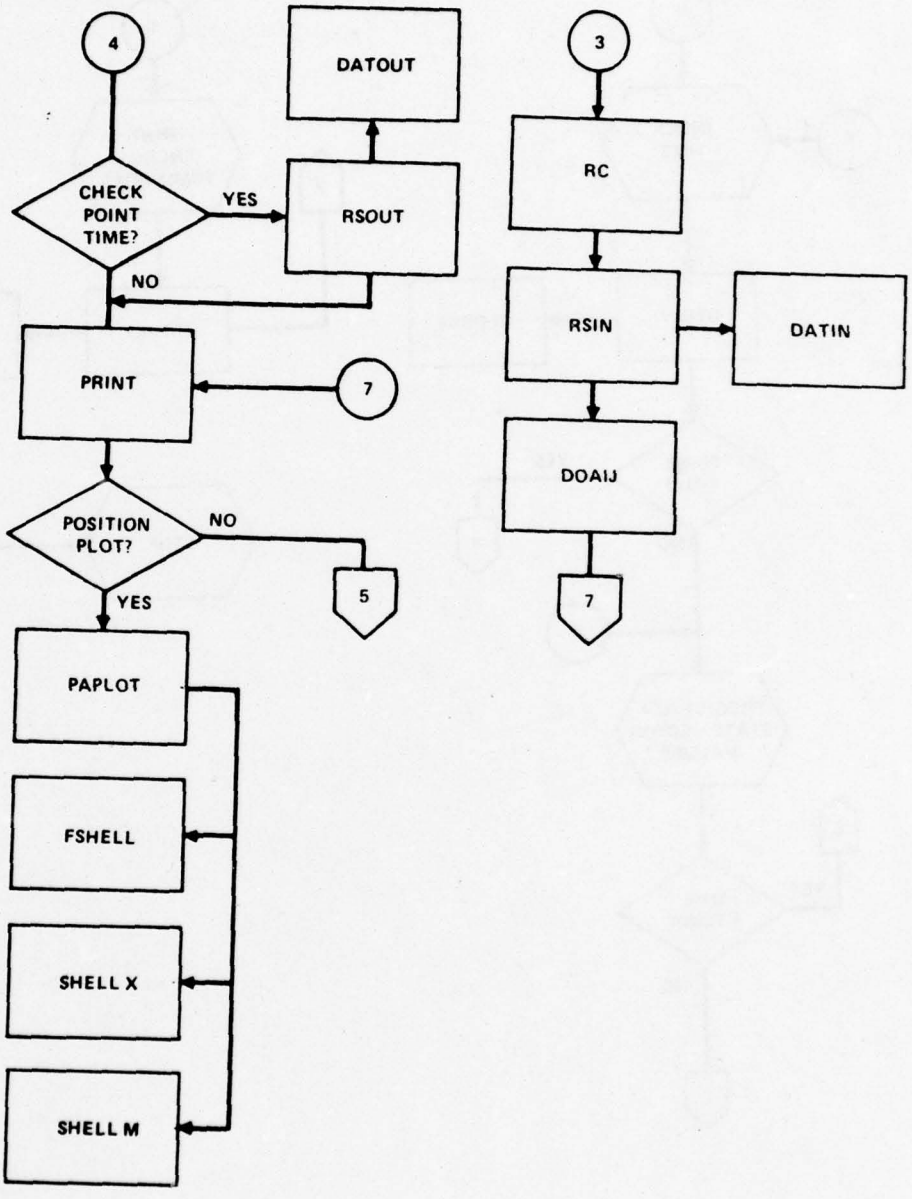


Figure 3-1. KRASH Flow Chart (Sheet 3 of 3)

TABLE 3-1. SUBROUTINE CROSS REFERENCE SUMMARY

Called / Calling	Core Size Req. Fortran H Compiler OPT = 2	ACCELT	CDATE	CFORCE	DATIN	DATOUT	DERIV	DOAIJ	ECHO	EULER	FSHELL	GENMOD	IC	INPRNT	INPUT	INTERP	JOBAC	MAIN	MATMUL	MATVEC	PAPLOT	PLOTT	PREPLT	PRINT	RC	RSIN	RSOUT	SHELLM	SHELLX
ACCELT	438															•													
CDATE	1FA																												
CFORCE	2DE8																			•									
DATIN	B3C																												
DATOUT	A08		•														•												
DERIV	B556	•		•																									
DOAIJ	280E																												
ECHO	2AC																												
EULER	2DO																												
FSHELL	28C																												
GENMOD	336A																												
IC	35BO									•									•	•									
INPRNT	5390																												
INPUT	30A4																												
INTERP	14C																												
JOBAC	88																												
MAIN	1EB8						•	•	•			•	•	•	•								•	•	•	•	•		
MATMUL	1FC																												
MATVEC	1FA																												
PAPLOT	1B6A										•																	•	•
PLOTT	AB8																												
PREPLT	587A																				•								
PRINT	4C6C																												
RC	1DA8									•																			
RSIN	24A8				•																								
RSOUT	23CC					•																							
SHELLM	1FA																												
SHELLX	202																												

3.1.2 Subroutine Functional Description

Described in this section are the functional operations of each subroutine along with definitions of the symbols which compose the subroutine call statement argument list. When possible these symbols are referenced to the corresponding symbols used in the theoretical development presented in Reference (1).

3.1.2.1 MAIN

The MAIN segment of program KRASH serves primarily as a control routine for the program. Processing of data is controlled by calls to the various functional subroutines included in the program. In addition to the above, the MAIN segment contains the predictor-corrector numerical integration algorithm used by program KRASH. The predictor-corrector method used is discussed in detail in Section 1.3.13 of Reference (1). At the end of each run, MAIN controls the printing of various summary data which recap the significant events of the run. Examples of these summaries are shown in Figure 3.2.

Comment cards are included in the MAIN source deck which refer to RUNMOD options 3 and 4. These options are not discussed in the User's Manual, Reference (2), and are not intended for production use at this time. Option 3 is set aside for future use as a model data card punch option. Option 4 is an option which has been set up to aid in the debugging of the program during its development.

A number of energy error checks are controlled from MAIN, see Section 3.4. When any of these checks fail, control is passed to the summary print section of MAIN for execution and subsequent run termination.

SUMMARY OF EXTERNAL SPRING LOADING AND UNLOADING

TYPES;1=INITIAL LOADING 2=MAX.LOADING 3=UNLOAD TO ZERO FORCE 4=INITIATION OF RELOAD

NOTE:SPRING RELOADS AT ZERO FORCE(SEQ.1,2,3,4) OR AT FINITE FORCE VALUE(SEQ.1,2,4)

NOTE:INITIAL DEFLECTION IS FIRST IMPACT IF NTYPE=1, OTHERWISE IT IS POINT AT WHICH RELOADING OCCUR FOR NTYPE=4

TIME(SEC)	MASS NO.	NODE NO.	DIRECTION L=1,2,3	TYPE NO.	INITIAL DEFLECTION	MAXIMUM FORCE &/OR DEFLECT		UNLOADED DEFLECT	& FORCE
0.000010	6	0	3	1	0.0023	0.0	0.0	0.0	0.0
0.000010	22	0	3	1	0.0023	0.0	0.0	0.0	0.0
0.000290	5	0	3	1	0.0025	0.0	0.0	0.0	0.0
0.000290	21	0	3	1	0.0025	0.0	0.0	0.0	0.0
0.000720	4	0	3	1	0.0010	0.0	0.0	0.0	0.0
0.000720	20	0	3	1	0.0010	0.0	0.0	0.0	0.0
0.001190	3	0	3	1	0.0003	0.0	0.0	0.0	0.0
0.001190	19	0	3	1	0.0003	0.0	0.0	0.0	0.0
0.001640	2	0	3	1	0.0029	0.0	0.0	0.0	0.0
0.001640	18	0	3	1	0.0029	0.0	0.0	0.0	0.0

SUMMARY OF PLASTIC HINGE FORMATIONS

TIME	BEAM IJ	I	J	M	N	BEAM END MASS NO.	DIRECTION
0.000660	22	6	12	0	0	12	5
0.000660	48	22	28	0	0	28	5
0.001310	20	4	10	0	0	4	5
0.001310	46	20	26	0	0	20	5
0.002010	19	3	9	0	0	9	5
0.002010	45	19	25	0	0	25	5

SUMMARY OF INTERNAL BEAM YIELDING AND RUPTURE

TIME	BEAM IJ	I	J	M	N	BEAM DIRECTION FOR YIELD	RUPTURE	TENSION(+) OR COMPRESSION(-)
0.000020	10	11	12	0	0	0	1	1
0.000020	43	28	29	0	0	0	1	1

SUMMARY OF ENERGY DISTRIBUTION

TIME	PERCENT MAXIMUM ENERGY DEVIATION	PERCENT TOTAL SYSTEM ENERGY	KINETIC ENERGY	PERCENT OF CURRENT TOTAL	POTENTIAL ENERGY	PERCENT OF CURRENT TOTAL	STRAIN ENERGY	PERCENT OF CURRENT TOTAL	DAMPING ENERGY	PERCENT OF CURRENT TOTAL	CRUSHING ENERGY	PERCENT OF CURRENT TOTAL	FRICTION ENERGY	PERCENT OF CURRENT TOTAL
.0	0.0	100.00	7.695E 04	84.95	1.364E 04	15.05	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
.00100	0.290289	100.02	7.519E 04	82.99	1.346E 04	14.85	1.309E 02	0.14	1.073E 01	0.01	1.813E 03	2.00	0.0	0.0
.00200	0.432690	100.04	7.014E 04	77.40	1.328E 04	14.66	2.922E 02	0.32	4.429E 01	0.05	6.867E 03	7.58	0.0	0.0

Figure 3-2 Example End of Run Summary Tables

3.1.2.2 EULER

Subroutine EULER generates the transformation matrix defined by equation 1-2 of Reference (1). The angles PHI, THETA and PSI are used to form the nine elements of transformation matrix A. The elements of the matrix are returned to the calling routine via the argument list.

CALLING STATEMENT ARGUMENT LIST			
Mnemonic	Symbol Ref. (1)	Type	
A	A	R*8	Transformation matrix
PHI	ϕ	R*8	Euler angles defined by equation 1-2, Reference (1)
THETA	θ	R*8	
PSI	ψ	R*8	

3.1.2.3 MATVEC

Subroutine MATVEC performs the vector matrix multiplication $\widehat{A*V}$ if ISW is equal to zero, otherwise the vector matrix multiplication $\widehat{A^T*V}$ is performed. The product of the multiplication is returned to the calling subroutine by P.

CALLING STATEMENT ARGUMENT LIST			
Mnemonic	Symbol Ref. (1)	Type	
A		R*8	Insert matrix
V		R*8	Input matrix
P		R*8	Resulting output matrix
ISW		I*4	Transposition flag

A blank in the symbol (Reference(1)) column indicates that there is no equivalent symbol defined in the KRASH theory which can be directly related to the particular Mnemonic term.

3.1.2.4 ACCELT

Subroutine ACCELT enters the acceleration input table stored in the common region named INAC. Appropriate levels are extracted from the table based on the time parameter TIME. These levels are passed to the subroutine INTERP for interpolation. The interpolated values are returned to the calling routine by X1, YC, ZC, A1, A2, and A3. The counters NPTSP and NPTS are set equal to zero each time through DERIV.

CALLING STATEMENT ARGUMENT LIST			
Mnemonic	Symbol Ref. (1)	Type	
MASDEX		I*4	Mass number
X1	$\dot{u}$	R*8	Time derivative of translational velocity along {X, Y, Z} axis
YC	$\dot{v}$	R*8	
ZC	$\dot{w}$	R*8	
A1	$\dot{p}$	R*8	Time derivative of rotational velocity about {X, Y, Z} axis
A2	$\dot{q}$	R*8	
A3	$\dot{r}$	R*8	
TIME	t	R*8	Integration time step
NPTSP		I*4	counter, previous
NPTS		I*4	counter, current

3.1.2.5 INTERP

Subroutine INTERP interpolates between tabulated acceleration values for the acceleration at time TT. A trapazoidal interpolation scheme is used.

CALLING STATEMENT ARGUMENT LIST			
Mnemonic	Symbol Ref. (1)	Type	
IREF		I*4	Acceleration table acceleration values
TT	t	R*8	Integration time value
YOUT		R*8	Interpolated acceleration value

3.1.2.6 DERIV

In subroutine DERIV the equations of motion associated with each mass element are formed. The terms included in the equations are based on the linear and nonlinear stiffness characteristics and the damping properties of the beam elements, Section 1.3.5.3, Reference (1); the external aerodynamic forces acting on the vehicle, Section 1.3.5.2, Reference (1); the external spring forces acting on the vehicle, Section 1.3.5.4, Reference (1); and inertia properties of the mass elements. The equations of motion are integrated numerically, Section 1.3.13, Reference (1), to determine the incremental displacement, velocity, and acceleration of each mass element.

External spring forces and deflections are supplied to DERIV by a call to subroutine CFORCE. Subroutine ACCELT is called only when the input option to supply time-history tables for mass accelerations is exercised. All data input and output to DERIV is accomplished through the various common block regions specified in the subroutines.

3.1.2.7 CFORCE

In subroutine CFORCE the computations corresponding to the theoretical analyses discussed in Section 1.3.5.4, Reference (1), are carried out. The deflections of the external springs which are in contact with the ground plane are determined. Based on these deflections, the force acting along the axis of each spring is determined. The component of this force acting perpendicular to the ground plane is combined with the friction coefficient supplied in the input data to give the drag force acting on the spring. The force in the spring and the drag force are resolved into forces and moments acting on the mass element to which the spring is attached. These forces and moments are returned to DERIV, the calling subroutine, through the various common block regions included in the subroutines.

3.1.2.8 INPUT

Subroutine INPUT reads all input card data. The data are processed and stored in appropriate common block regions. A detailed description of all input data required by program KRASH is presented in Reference (2).

3.1.2.9 INPRNT

Subroutine INPRNT processes and prints data supplied by subroutine INPUT and when appropriate, subroutine GENMOD. The data is supplied through the various common block regions included in the subroutine. The data printed by this subroutine are discussed in detail in Reference (2) and an example listing of the data is shown in Figure 3-3.

3.1.2.10 ECHO

Subroutine ECHO prints a complete listing of the input data in card image format. An example of this output is shown in Figure 3-4.

3.1.2.11 GENMOD

Subroutine GENMOD generates the necessary input data to expand a half airplane model representation into a full airplane model representation. This subroutine is called only when the RUNMOD flag is set equal to or greater than 2. The various common block regions included in GENMOD are used for the input and output of data.

3.1.2.12 RSOUT

In subroutine RSOUT all state vector data are processed for subsequent output through calls to subroutine DATOUT. RSOUT is called only when one of the check-point times of the restart option has been encountered. Input to the subroutine is made through the included common block regions and the subroutine call argument list.

CALLING STATEMENT ARGUMENT LIST			
Mnemonic	Symbol Ref. (1)	Type	
MODEL	Name	R*8	Check point run name identifier
CASE	Case No.	I*4	Check point case number identifier
MSEC		I*4	Check point time in milliseconds

```
SAMPLE CASE SUBSECTION DROP TEST SIMULATION  16MASS/32MEMBER MODEL
6-1-79 KRASH.F79.DATA 27.5 FT./SEC

PROGRAM SIZE DATA

NUMBER OF:

MASSES  SPRINGS  BEAMS  KR TABLES  NON-ZERO HE OR IXY  MASS PENETR.  VOLUME CHANGE  DRI ELEMENTS  MTL TYPES  ACCEL. TABLES  NON-STANDARD MAX. DEFL. NVB + -  NON-STANDARD MAX. FORCE NFB + -  NON-ZERO PHI''  NON-STANDARD DAMPING  STIFFNESS MATRICES  NO. NODE PTS.
  NM      NSP     NB     NLB        NHI           MVP           NVCH          NDRI         NMTL         NACC          0 0              0 0             NPH            ND              NKM              NNP
  32      20      58     4          0             0             0             2            0            0             0 0              0 0             0              2               0                12

NSC= 1   NIC= 1   NTOL1= 10%   NTOL2= 50%   NTOL3= 100%

NO.OF OLEO STRUTS= 0   ALPHA= 0.0

PROGRAM DATA MANAGEMENT CONTROL DATA

        RESTART: TITLE -                    SAVE: TITLE -
                 CASE  - 0                        CASE  - 0
                 TIME  - 0                        TIMES - 0 0 0 0 0

VARIABLE INTEGRATION CONTROL DATA

   VAR. INT. FLAG = 0  EL = 0.0   EU = 0.0   LOWER RATIO = 0.0   UPPER RATIO = 0.0

PROGRAM CONTROL DATA

FRINT INTERVAL/ INTEGRATION INTERVAL  INTEGRATION INTERVAL  MAX. TIME  PLOW FORCE STARTING TIME  FILTER CUTOFF FREQUENCY  CASE TYPE INDICATOR
        DP/DT                              DT                TMAX          PLOWT                     FCUT                    RUNTOD
        100                           0.000010               0.002000      0.0                       85.000                  2.000

TIME HISTORY PRINT CONTROL CARDS

STRAIN FORCES  TOTAL FORCES  BEAM DEFLECTIONS  EXT.SPRING DATA  ENERGY DATA  STRESS DATA  ACCEL DATA  IMPULSE DATA
      1             1              1               1              1            1            1           1

NO.OF MASS POSITION PLOTS EACH TIME= 2        PLOT PRINT FACTOR = 20

PLANE I.D.   NO.OF POINTS
    2            5
    2            5
```

Figure 3-3. Example INPRNT Output (Sheet 1 of 7)

VEHICLE ROTATIONAL VELOCITIES IN VEHICLE AXES (RAD/SEC)
EULER ANGLES OF VEHICLE RELATIVE TO GROUND (RADIANS)

XGDOT P' PHI'	YGDOT Q' THETA'	ZGDOT R' PSI'
0.0	0.0	3.30000D 02
0.0	0.0	0.0
0.0	1.31800D-02	0.0

GENERALIZED SURFACE DATA

BETA = 0.0 DEGREES
XGIN = 0.0
ZGIN = 0.0

CORRESPONDING MASS AND BEAM NUMBERS FOR LEFT AND RIGHT SIDES OF AIRPLANE

MASSES		BEAMS									
		LEFT					RIGHT				
LEFT I	RIGHT I	IJ	I	J	M	N	IJ	I	J	M	N
1	17	1	1	2	0	0	33	17	18	0	0
2	18	2	2	3	0	0	34	18	19	0	0
3	19	3	3	4	0	0	35	19	20	0	0
4	20	4	4	5	0	0	36	20	21	0	0
5	21	5	5	6	0	0	37	21	22	0	0
6	22	6	7	8	0	0	38	23	24	0	0
7	23	7	8	9	0	0	39	24	25	0	0
8	24	8	9	10	0	0	40	25	26	0	0
9	25	9	10	11	0	0	41	26	27	0	0
10	26	10	11	12	0	0	42	27	28	0	0
11	27	11	1	17	0	0	0	0	0	0	0
12	28	12	2	18	0	0	0	0	0	0	0
13	29	13	3	19	0	0	0	0	0	0	0
14	30	14	4	20	0	0	0	0	0	0	0
15	31	15	5	21	0	0	0	0	0	0	0
16	32	16	6	22	0	0	0	0	0	0	0
		17	1	7	0	0	43	17	23	0	0
		18	2	8	0	0	44	18	24	0	0
		19	3	9	0	0	45	19	25	0	0
		20	4	10	0	0	46	20	26	0	0
		21	5	11	0	0	47	21	27	0	0
		22	6	12	0	0	48	22	28	0	0
		23	3	16	0	1	49	19	32	0	1
		24	5	16	0	2	50	21	32	0	2
		25	9	16	0	3	51	25	32	0	3
		26	11	16	0	4	52	27	32	0	4
		27	13	14	0	0	53	29	30	0	0
		28	13	15	0	0	54	29	31	0	0
		29	5	13	0	0	55	21	29	0	0
		30	11	13	0	0	56	27	29	0	0
		31	13	16	0	0	57	29	32	0	0
		32	13	16	1	5	58	29	32	1	5

Figure 3-3. Example INPRNT Output (Sheet 2 of 7)

MASS DATA

I	WEIGHTS W	MASS COORDINATES F.S.,B.L.,W.L. X''	Y''	Z''	MASS MOMENTS OF INERTIA (LB-IN-SEC**2) IX	IY	IZ	I
1	1.570000D 00	1.350000D 02	6.000000D 00	-1.600000D 01	1.350000-01	2.380000-02	5.100000-02	1
2	5.030000D 00	1.400000D 02	6.000000D 00	-1.600000D 01	4.340000-01	1.742000-01	2.754000-01	2
3	1.721000D 01	1.510000D 02	6.000000D 00	-1.600000D 01	4.300000 00	4.400000 00	5.460000-01	3
4	7.210000D 00	1.630000D 02	6.000000D 00	-1.600000D 01	6.200000-01	3.000000-01	4.410000-01	4
5	5.640000D 00	1.740000D 02	6.000000D 00	-1.600000D 01	4.860000-01	1.990000-01	2.960000-01	5
6	2.200000D 00	1.810000D 02	6.000000D 00	-1.600000D 01	1.893000-01	5.350000-02	9.140000-02	6
7	3.130000D 00	1.350000D 02	2.000000D 01	-1.600000D 01	1.816000 00	1.700000 00	1.827000-01	7
8	1.002900D 01	1.400000D 02	2.000000D 01	-1.600000D 01	5.813000 00	5.750000 00	8.930000-01	8
9	2.442000D 01	1.510000D 02	2.000000D 01	-1.600000D 01	1.215000 01	1.220000 01	1.600000 00	9
10	1.442000D 01	1.630000D 02	2.000000D 01	-1.600000D 01	8.355000 00	8.460000 00	1.479000 00	10
11	1.128230 01	1.740000D 02	2.000000D 01	-1.600000D 01	6.530000 00	7.170000 00	1.136000 00	11
12	4.390000D 00	1.810000D 02	2.000000D 01	-1.600000D 01	2.540000 00	2.380000 00	2.560000-01	12
13	7.286000 01	1.660000 02	1.300000 01	5.800000 00	1.395110 01	1.477420 01	1.683410 01	13
14	7.286000 01	1.660000 02	1.300000 01	2.089000 01	1.131160 01	1.079890 01	6.531800 00	14
15	7.286000 01	1.660000 02	1.300000 01	2.089000 01	1.131160 01	1.079890 01	6.531800 00	15
16	2.050000 01	1.660000 02	1.300000 01	-1.700000 00	5.950000 00	6.606200 00	3.152000 00	16
17	1.570000D 00	1.350000D 02	-6.000000D 00	-1.600000D 01	1.350000-01	2.380000-02	5.100000-02	17
18	5.030000D 00	1.400000D 02	-6.000000D 00	-1.600000D 01	4.340000-01	1.742000-01	2.754000-01	18
19	1.721000D 01	1.510000D 02	-6.000000D 00	-1.600000D 01	4.300000 00	4.400000 00	5.460000-01	19
20	7.210000D 00	1.630000D 02	-6.000000D 00	-1.600000D 01	6.200000-01	3.000000-01	4.410000-01	20
21	5.640000D 00	1.740000D 02	-6.000000D 00	-1.600000D 01	4.860000-01	1.990000-01	2.960000-01	21
22	2.200000D 00	1.810000D 02	-6.000000D 00	-1.600000D 01	1.893000-01	5.350000-02	9.140000-02	22
23	3.130000D 00	1.350000D 02	-2.000000D 01	-1.600000D 01	1.816000 00	1.700000 00	1.827000-01	23
24	1.002900D 01	1.400000D 02	-2.000000D 01	-1.600000D 01	5.813000 00	5.750000 00	8.930000-01	24
25	2.442000D 01	1.510000D 02	-2.000000D 01	-1.600000D 01	1.215000 01	1.220000 01	1.600000 00	25
26	1.442000D 01	1.630000D 02	-2.000000D 01	-1.600000D 01	8.355000 00	8.460000 00	1.479000 00	26
27	1.128230 01	1.740000D 02	-2.000000D 01	-1.600000D 01	6.530000 00	7.170000 00	1.136000 00	27
28	4.390000D 00	1.810000D 02	-2.000000D 01	-1.600000D 01	2.540000 00	2.380000 00	2.560000-01	28
29	7.286000 01	1.660000 02	-1.300000 01	5.800000 00	1.395110 01	1.477420 01	1.683410 01	29
30	7.286000 01	1.660000 02	-1.300000 01	2.089000 01	1.131160 01	1.079890 01	6.531800 00	30
31	7.286000 01	1.660000 02	-1.300000 01	2.089000 01	1.131160 01	1.079890 01	6.531800 00	31
32	2.050000 01	1.660000 02	-1.300000 01	-1.700000 00	5.950000 00	6.606200 00	3.152000 00	32

NODE POINT DATA

MASS I	N.P. M	NODE POINT COORDINATES F.S.,B.L.,W.L. X''	Y''	Z''
13	1	1.660000 02	1.300000 01	5.800000 00
16	1	1.510000D 02	6.000000 00	-1.700000 00
16	2	1.740000D 02	6.000000 00	-1.700000 00
16	3	1.510000D 02	2.000000 01	-1.700000 00
16	4	1.740000D 02	2.000000 01	-1.700000 00
16	5	1.660000 02	1.300000 01	-1.700000 00
29	1	1.660000 02	-1.300000 01	5.800000 00
32	1	1.510000D 02	-6.000000 00	-1.700000 00
32	2	1.740000D 02	-6.000000 00	-1.700000 00
32	3	1.510000D 02	-2.000000 01	-1.700000 00

Figure 3-3. Example INPRNT Output (Sheet 3 of 7)

EXTERNAL SPRING DATA

SPRING I	K	M	FREE LENGTH LBAR(IKM)	FRICTION COEFFICIENT MU(IKM)	BOTTOMING SPRING KE(IKM)	PLOWING FORCE FORCE(IKM)	GROUND FLEXIBILITY GFLEX(IKM)
2	3	0	8.000000D 00	0.0	1.000000 04	0.0	0.0
3	3	0	8.000000 00	0.0	1.000000 04	0.0	0.0
4	3	0	8.000000 00	0.0	1.000000 04	0.0	0.0
5	3	0	8.000000 00	0.0	1.000000 04	0.0	0.0
6	3	0	8.000000 00	0.0	1.000000 04	0.0	0.0
8	3	0	3.300000 00	0.0	1.000000 04	0.0	0.0
9	3	0	3.300000 00	0.0	1.000000 04	0.0	0.0
10	3	0	3.300000 00	0.0	1.000000 04	0.0	0.0
11	3	0	3.300000 00	0.0	1.000000 04	0.0	0.0
12	3	0	3.300000 00	0.0	1.000000 04	0.0	0.0
18	3	0	8.000000 00	0.0	1.000000 04	0.0	0.0
19	3	0	8.000000 00	0.0	1.000000 04	0.0	0.0
20	3	0	8.000000 00	0.0	1.000000 04	0.0	0.0
21	3	0	8.000000 00	0.0	1.000000 04	0.0	0.0
22	3	0	8.000000 00	0.0	1.000000 04	0.0	0.0
24	3	0	3.300000 00	0.0	1.000000 04	0.0	0.0
25	3	0	3.300000 00	0.0	1.000000 04	0.0	0.0
26	3	0	3.300000 00	0.0	1.000000 04	0.0	0.0
27	3	0	3.300000 00	0.0	1.000000 04	0.0	0.0
28	3	0	3.300000 00	0.0	1.000000 04	0.0	0.0

SPRING			DEFLECTION COORDINATES			SPRING AXIAL FORCES				
I	K	M	SI(IKM)	SA(IKM)	SO(IKM)	SF(IKM)	FSPOI(IKM)	FSPOF(IKM)	CRIT.DAMP	COAMP(IKM)
2	3	0	1.000000-01	5.000000-01	7.500000-01	4.000000 00	2.290000 03	2.290000 03	0.0	0.0
3	3	0	1.000000-01	5.000000-01	7.500000-01	4.000000 00	2.650000 03	2.650000 03	0.0	0.0
4	3	0	1.000000-01	5.000000-01	7.500000-01	4.000000 00	2.650000 03	2.650000 03	0.0	0.0
5	3	0	1.000000-01	5.000000-01	7.500000-01	4.000000 00	2.410000 03	2.410000 03	0.0	0.0
6	3	0	1.000000-01	5.000000-01	7.500000-01	4.000000 00	1.760000 03	1.760000 03	0.0	0.0
8	3	0	2.500000-01	5.000000-01	7.500000-01	4.000000 00	6.700000 02	1.390000 03	0.0	0.0
9	3	0	2.500000-01	5.000000-01	7.500000-01	4.000000 00	6.700000 02	1.390000 03	0.0	0.0
10	3	0	2.500000-01	5.000000-01	7.500000-01	4.000000 00	6.700000 02	1.390000 03	0.0	0.0
11	3	0	2.500000-01	5.000000-01	7.500000-01	4.000000 00	6.700000 02	1.390000 03	0.0	0.0
12	3	0	2.500000-01	5.000000-01	7.500000-01	4.000000 00	6.700000 02	1.390000 03	0.0	0.0
18	3	0	1.000000-01	5.000000-01	7.500000-01	4.000000 00	2.290000 03	2.290000 03	0.0	0.0
19	3	0	1.000000-01	5.000000-01	7.500000-01	4.000000 00	2.650000 03	2.650000 03	0.0	0.0
20	3	0	1.000000-01	5.000000-01	7.500000-01	4.000000 00	2.650000 03	2.650000 03	0.0	0.0
21	3	0	1.000000-01	5.000000-01	7.500000-01	4.000000 00	2.410000 03	2.410000 03	0.0	0.0
22	3	0	1.000000-01	5.000000-01	7.500000-01	4.000000 00	1.760000 03	1.760000 03	0.0	0.0
24	3	0	2.500000-01	5.000000-01	7.500000-01	4.000000 00	6.700000 02	1.390000 03	0.0	0.0
25	3	0	2.500000-01	5.000000-01	7.500000-01	4.000000 00	6.700000 02	1.390000 03	0.0	0.0
26	3	0	2.500000-01	5.000000-01	7.500000-01	4.000000 00	6.700000 02	1.390000 03	0.0	0.0
27	3	0	2.500000-01	5.000000-01	7.500000-01	4.000000 00	6.700000 02	1.390000 03	0.0	0.0
28	3	0	2.500000-01	5.000000-01	7.500000-01	4.000000 00	6.700000 02	1.390000 03	0.0	0.0

Figure 3-3. Example INPRNT Output (Sheet 4 of 7)

MATERIAL PROPERTIES

MATERIAL NO.	MODULUS OF ELASTICITY	MODULUS OF RIGIDITY	TENSION STRESS	COMPRESS. STRESS	SHEAR STRESS
1	3.0000D 07	1.1[illegible]000 07	75000.	75000.	37500.
2	3.0000D 07	1.1000D 07	205000.	205000.	80000.
3	2.8000D 07	1.2500D 07	70000.	46000.	36000.
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
5	1.0000D 07	3.8000D 06	35000.	34000.	17000.
6	1.0000D 07	3.8000D 06	16000.	16000.	17000.
7	1.0000D 06	3.0000D 05	16000.	16000.	17000.
8	1.0000D 06	0.0	16000.	16000.	17000.
9	1.0000D 06	3.0000D 05	16000.	16000.	17000.
10	1.0000D 06	3.0000D 05	16000.	16000.	17000.

INTERNAL BEAM DATA

BEAM IJ	BEAM I	BEAM J	BEAM M	BEAM N	AREA	MOMENTS OF INERTIA IYY	IZZ	JX	DISTANCES FROM NEUTRAL AXIS TO EXTREME FIBRES TORSION ZDIJ AXIS Z1	Z2	YDIJ AXIS PARAMETER XIQ	LENGTH XLB	DAMPING RATIO CBAR	MTL MC	P-CODES Y I	Z I	Y J	Z J	BEAM IJ	BEAM I	BEAM J	BEAM M	BEAM N
1	1	2	0	0	6.157D-01	4.182D 00	6.052D-02	4.243D 00	5.780D 00	6.670D-01	0.0	5.000D 00	4.000D-02	4	0	0	0	0	1	1	2	0	0
2	2	3	0	0	6.157D-01	4.182D 00	6.052D-02	4.243D 00	5.780D 00	6.670D-01	0.0	1.100D 01	4.000D-02	4	0	0	0	0	2	2	3	0	0
3	3	4	0	0	6.157D-01	4.182D 00	6.052D-02	4.243D 00	5.780D 00	6.670D-01	0.0	1.200D 01	4.000D-02	4	0	0	0	0	3	3	4	0	0
4	4	5	0	0	6.157D-01	4.182D 00	6.052D-02	4.243D 00	5.780D 00	6.670D-01	0.0	1.100D 01	4.000D-02	4	0	0	0	0	4	4	5	0	0
5	5	6	0	0	6.157D-01	4.182D 00	6.052D-02	4.243D 00	5.780D 00	6.670D-01	0.0	7.000D 00	4.000D-02	4	0	0	0	0	5	5	6	0	0
6	7	8	0	0	1.280D-01	3.418D-01	4.267D-02	3.844D-01	1.650D 00	1.000D 00	0.0	5.000D 00	4.000D-02	4	0	0	0	0	6	7	8	0	0
7	8	9	0	0	1.280D-01	3.418D-01	4.267D-02	3.844D-01	1.650D 00	1.000D 00	0.0	1.100D 01	4.000D-02	4	0	0	0	0	7	8	9	0	0
8	9	10	0	0	1.280D-01	3.418D-01	4.267D-02	3.844D-01	1.650D 00	1.000D 00	0.0	1.200D 01	4.000D-02	4	0	0	0	0	8	9	10	0	0
9	10	11	0	0	1.280D-01	3.418D-01	4.267D-02	3.844D-01	1.650D 00	1.000D 00	0.0	1.100D 01	4.000D-02	4	0	0	0	0	9	10	11	0	0
10	11	12	0	0	1.280D-01	3.418D-01	4.267D-02	3.844D-01	1.650D 00	1.000D 00	0.0	7.000D 00	4.000D-02	4	0	0	0	0	10	11	12	0	0
11	1	17	0	0	2.893D-01	1.874D 00	4.252D-03	1.878D 00	3.930D 00	5.640D-01	0.0	1.200D 01	4.000D-02	4	0	0	0	0	11	1	17	0	0
12	2	18	0	0	2.893D-01	1.874D 00	4.252D-03	1.878D 00	3.930D 00	5.640D-01	0.0	1.200D 01	4.000D-02	4	0	0	0	0	12	2	18	0	0
13	3	19	0	0	2.893D-01	1.874D 00	4.252D-03	1.878D 00	3.930D 00	5.640D-01	0.0	1.200D 01	4.000D-02	4	0	0	0	0	13	3	19	0	0
14	4	20	0	0	2.893D-01	1.874D 00	4.252D-03	1.878D 00	3.930D 00	5.640D-01	0.0	1.200D 01	4.000D-02	4	0	0	0	0	14	4	20	0	0
15	5	21	0	0	2.893D-01	1.874D 00	4.252D-03	1.878D 00	3.930D 00	5.640D-01	0.0	1.200D 01	4.000D-02	4	0	0	0	0	15	5	21	0	0
16	6	22	0	0	2.893D-01	1.874D 00	4.252D-03	1.878D 00	3.930D 00	5.640D-01	0.0	1.200D 01	4.000D-02	4	0	0	0	0	16	6	22	0	0
17	1	7	0	0	2.184D-01	7.779D-01	4.093D-03	7.820D-01	2.820D 00	5.500D-01	0.0	1.400D 01	4.000D-02	4	0	0	0	0	17	1	7	0	0
18	2	8	0	0	2.184D-01	7.779D-01	4.093D-03	7.820D-01	2.820D 00	5.500D-01	0.0	1.400D 01	4.000D-02	4	1	0	1	0	18	2	8	0	0
19	3	9	0	0	2.184D-01	7.779D-01	4.093D-03	7.820D-01	2.820D 00	5.500D-01	0.0	1.400D 01	4.000D-02	4	1	1	1	1	19	3	9	0	0
20	4	10	0	0	2.184D-01	7.779D-01	4.093D-03	7.820D-01	2.820D 00	5.500D-01	0.0	1.400D 01	4.000D-02	4	1	0	1	0	20	4	10	0	0
21	5	11	0	0	2.184D-01	7.779D-01	4.093D-03	7.820D-01	2.820D 00	5.500D-01	0.0	1.400D 01	4.000D-02	4	0	1	0	1	21	5	11	0	0
22	6	12	0	0	2.184D-01	7.779D-01	4.093D-03	7.820D-01	2.820D 00	5.500D-01	0.0	1.400D 01	4.000D-02	4	0	0	1	0	22	6	12	0	0
23	3	16	0	1	1.888D-01	1.800D-01	5.400D-01	7.200D-01	6.000D-02	6.000D-02	0.0	1.430D 01	4.000D-02	6	0	0	0	0	23	3	16	0	1
24	5	16	0	2	1.888D-01	1.800D-01	5.400D-01	7.200D-01	6.000D-02	6.000D-02	0.0	1.430D 01	4.000D-02	6	0	0	0	0	24	5	16	0	2
25	9	16	0	3	1.888D-01	1.800D-01	5.400D-01	7.200D-01	6.000D-02	6.000D-02	0.0	1.430D 01	4.000D-02	6	0	0	0	0	25	9	16	0	3
26	11	16	0	4	1.888D-01	1.800D-01	5.400D-01	7.200D-01	6.000D-02	6.000D-02	0.0	1.430D 01	4.000D-02	6	0	0	0	0	26	11	16	0	4
27	13	14	0	0	2.000D-02	7.500D-03	7.500D-03	1.500D-02	0.0	0.0	0.0	1.500D 01	4.100D-01	4	0	0	0	0	27	13	14	0	0
28	13	15	0	0	7.197D-03	4.800D-03	4.800D-03	9.600D-03	0.0	0.0	0.0	1.500D 01	3.111D-0110	0	0	0	0	0	28	13	15	0	0
29	5	13	0	0	2.157D-03	0.0	0.0	0.0	0.0	0.0	0.0	2.425D 01	4.000D-02	4	0	0	0	0	29	5	13	0	0
30	11	13	0	0	2.157D-03	0.0	0.0	0.0	0.0	0.0	0.0	2.425D 01	4.000D-02	4	0	0	0	0	30	11	13	0	0
31	13	16	0	0	3.810D-04	0.0	0.0	0.0	0.0	0.0	0.0	7.500D 00	4.000D-02	4	0	0	0	0	31	13	16	0	0
32	13	16	1	5	1.170D-03	0.0	0.0	0.0	0.0	0.0	0.0	7.500D 00	4.000D-02	4	0	0	0	0	32	13	16	1	5
33	17	18	0	0	6.157D-01	4.182D 00	6.052D-02	4.243D 00	5.780D 00	6.670D-01	0.0	5.000D 00	4.000D-02	4	0	0	0	0	33	17	18	0	0
34	18	19	0	0	6.157D-01	4.182D 00	6.052D-02	4.243D 00	5.780D 00	6.670D-01	0.0	1.100D 01	4.000D-02	4	0	0	0	0	34	18	19	0	0
35	19	20	0	0	6.157D-01	4.182D 00	6.052D-02	4.243D 00	5.780D 00	6.670D-01	0.0	1.200D 01	4.000D-02	4	0	0	0	0	35	19	20	0	0

Figure 3-3. Example INPRNT Output (Sheet 5 of 7)

UNSYMMETRICAL BEAM DATA

BEAM					TENSION-COMPRESSION FLAG	DEADBAND
IJ	I	J	M	N	IJUB	DB
29	5	13	0	0	1	0.0
30	11	13	0	0	1	0.0
31	13	16	0	0	-1	0.0
32	13	16	1	5	-1	7.500D-01
55	21	29	0	0	1	0.0
56	27	29	0	0	1	0.0
57	29	32	0	0	-1	0.0
58	29	32	1	5	-1	7.500D-01

PLASTIC HINGE AND END-FIXITY DATA

BEAM					P-CODES				SHAPE FACTORS				PLASTIC HINGE MOMENTS			
IJ	I	J	M	N	IYI	IZJ	YJZ		SF35	SF26	SF35J	SF26J	PLM35	PLM26	PLM35J	PLM26J
18	2	8	0	0	1	0	1	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
19	3	9	0	0	1	1	1	1	0.500	0.500	0.500	0.500	6.483D 03	1.749D 02	6.483D 03	1.749D 02
20	4	10	0	0	1	0	1	0	0.250	0.0	0.750	0.0	3.241D 03	0.0	9.724D 03	0.0
21	5	11	0	0	0	1	0	1	0.0	0.500	0.0	0.500	0.0	1.749D 02	0.0	1.749D 02
22	6	12	0	0	0	0	1	0	0.0	0.0	0.300	0.0	0.0	0.0	3.890D 03	0.0
44	18	24	0	0	1	0	1	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
45	19	25	0	0	1	1	1	1	0.500	0.500	0.500	0.500	6.483D 03	1.749D 02	6.483D 03	1.749D 02
46	20	26	0	0	1	0	1	0	0.250	0.0	0.750	0.0	3.241D 03	0.0	9.724D 03	0.0
47	21	27	0	0	0	1	0	1	0.0	0.500	0.0	0.500	0.0	1.749D 02	0.0	1.749D 02
48	22	28	0	0	0	0	1	0	0.0	0.0	0.300	0.0	0.0	0.0	3.890D 03	0.0

NONLINEAR BEAM DATA

BEAM					DIRECTION	STANDARD TABLE NO.	LINEAR DEFLECTION	BOTTOMING DEFLECTION
IJ	I	J	M	N	L	NP	LDP	LDP1
31	13	16	0	0	1	8	7.50000E-01	0.0
32	13	16	1	5	1	5	2.75000E 00	0.0

Figure 3-3. Example INPRNT Output (Sheet 6 of 7)

```
KR TABLE FOR I,J,M,N,L =   13   16    0    0    1
  1    0.0              1.00000E 00
  2    7.50000E-01      1.00000E 00
  3    7.50750E-01     -1.00000E 00
  4    1.50000E 00     -1.00000E 00
  5    1.50075E 00      0.0
  6    7.50000E 00      0.0
  7    1.12500E 01      0.0
  8    1.50000E 01      0.0

KR TABLE FOR I,J,M,N,L =   13   16    1    5    1
  1    0.0              1.00000E 00
  2    2.75000E 00      1.00000E 00
  3    2.75275E 00      0.0
  4    2.75000E 01      0.0
  5    5.50000E 01      0.0

KR TABLE FOR I,J,M,N,L =   29   32    0    0    1
  1    0.0              1.00000E 00
  2    7.50000E-01      1.00000E 00
  3    7.50750E-01     -1.00000E 00
  4    1.50000E 00     -1.00000E 00
  5    1.50075E 00      0.0
  6    7.50000E 00      0.0
  7    1.12500E 01      0.0
  8    1.50000E 01      0.0

KR TABLE FOR I,J,M,N,L =   29   32    1    5    1
  1    0.0              1.00000E 00
  2    2.75000E 00      1.00000E 00
  3    2.75275E 00      0.0
  4    2.75000E 01      0.0
  5    5.50000E 01      0.0


DRI ELEMENTS

 I  J
13 15
29 31



I,J,M,N
K-MATRIX FOR INTERNAL BEAM IJ
  1  2  0  0
    1.29292D 06     0.0             0.0             0.0             0.0             0.0
    0.0             6.10052D 04     0.0             0.0             0.0            -1.52513D 05
    0.0             0.0             4.21574D 06     0.0             1.05393D 07     0.0
    0.0             0.0             0.0             3.39424D 06     0.0             0.0
    0.0             0.0             1.05393D 07     0.0             3.51312D 07     0.0
    0.0            -1.52513D 05     0.0             0.0             0.0             5.08376D 05
  2  3  0  0
    5.87689D 05     0.0             0.0             0.0             0.0             0.0
    0.0             5.72926D 03     0.0             0.0             0.0            -3.15109D 04
    0.0             0.0             3.95918D 05     0.0             2.17755D 06     0.0
    0.0             0.0             0.0             1.54284D 06     0.0             0.0
```

Figure 3-3. Example INPRNT Output (Sheet 7 of 7)

ECHO OF THE INPUT DATA IN CARD IMAGE FORMAT

```
                1         2         3         4         5         6         7         8
CARD NO. 12345678901234567890123456789012345678901234567890123456789012345678901234567890

    1  SAMPLE CASE SUBSECTIN DROP TEST SIMULATION  16MASS/32MEMBER MODEL          00000010
    2  6-1-79 KRASH.F79.DATA 27.5 FT./SEC                                        00000020
    3  12345678901234567890123456789012345678901234567890123456789012345678901200000030
    4     16   10   32    2    6    5    4    1    0    0    0    0    0    1  00000040
    5      0    0    0    0    0    0    0   10   50  100    1    1             00000050
    6                                                                          00000060
    7                                                                          00000070
    8          100 0.00001   0.002      0.0         85.0       2.0            00000080
    9                                                                          00000090
   10      1    1    1    1    1    1    1    1                               00000100
   11      5    1    2    2    1    4    2    1    2   20                     00000110
   12   0.0          0.0        330.0                                         00000120
   13   0.0          0.0        0.0                                           00000130
   14   0.0          0.0131     0.0        0.0        0.0        0.0          00000140
   15   1.570        135.0      6.0       -16.0       0.13500    0.02380    0.05100  00000150
   16   5.030        140.0      6.0       -16.0       0.43400    0.17420    0.27540  00000160
   17   17.21        151.0      6.0       -16.0       4.30       4.40       0.54600  00000170
   18   7.21         163.0      6.0       -16.0       0.62       0.30       0.441    00000180
   19   5.64         174.0      6.0       -16.0       0.486      0.199      0.29600  00000190
   20   2.2          101.0      6.0       -16.0       0.18930    0.05350    0.09140  00000200
   21   3.13         135.0      20.0      -16.0       1.816      1.700      0.1827   00000210
   22   10.029       140.0      20.0      -16.0       5.813      5.75       0.893    00000220
   23   24.42        151.0      20.0      -16.0       12.15      12.20      1.60     00000230
   24   14.42        163.0      20.0      -16.0       8.355      8.46       1.479    00000240
   25   11.2823      174.0      20.0      -16.0       6.538      7.17       1.136    00000250
   26   4.39         181.0      20.0      -16.0       2.540      2.3600     0.2560   00000260
   27   72.86        166.0      13.0       5.8        13.9511    14.7742    16.8341  00000270
   28   72.86        166.0      13.0       20.89      11.3116    10.7989    6.5318   00000280
   29   72.86        166.0      13.0       20.89      11.3116    10.7989    6.5318   00000290
   30   20.5         166.0      13.0      -1.7        5.95       6,6062     3.152    00000300
   31      1   13 166.0        13.0       5.8                                   00000310
   32      1   16 151.0        6.0       -1.7                                   00000320
   33      2   16 174.0        6.0       -1.7                                   00000330
   34      3   16 151.0        20.0      -1.7                                   00000340
   35      4   16 174.0        20.0      -1.7                                   00000350
   36      5   16 166.0        13.0      -1.7                                   00000360
   37      2    3 8.0          0.0        10000.0                               00000370
   38      3    3 8.0          0.0        10000.0                               00000380
   39      4    3 8.0          0.0        10000.0                               00000390
   40      5    3 8.0          0.0        10000.0                               00000400
   41      6    3 8.0          0.0        10000.0                               00000410
   42      8    3 3.3          0.0        10000.0                               00000420
   43      9    3 3.3          0.0        10000.0                               00000430
   44     10    3 3.3          0.0        10000.0                               00000440
   45     11    3 3.3          0.0        10000.0                               00000450
   46     12    3 3.3          0.0        10000.0                               00000460
   47  0.100        0.500      0.750      4.0        2290.0     2290.     .00    00000470
   48  0.100        0.500       .750      4.0        2650.0     2650.     .00    00000480
   49  0.100        0.500      0.750      4.0        2650.0     2650.     .00    00000490
   50  0.100        0.500      0.750      4.0        2410.0     2410.     .00    00000500
```

Figure 3-4. Example ECHO Output

3.1.2.13 RSIN

In subroutine RSIN state vector data are retrieved through calls to subroutine DATIN. RSIN is called only when a restart run is made. Input of data to the subroutine is made through the calling statement argument list while output is through the included common block region.

CALLING STATEMENT ARGUMENT LIST			
Mnemonic	Symbol Ref. (1)	Type	
IMODEL	Name	R*8	Restart run name identifier
ICASE	Case No.	I*4	Restart run name identifier
IMSEC		I*4	Restart time in milliseconds

3.1.2.14 DOAIJ

Beam fundamental uncoupled frequencies, beam constants, and beam Euler angle transformations are computed in subroutine DOAIJ. The frequencies are computed using equations 1-55a and 1-55b of Reference (1) while the damping constants are determined using equation 1-54 of Reference (1). All input and output to the subroutine is accomplished through the various common block regions included in the subroutine.

3.1.2.15 RC

Within subroutine RC the initial conditions for all model elements are computed for a restart run. In addition, allowable force and deflection are determined and printed. Subroutine RC is called only when a restart case is run. Input and output to the subroutine is accomplished through the various common block regions included in the subroutine.

3.1.2.16 PRINT

Subroutine PRINT is called at the beginning of each run and at each print-time interval specified in the input data. The subroutine provides for the printing of dynamic response information defining the motion of massless nodes and masses, the forces and deflections associated with all beam and spring elements, and a complete energy distribution summary for the model. Examples of the data printed are shown in Figure 3-5.

When summary plots are requested, the necessary mass and element data are processed and written on the temporary data storage units specified in Section 2.2. Storage of this data takes place at each print-time interval.

Position plots are also generated within the PRINT subroutine by a call to subroutine PAPLOT. This call is made at the plot time interval specified in the input data.

All input and output to subroutine PRINT is accomplished through the various common block regions included in the subroutine.

3.1.2.17 IC

Within subroutine IC the initial condition data for all elements of the model are determined. Subroutine IC is called at the beginning of each run except a restart run, in which case subroutine RC is called. In addition to the initial condition data, subroutine IC determines allowable beam force and deflection data. These data are based on the theoretical discussion presented in Section 1.3.17 of Reference (1).

An example of the data printed from subroutine IC is shown in Figure 3-6. Input and output to this subroutine is accomplished through the various common block regions included in the subroutine.

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TEST CASE FOR KRASH PROGRAMMER'S MANUAL
CHECK-POINT DEMONSTRATION CASE

TIME = 0.003000 NUMBER OF INTEGRATION INTERVALS = 100

MASS DISPLACEMENTS, VELOCITIES, AND ACCELERATIONS

	X XDOT U UDOT XACCEL	Y YDOT V VDOT YACCEL	Z ZDOT W WDOT ZACCEL	PHI PHIDOT P PDOT XACCEL	THETA THETADOT Q QDOT YACCEL	PSI PSIDOT R RDOT ZACCEL
MASS 1	1.181330D 02	-6.648190D-15	-1.943810 01	-4.541670-15	8.641920D-02	-7.081530-15
	7.423780 02	-2.399530-11	5.359370 02	-1.581960-11	-2.591650-01	-2.035290-11
	4.933520 02	-2.399570-11	5.980100 02	-1.406290-11	-2.591660-01	-2.027690-11
	-2.895730 02	-8.116240-08	1.736440 02	-4.481660-08	5.597950 01	-4.105400-08
	-1.151700 00	-2.249010-10	9.153800-01	-5.196040-01	-2.692880-11	9.684660-01
MASS 2	1.164070 02	-1.112250-13	-3.936390 01	-7.878390-16	8.637070-02	-6.648510-17
	7.480830 02	-3.271240-10	5.369190 02	-2.985900-12	-2.979760-01	-2.256290-13
	4.991500 02	-3.271380-10	5.974570 02	-2.966460-12	-2.979760-01	-2.245890-13
	-3.121460 01	-6.874970-07	8.236510 01	-9.919050-09	1.395320 00	-6.454060-10
	-5.420800-01	-1.776840-09	7.530970-01	-5.801870-01	-3.234800-10	6.312060-01
MASS 3	4.666950 01	1.583530-11	-3.332590 01	4.031670-14	8.636860-02	-1.288000-14
	7.467900 02	3.617360-08	5.140570 02	7.610750-11	-3.001070-01	-3.375520-11
	6.996630 02	3.617350-08	5.745540 02	7.901930-11	-3.001070-01	-3.362960-11
	2.582010 02	5.169500-05	-1.416000 00	1.208190-07	-1.203560-01	-7.490480-08
	2.224680-01	1.337460-07	5.403050-01	-2.496260-01	3.432400-08	7.783950-01
MASS 4	4.666780 01	-3.999960 01	-3.332580 01	2.257110-06	8.636710-02	1.558770-05
	7.466030 02	-4.549860-01	5.141180 02	4.187400-03	-3.021110-01	3.249190-02
	6.974860 02	-4.652900-01	5.764310 02	1.384660-03	-3.021110-01	3.237150-02
	-2.782420 03	-1.381070 01	-1.424370 02	1.645370 00	-2.140290 00	4.448480 01
	-7.659470 00	2.064790-02	1.768890-01	-2.144010 00	-4.367100-01	6.813630-01
NODE 1	2.474220 01	-2.999970 01	-3.160060 01			
	7.437610 02	-1.102420 00	5.081400 02			
	6.971560 02	-1.112720 00	5.704030 02			
	-8.807150 00	-2.284270 00	1.083640-01	-2.437880 00	-1.035790 00	6.527990-01
MASS 5	4.608170 01	-3.999670 01	-6.321330 01	5.839670-08	8.636770-02	-2.107020-08
	7.561660 02	2.056670-02	5.131000 02	1.062770-04	-3.016470-01	-3.320820-06
	7.090870 02	2.061440-02	5.764150 02	1.065640-04	-3.016470-01	-3.290770-06
	1.210700 02	-2.775290 02	2.713670 01	1.044660-01	-2.145610 00	6.241130-02
	-1.367270-01	-7.121520-01	6.244320-01	1.886500-01	-1.633470-01	2.861140-01
MASS 6	-3.363620 01	-3.999270 01	-2.644590 01	4.175580-04	8.619190-02	-8.749900-05
	7.391160 02	3.226700 00	4.641950 02	6.062690-01	-5.730830-01	-1.131420-01
	6.964110 02	3.511060 00	5.260980 02	6.160080-01	-5.731300-01	-1.124820-01
	-1.030470 03	5.848020 02	-1.701010 04	6.906720 02	-3.212660 02	-9.778870 01
	-5.781230 00	4.725060-01	-4.302790 01	-3.011620 00	1.544290 00	-1.863210 01
NODE 1	-1.310920 01	-2.999450 01	-2.811150 01			
	7.417530 02	9.694860-01	4.816550 02			
	6.975360 02	1.261390 00	5.437200 02			
	-3.774660 00	-6.622720 00	-8.491000 00	-2.082320 00	-3.374660-01	-8.503290 00

Figure 3-5. Example PRINT Output (Sheet 1 of 4)

BEAM FORCES

STRAIN FORCES

I	J	M	N	FX	FY	FZ	MX	MYI	MYJ	MZI	MZJ
1	2	0	0	2.25740-01	8.19230-10	3.30180 00	-2.47400-09	1.13810 01	5.46550 01	-6.67660-09	-9.70820-09
2	3	0	0	2.34320 00	-3.39630-10	-5.46700-03	-3.39070-10	-2.09700-01	-1.72980-01	1.20020-08	1.17720-08
1	3	0	0	0.0	-3.79810-11	-6.86710-03	-3.69190-11	-3.03510-01	-1.96420-01	1.40310-09	1.36190-09
2	5	0	0	2.75990 00	-1.77870-04	-5.99820-04	9.96930-04	-2.83490-02	-2.32480-02	7.30280-03	7.99810-03
3	4	0	0	5.50530 01	-1.33820-01	5.10410-03	1.02920-02	8.22500-02	1.21910-01	2.54150 00	2.81110 00
4	5	0	0	5.71780 00	-6.36910-02	-1.54200-01	8.35890-02	-2.30990 00	-2.33840 00	9.49310-01	9.61370-01
5	14	0	0	-6.22570 00	-7.91550-12	2.34760-11	2.03850-12	-5.09800-04	5.09800-04	-2.30380-04	2.30390-04
7	16	0	0	-2.39390 01	-2.11170-11	6.28440-11	1.23290-10	1.31740-02	-1.31740-02	9.60860-04	-9.60860-04
6	7	0	0	-4.44850 02	1.14930 00	-1.05700-01	-4.69950-01	-3.38110-01	-2.83250 00	-2.02510 01	-1.42210 01
6	15	0	0	-5.41730 02	-5.62520-09	1.86370-08	-1.29720-07	-3.65060 00	3.65060 00	-1.08790 00	1.08790 00
4	8	0	0	9.33700 01	-3.16440-02	-1.81160-01	-1.41620 00	-8.01520 00	-6.47780 00	1.71670 00	8.14810-01
5	8	0	0	4.47690 00	-7.27140-05	-1.74100-03	-2.95340-04	-5.94480-17	-1.74100-01	3.57080-03	3.70100-03
6	10	1	0	-5.28050 01	-3.12020-01	7.45520-01	-4.10510-01	1.08370 01	1.60420 01	4.92070 00	6.32850 00

TOTAL FORCES (STRAIN+DAMPING)

I	J	M	N	FX	FY	FZ	MX	MYI	MYJ	MZI	MZJ
1	2	0	0	2.26360-01	8.81400-10	3.20080 00	-2.79170-09	9.71900 00	5.42980 01	-7.12920-09	-1.05030-08
2	3	0	0	2.14720 00	-5.76110-10	-5.25710-03	-4.47070-10	-2.09260-01	-1.59740-01	2.03690-08	1.99570-08
1	3	0	0	0.0	-2.04700-10	-1.69300-02	-1.02730-10	-7.67300-01	-4.70230-01	7.62950-09	7.41820-09
2	5	0	0	2.05130 00	3.56250-03	-3.42610-03	1.07750-02	-1.65850-01	-1.28870-01	-1.55970-01	-1.50470-01
3	4	0	0	5.60120 01	-3.04510-01	1.18400-02	3.88560-02	1.92310-01	2.81260-01	5.69680 00	6.48330 00
4	5	0	0	5.75470 00	-1.05080-01	-4.07950-01	6.92440-01	-6.11130 00	-6.12690 00	1.56130 00	1.59090 00
5	14	0	0	-6.30480 00	-5.77890-11	1.08330-10	4.12250-11	-2.77750-03	2.77750-03	-5.30340-04	5.30340-04
7	16	0	0	-2.29130 01	-1.30020-10	4.37860-10	9.86950-10	5.24720-02	-5.24720-02	4.38950-03	-4.38950-03
6	7	0	0	-4.45800 02	2.51320 00	-8.39810-02	-2.93650 00	2.19480 00	-4.70390 00	-4.56730 01	-2.97040 01

BEAM RELATIVE DEFLECTIONS AND ROTATIONS AND BEAM EULER ANGLES (INCHES AND DEGREES)

BEAM				DEFLECTIONS (J-I)			ROTATIONS (J-I)			ROTATIONS (J+I)		EULER ANGLES	
I	J	M	N	X	Y	Z	PHI	THETA	PSI	THETA	PSI	THETA	PSI
1	2	0	0	1.01690-03	5.40180-14	2.25770-04	-3.96510-13	2.54300-03	-1.78150-13	1.00370-01	2.66600-13	89.0	-180.0
2	3	0	0	4.14150-05	-1.52550-11	-2.45570-04	-2.40260-12	1.15730-04	-7.24980-13	1.01020-01	-7.32380-13	-4.9	180.0
1	3	0	0	1.04990-03	-1.44300-11	-2.62850-03	-2.39120-12	2.65580-03	-1.02480-12	1.00480-01	-1.67230-12	11.0	180.0
2	5	0	0	1.74910-04	-1.12330-04	-3.78780-04	7.62970-05	1.49660-04	2.03980-05	9.02100-02	1.37890-02	16.1	-151.1
3	4	0	0	6.14830-04	-2.02210-03	7.71570-05	8.78790-05	1.28820-04	8.75610-04	1.30300-01	8.75560-04	-0.0	-90.0
4	5	0	0	9.07570-05	-6.72270-04	-1.62950-03	8.84700-04	-3.44010-05	4.86220-05	1.01280-01	-6.07140-05	85.1	180.0
5	14	0	0	-1.30510-06	-2.57190-13	2.86310-12	3.48110-14	6.62320-06	2.99310-06	-1.01380-13	1.10860-13	-0.0	90.0
7	16	0	0	-5.35540-04	-2.55310-12	7.59950-12	2.10540-12	-1.71150-04	-1.24830-05	-3.05540-12	6.85580-14	-0.0	90.0
6	7	0	0	-7.00020-01	1.21250-02	-1.11520-03	-4.97290-03	-1.00550-02	2.43060-02	1.13320-01	-2.40470-02	85.1	-179.9
5	7	0	0	-2.93530-05	-1.26370-04	-2.17730-02	8.92250-05	6.50440-06	-2.60710-08	1.03250-01	-2.45000-06	-4.9	180.0
6	15	0	0	-1.21380-02	-6.30020-10	2.25300-09	-2.21500-09	4.74220-02	1.41330-02	3.19650-09	9.15450-10	-0.0	90.0
4	8	0	0	2.00220-03	-3.02670-03	-2.19020-02	-2.41850-02	9.98740-03	-5.05880-03	1.13300-01	-4.08750-03	-4.9	180.0
5	8	0	0	3.27830-04	-7.21450-05	-6.86480-03	-2.62760-05	-4.99910-05	4.44170-06	8.24320-02	-4.32660-03	-4.0	-143.0

Figure 3-5. Example PRINT Output (Sheet 2 of 4)

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DEVIATION OF TOTAL ENERGY OF EACH MASS FROM 100 PERCENT

MASS DEVIATION(PERCENT)

1	-0.002522
2	-0.002636
3	-0.002912
4	-0.030205
5	-0.002895
6	0.000358
7	0.004996
8	-0.001104
9	0.030083
10	-0.002636
11	-0.002920
12	0.0
13	-0.000705
14	-0.002895
15	0.000358
16	0.004996
17	-0.001104
18	0.030083

ELEMENT STRESSES

	BEAM				RATIO OF CURRENT STRESS / FAILURE STRESS								RATIO OF CURRENT		
					MAXIMUM SHEAR STRESS THEORY				THEORY OF CONSTANT ENERGY OF DISTORTION				AXIAL/FAILURE		BUCK. / CR.BUCK.
EJ	I	J	M	Y	TOP	BOTTOM	LEFT	RIGHT	TOP	BOTTOM	LEFT	RIGHT	COMPR. STRESS	TENSILE STRESS	LOAD
1	1	2	0	0	2.0850-03	2.0940-03	1.7310-04	1.7310-04	2.0850-03	2.0940-03	1.4990-04	1.4990-04		4.0780-06	
2	2	3	0	0	4.0270-05	8.1730-05	6.1000-05	6.1000-05	5.4610-05	1.1080-04	8.2710-05	8.2710-05		8.2710-05	
3	1	3	0	0	7.4500-04	7.4500-04	8.8800-06	8.8800-06	8.4050-06	6.9740-04	8.6760-06	7.1990-06	0.0		0.0
4	2	5	0	0	1.9700-04	5.2000-04	5.1120-04	2.0440-04	1.8430-04	4.8750-04	4.7850-04	1.9320-04		3.3570-04	
5	3	4	0	0	3.6410-03	3.8280-03	5.6450-03	1.8230-03	3.4270-03	3.5840-03	5.3030-03	1.7030-03		3.5050-03	
6	4	5	0	0	3.9590-03	2.5270-03	1.6530-03	2.5700-04	3.7030-03	2.8410-03	1.5270-03	2.5850-04		6.8020-04	
7	5	14	0	0	4.2130-04	4.2060-04	4.2130-04	4.2160-04	4.7640-04	4.7450-04	4.7530-04	4.7530-04	4.7550-04		2.8970-03
8	7	14	0	0	1.5160-03	1.5470-03	1.5330-03	1.5300-03	1.7100-03	1.7460-03	1.7290-03	1.7230-03	1.7280-03		1.0530-02
9	6	7	0	0	5.3820-02	5.8810-02	3.2350-02	8.0290-02	6.0720-02	6.6340-02	3.6480-02	9.0530-02	4.3500-02		4.7680-02
10	5	7	0	0	8.3450-03	8.1280-03	2.2140-04	1.4010-04	9.4150-03	7.6090-03	2.3510-04	1.4030-04	1.2280-04		7.4800-04
11	6	15	0	0	4.1960-02	3.2130-02	3.5550-02	3.8540-02	4.7330-02	3.6250-02	4.0100-02	4.3480-02	4.1790-02		2.5440-01
12	4	6	0	0	2.6440-03	1.3170-02	5.8800-03	7.9420-03	2.5850-03	1.2260-02	5.3750-03	7.3270-03		5.9740-03	
13	5	8	0	0	2.1810-03	2.9710-04	1.4000-03	4.0390-04	2.0420-03	3.3520-04	1.3860-03	3.7800-04		8.8190-04	
14	8	10	1	0	1.9270-02	6.9230-03	1.5950-03	1.1600-02	2.1740-02	6.4690-03	1.4200-03	1.3090-02	6.9760-03		7.5660-03
15	9	10	1	0	9.1080-03	7.9970-03	1.3670-02	3.4150-03	1.0270-02	9.0050-03	1.5420-02	3.8530-03	9.6180-03		1.0450-02
16	7	8	0	0	2.0740-03	7.5450-03	1.7380-03	3.7340-03	2.3400-03	7.0630-03	1.6270-03	3.4940-03		2.5610-03	
17	6	8	0	0	2.4730-02	2.4740-02	2.2210-02	2.7260-02	2.4730-02	2.4730-02	2.2200-02	2.7260-02	2.4710-02		4.5780-01
18	10	11	0	0	4.3820-04	4.3820-04	2.0720-02	2.0720-02	8.8870-04	8.8870-04	3.8140-02	3.8140-02	8.8870-04		5.8940-09
19	10	12	0	0	3.5560-04	3.5560-04	1.9220-02	1.9220-02	7.5570-04	7.5570-04	3.5370-02	3.5370-02	7.5570-04		5.0120-05
20	8	9	0	0	2.6430-01	2.6010-01	1.8050-01	1.4270-01	2.6340-01	2.3030-01	1.7720-01	1.4180-01	1.3970-02		9.9850-04
21	3	5	0	0	2.3070-04	4.3010-04	5.0440-04	1.5830-04	2.1590-04	4.0260-04	4.7220-04	1.4820-04		3.0910-04	
22	2	14	0	0	1.9700-04	5.2000-04	2.0440-04	5.1120-04	1.8430-04	4.8750-04	1.9320-04	4.7850-04		3.3570-04	

Figure 3-5. Example PRINT Output (Sheet 3 of 4)

EXTERNAL SPRINGS

MASS I	SPRING K	SPRING M	SPRING COMPRESSION	GRIBING DEFLECTION	SPRING COMPRESSION LOAD	GROUND CONTACT POINT LOADS IN GROUND OR SLOPE AXES X(+ AFT OR DOWN SLOPE)	Y(+ LEFT)	Z(+ UP OR NORMAL TO SLOPE)	GROUND CONTACT POINT LOADS IN MASS AXES X (+ FORWARD)	Y (+ RIGHT)	Z (+ DOWN)
1	1	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1	3	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
9	3	0	1.351920 00	0.0	1.400210 03	5.470720 02	-1.112250 02	1.395660 03	-4.333880 02	1.008430 02	-1.435800 03
9	1	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
4	3	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
10	3	0	1.351920 00	0.0	1.400210 03	5.470720 02	-1.112250 02	1.395660 03	-4.333880 02	-1.008430 02	-1.435800 03
10	1	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
13	3	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

DRI RESULTS: MASS NO. AND DRI VALUE

MASS	DRI
12	-1.617700-03

VEHICLE C.G. TRANSLATIONAL VELOCITIES, GROUND AXES, BASED ON SYSTEM LINEAR MOMENTUM

XDOT (+FWD)	YDOT (+RIGHT)	ZDOT (+DOWN)
[illegible]	[illegible]	[illegible]

VOLUME CHANGE DATA

VOL. NO.	VOL.	VOL./ZERO	VOLUME LENGTH CHANGES DX	DY	DZ
1	1.919540 05	9.997710-01	-1.347360-03	-5.284880-03	-4.379480-03

ENERGY DISTRIBUTION

TOTAL ENERGY	KINETIC ENERGY	POTENTIAL ENERGY	STRAIN ENERGY	DAMPING ENERGY	CRUSHING ENERGY	FRICTION ENERGY
1.799620 05	1.694410 05	7.377220 03	7.969820 01	3.811370 00	1.885420 03	1.192430 03
PERCENT OF TOTAL ENERGY	94.150	4.099	0.044	0.002	1.048	0.657

MASS	KINETIC ENERGY	PCT	POTENTIAL ENERGY	PCT	INTERNAL BEAM IJ	I	J	M	N	STRAIN ENERGY	PCT	DAMPING ENERGY	PCT	EXTERNAL SPRING I K M	CRUSHING ENERGY	PCT	FRICTION ENERGY	PCT
1	3.250D 03	1.9	5.831D 01	0.8	1	1	2	0	0	9.797D-04	0.0	8.106D-05	0.0	1 1 0	0.0	0.0	0.0	0.0
2	5.479D 03	3.2	1.948D 02	2.7	2	2	3	0	0	1.016D-04	0.0	6.535D-05	0.0	1 3 0	0.0	0.0	0.0	0.0
3	5.320D 03	3.1	1.666D 02	2.3	3	1	3	0	0	1.033D-05	0.0	2.431D-05	0.0	9 3 0	9.427D 02	50.0	5.912D 02	50.0
4	7.955D 03	4.7	2.429D 02	3.4	4	2	5	0	0	2.505D-04	0.0	5.466D-05	0.0	9 1 0	0.0	0.0	0.0	0.0
5	1.097D 04	6.4	6.485D 02	8.8	5	3	4	0	0	1.728D-02	0.0	6.911D-04	0.0	4 3 0	0.0	0.0	0.0	0.0
6	9.873D 03	5.8	2.665D 02	3.6	6	4	5	0	0	4.285D-04	0.0	3.680D-04	0.0	10 3 0	9.427D 02	50.0	5.912D 02	50.0
7	1.081D 04	6.0	6.020D 02	8.2	7	5	14	0	0	4.824D-04	0.0	5.208D-04	0.0	10 1 0	0.0	0.0	0.0	0.0
8	1.559D 04	9.2	9.459D 02	12.8	8	7	14	0	0	6.620D-03	0.0	2.317D-03	0.1	13 3 0	0.0	0.0	0.0	0.0
9	2.243D 03	1.3	1.988D 01	0.3	9	6	7	0	0	1.586D 00	2.0	7.278D-02	1.9					
10	2.628D 04	15.5	7.469D 02	10.1	10	5	7	0	0	2.030D-03	0.0	7.164D-03	0.2					

Figure 3-5. Example PRINT Output (Sheet 4 of 4)

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MODEL PARAMETERS

VEHICLE WT = 1.6400D 02

VEHICLE CG POSITION
X (FS) = 1.3361D 02
Y (BL) = 0.0
Z (WL) = 1.3536D 01

VEHICLE INERTIAS (IN-LB-SEC**2)
I(XX) = 1.4710D 03
I(YY) = 1.1830D 03
I(ZZ) = 2.1826D 03

VEHICLE CG INITIAL GROUND COORDINATES
XCG IS THE DISTANCE FROM SLOPE/GROUND INTERSECTION TO VEHICLE CG,+FORWARD
ZCG IS THE DISTANCE FROM GROUND PLANE TO VEHICLE CG,+DOWN
XCG = 0.0
ZCG = -4.6568D 01

BEAM LOADS

IJ	BEAM I	BEAM J	M	N	AXIAL LOAD BUCKLING	AXIAL LOAD TENSION	AXIAL LOAD COMPRESSION	SHEAR FORCE LATERAL(Y)	SHEAR FORCE VERTICAL(Z)	MOMENT ROLL(X)	MOMENT PITCH(Y)	MOMENT YAW(Z)	IJ	BEAM I	BEAM J	M	N
1	1	2	0	0	9.6224D 05	5.5500D 04	5.5500D 04	1.8592D 04	1.8592D 04	3.1043D 04	2.5986D 04	2.5986D 04	1	1	2	0	0
2	2	3	0	0	5.1264D 03	2.5960D 04	2.0480D 04	1.1792D 04	1.1792D 04	9.0559D 03	5.9021D 03	5.9021D 03	2	2	3	0	0
3	1	3	0	0	6.2570D 02	6.1100D 03	5.0700D 03	1.9162D 03	1.9162D 03	9.4352D 02	9.0699D 02	9.0699D 02	3	1	3	0	0
4	2	5	0	0	4.4813D 02	6.1100D 03	5.0700D 03	1.9162D 03	1.9162D 03	9.4352D 02	9.0699D 02	9.0698D 02	4	2	5	0	0
5	3	4	0	0	8.7050D 03	1.5980D 04	1.3260D 04	5.0116D 03	5.0116D 03	2.9530D 03	2.9918D 03	2.9918D 03	5	3	4	0	0
6	4	5	0	0	9.3498D 03	8.4600D 03	7.0200D 03	2.6532D 03	2.6532D 03	1.7876D 03	1.6881D 03	1.6881D 03	6	4	5	0	0
7	5	14	0	0	2.1762D 03	1.5980D 04	1.3260D 04	5.0116D 03	5.0116D 03	2.9530D 03	2.9918D 03	2.9918D 03	7	5	14	0	0
8	7	16	0	0	2.1762D 03	1.5980D 04	1.3260D 04	5.0116D 03	5.0116D 03	2.9530D 03	2.9918D 03	2.9918D 03	8	7	16	0	0
9	6	7	0	0	9.3498D 03	8.4600D 03	7.0200D 03	2.6532D 03	2.6532D 03	1.7876D 03	1.6881D 03	1.6881D 03	9	6	7	0	0
10	5	7	0	0	2.1762D 03	1.5980D 04	1.3260D 04	5.0116D 03	5.0116D 03	2.9530D 03	2.9918D 03	2.9918D 03	10	5	7	0	0
11	6	15	0	0	2.1762D 03	1.5980D 04	1.3260D 04	5.0116D 03	5.0116D 03	2.9530D 03	2.9918D 03	2.9918D 03	11	6	15	0	0
12	4	6	0	0	2.1762D 03	1.5980D 04	1.3260D 04	5.0116D 03	5.0116D 03	2.9530D 03	2.9918D 03	2.9918D 03	12	4	6	0	0
13	5	8	0	0	1.6581D 02	6.1100D 03	5.0700D 03	1.9162D 03	1.9162D 03	9.4352D 02	9.0699D 02	9.0699D 02	13	5	8	0	0
14	6	10	1	0	6.4729D 03	8.4600D 03	7.0200D 03	2.6532D 03	2.6532D 03	1.7876D 03	1.6881D 03	1.6881D 03	14	6	10	1	0
15	4	10	1	0	6.4729D 03	8.4600D 03	7.0200D 03	2.6532D 03	2.6532D 03	1.7876D 03	1.6881D 03	1.6881D 03	15	4	10	1	0
16	7	8	0	0	1.9344D 03	1.5980D 04	1.3260D 04	5.0116D 03	5.0116D 03	2.9530D 03	2.9918D 03	2.9918D 03	16	7	8	0	0
17	8	9	0	0	5.2833D 02	9.7500D 03	9.7500D 03	3.2642D 03	0.0	1.6083D 03	0.0	1.7442D 03	17	6	8	0	0
18	10	11	0	0	7.4022D 02	4.9092D 01	4.9092D 01	3.4948D 01	3.4948D 01	0.0	0.0	0.0	18	10	11	0	0
19	10	12	0	0	4.7374D 02	3.1419D 01	3.1419D 01	2.2364D 01	2.2364D 01	0.0	0.0	0.0	19	10	12	0	0
20	6	9	0	0	9.7625D 05	6.9750D 04	6.9750D 04	2.3366D 04	2.3366D 04	3.9565D 04	4.1559D 04	4.1559D 04	20	6	9	0	0
21	3	5	0	0	1.3269D 03	6.1100D 03	5.0700D 03	1.9162D 03	1.9162D 03	9.4352D 02	9.0699D 02	9.0698D 02	21	3	5	0	0
22	2	14	0	0	4.4813D 02	6.1100D 03	5.0700D 03	1.9162D 03	1.9162D 03	9.4352D 02	9.0699D 02	9.0699D 02	22	2	14	0	0
23	3	13	0	0	8.7050D 03	1.5980D 04	1.3260D 04	5.0116D 03	5.0116D 03	2.9530D 03	2.9918D 03	2.9918D 03	23	3	13	0	0
24	13	14	0	0	9.3498D 03	8.4600D 03	7.0200D 03	2.6532D 03	2.6532D 03	1.7876D 03	1.6881D 03	1.6881D 03	24	13	14	0	0
25	15	16	0	0	9.3498D 03	8.4600D 03	7.0200D 03	2.6532D 03	2.6532D 03	1.7876D 03	1.6881D 03	1.6881D 03	25	15	16	0	0

Figure 3-6. Example IC Output (Sheet 1 of 2)

BEAM DEFLECTIONS

IJ	BEAM I	J	M	N	DEFLECTION BUCKLING	TENSION	COMPRESSION	TRANSLATION DUE TO F(Y)	F(Z)	RM(Y)	RM(Z)	ROTATION ABOUT X-AXIS	Y-AXIS	Z-AXIS
1	1	2	0	0	8.6690-01	5.0000-02	5.0000-02	1.2710 00	1.2710 00	3.5540-01	3.5540-01	8.6830-02	5.3300-02	5.3300-02
2	2	3	0	0	9.0620-02	4.5890-01	3.6560-01	5.2970 02	5.2970 02	1.5150 01	1.5150 01	1.1200 00	6.4930-01	6.4930-01
3	1	3	0	0	3.3370-02	3.2590-01	2.7040-01	7.3350 02	7.3350 02	1.9080 01	1.9080 01	1.0670 00	7.8610-01	7.8610-01
4	2	5	0	0	2.8240-02	3.9510-01	3.1950-01	1.2100 03	1.2100 03	2.6630 01	2.6630 01	1.2600 00	9.2880-01	9.2880-01
5	3	4	0	0	9.7530-02	1.7300-01	1.4860-01	7.5760 01	7.5760 01	4.5230 00	4.5230 00	4.4010-01	3.3920-01	3.3920-01
6	4	5	0	0	1.4840-01	1.3430-01	1.1140-01	2.8010 01	2.8010 01	2.3760 00	2.3760 00	3.3020-01	2.3760-01	2.3760-01
7	5	14	0	0	4.8770-02	3.5810-01	2.9710-01	6.0610 02	6.0610 02	1.8090 01	1.8090 01	8.8020-01	6.7840-01	6.7840-01
8	7	16	0	0	4.8770-02	3.5810-01	2.9710-01	6.0610 02	6.0610 02	1.8090 01	1.8090 01	8.8020-01	6.7840-01	6.7840-01
9	6	7	0	0	1.4840-01	1.3430-01	1.1140-01	2.8010 01	2.8010 01	2.3760 00	2.3760 00	3.3020-01	2.3760-01	2.3760-01

BEAM UNCOUPLED, UNDAMPED FREQUENCIES (CPS)

IJ	I	J	M	N	(1)	(2)	(3)	(4)	(5)	(6)
1	1	2	0	0	2.4059D 03	2.7616D 02	2.7616D 02	2.8733D 02	5.5677D 02	7.1120D 02
2	2	3	0	0	4.7037D 02	9.3308D 00	9.3308D 00	1.9537D 01	1.1865D 01	1.2272D 01
3	1	3	0	0	3.1269D 02	3.6909D 00	3.6909D 00	1.4691D 01	2.7304D 01	3.2860D 01
4	2	5	0	0	2.1576D 02	2.1552D 00	2.1552D 00	1.5806D 00	3.1081D 00	2.5490D 00
5	3	4	0	0	5.3933D 02	1.4483D 01	1.4483D 01	5.9957D 00	2.7585D 01	1.3302D 01
6	4	5	0	0	3.7913D 02	1.4701D 01	1.4701D 01	3.6650D 00	1.0324D 01	1.2018D 01
7	5	14	0	0	2.9541D 02	4.0211D 00	4.0211D 00	3.2840D 00	7.5302D 00	5.6871D 00
8	7	16	0	0	2.9541D 02	4.0211D 00	4.0211D 00	3.2840D 00	7.5302D 00	5.6871D 00
9	6	7	0	0	3.5099D 02	1.3611D 01	1.3611D 01	3.1505D 00	9.5580D 00	9.5580D 00
10	5	7	0	0	2.9541D 02	4.0211D 00	4.0211D 00	3.2840D 00	7.5302D 00	5.6871D 00
11	6	15	0	0	2.9541D 02	4.0211D 00	4.0211D 00	3.2840D 00	7.5302D 00	5.6871D 00

DAMPING TERMS (LB/IN/SEC, TRANSLATIONS (1)-(3) AND LB-IN-SEC, ROTATIONS (4)-(6))

IJ	I	J	M	N	(1)	(2)	(3)	(4)	(5)	(6)
1	1	2	0	0	5.2921D-04	4.4105D-05	4.4105D-05	4.4312D-05	2.2882D-05	1.7902D-05
2	2	3	0	0	4.7671D-04	3.4113D-04	3.4113D-04	1.6292D-04	2.6826D-04	2.6043D-04
3	1	3	0	0	4.0719D-05	3.4496D-03	3.4496D-03	8.6668D-04	4.6632D-04	3.8747D-04
4	2	5	0	0	5.9017D-05	5.9078D-03	5.9078D-03	8.0564D-03	4.0965D-03	4.9562D-03
5	3	4	0	0	2.3607D-05	8.6714D-04	8.6714D-04	2.1235D-03	4.6157D-04	9.5716D-04
6	4	5	0	0	3.3594D-05	8.6607D-04	8.6607D-04	3.4740D-03	1.2333D-03	1.0594D-03
7	5	14	0	0	4.3101D-05	3.1663D-03	3.1663D-03	3.8771D-03	1.6908D-03	2.2388D-03
8	7	16	0	0	4.3101D-05	3.1663D-03	3.1663D-03	3.8771D-03	1.6908D-03	2.2388D-03
9	6	7	0	0	3.6275D-05	9.3547D-04	9.3547D-04	4.0414D-03	1.3321D-03	1.3321D-03
10	5	7	0	0	4.3101D-05	3.1663D-03	3.1663D-03	3.8771D-03	1.6908D-03	2.2388D-03
11	6	15	0	0	4.3101D-05	3.1663D-03	3.1663D-03	3.8771D-03	1.6908D-03	2.2388D-03

EULER ANGLES, BEAM IJ TO AIRPLANE (RADIANS)

IJ	I	J	M	N	THETJO(IJ)	PSIJO(IJ)
1	1	2	0	0	1.5708D 00	0.0
2	2	3	0	0	0.0	3.1415D 00
3	1	3	0	0	2.7830D-01	3.1415D 00
4	2	5	0	0	3.5422D-01	-2.6223D 01
5	3	4	0	0	0.0	-1.5708D 00
6	4	5	0	0	1.5708D 00	0.0
7	5	14	0	0	0.0	1.5708D 00
8	7	16	0	0	0.0	1.5708D 00

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Figure 3-6. Example IC Output (Sheet 2 of 2)

3.1.2.18 MATMUL

Subroutine MATMUL carries out the matrix multiplication A*B and returns the results in C.

CALLING STATEMENT ARGUMENT LIST			
Mnemonic	Symbol Ref. (1)	Type	
A		R*8	Input matrix
B		R*8	Input matrix
C		R*8	Resulting Output matrix

3.1.2.19 PREPLT

Subroutine PREPLT is called at the end of each run. The subroutine retrieves and reorders data sets previously stored on the logical units specified in Section 2.2. After processing, the data are transferred to subroutine PLOTT for subsequent output as summary plots. When the processing of data cannot be accomplished within the working space allocated to the subroutine, logical unit 12 is used for the temporary storage of the processed data. The maximum number of elements that can be accommodated in the allocated working space is tabulated in Table 3-2. Input of data to the subroutine is through the calling statement argument list as well as through the included common block regions.

CALLING STATEMENT ARGUMENT LIST			
Mnemonic	Symbol Ref. (1)	Type	
DELTAT		R*8	Integration time interval
NM		I*4	Number of mass elements
NNP		I*4	Number of massless node elements
NB		I*4	Number of beam elements
NSP		I*4	Number of external springs
NDRI		I*4	Number of DRI elements
MSECIN		I*4	Check point save times

TABLE 3-2. PLOT ELEMENT WORKING SPACE LIMITS

Element	Maximum Number of Elements Accommodated in Working Space
MASS	31
MASSLESS NODE	41
BEAM (Forces)	51
BEAM (Deflections)	51
BEAM (Stresses)	51
EXTERNAL SPRINGS	41
BEAM (Energies)	51
DRI	101

3.1.2.20 PLOTT

Subroutine PLOTT is called by subroutine PREPLOT and provides printer plotting capability for summary time history plots of requested model elements. This subroutine is a modified version of one published by Dr. David H. Laananen, Reference (4). The subroutine accepts data through the calling statement argument list and outputs the data in a special plot format. An example of the plot format is shown in Figure 3-7.

CALLING STATEMENT ARGUMENT LIST			
Mnemonic	Symbol Ref. (1)	Type	
M		I*4	Number dependent variables
NP		I*4	Dimension of X, Y1, Y2, Y3 arrays
X		R*4	Values for the independent variable
Y1		R*4	Values for the dependent variables
Y2		R*4	
Y3		R*4	

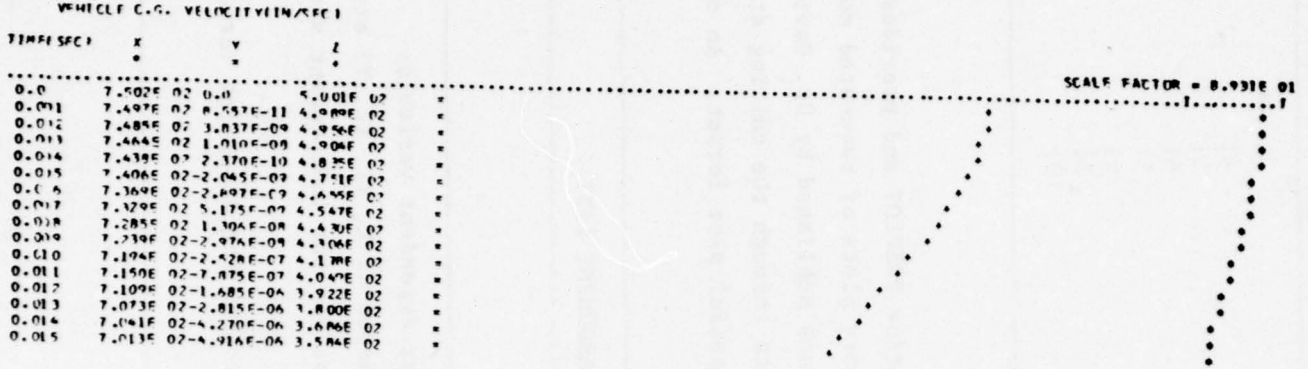


Figure 3-7. Example PLOTT Output

3.1.2.21 PAPLOT

Subroutine PAPLOT is called by subroutin PRINT at the beginning of each run and at each position plot time. See Section 2.2.7, Reference (2). The subroutine provides program KRASH with on-line plotting capability for plotting the location of mass elements in two-dimendional space. An example plot is shown in Figure 3-8.

Calls are made from PAPLOT to subroutines FSHELL, SHELLX, and SHELLM where data to be plotted is sorted. Based on the returned sorted data, format statements are generated which produce the desired position plots. Input data is supplied to PAPLOT through the calling statement argument list and the included common block regions.

CALLING STATEMENT ARGUMENT LIST			
Mnemonic	Symbol Ref. (1)	Type	
V		R*8	Quantity to be plotted along horizontal axis
W		R*8	Quantity to be plotted along vertical axis
XSCALE		R*4	Horizontal axis scale factor
YSCALE		R*4	Vertical axis scale factor
NPTS		I*2	Number of point to be included in plot
ISCALE		I*2	Scale option control flag

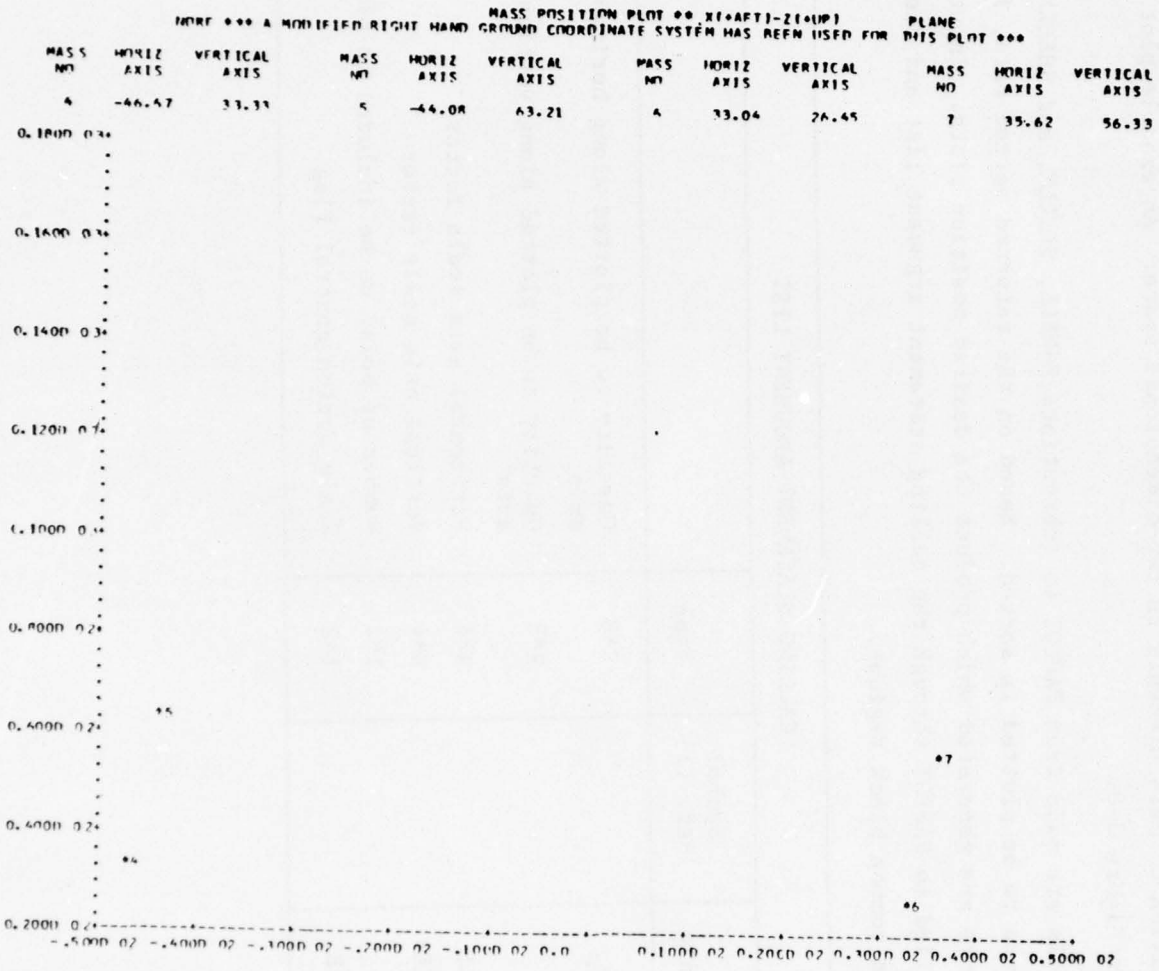


Figure 3-8. Example PAPLOT Output

3.1.2.22 FSHELL

Subroutine FSHELL is called by subroutine PAPLOT. In this subroutine elements located in ARRAY are sorted and relocated in ARRAY in ascending order (algebraically least first). The array KEY identifies and returns the original location of the corresponding element in ARRAY.

All data are passed through the calling statement argument list.

CALLING STATEMENT ARGUMENT LIST			
Mnemonic	Symbol Ref. (1)	Type	
ARRAY		R*4	Array containing elements to be sorted
KEY		I*4	Array containing integer flags which identify the location of corresponding ARRAY elements prior to sorting
N		I*4	Number of elements in ARRAY

3.1.2.23 SHELLX

Subroutine SHELLX is called by subroutine PAPLOT. In this subroutine elements of the array DARRAY are reordered in accordance with the locations specified by the elements in KEY.

All data are passed through the calling statement argument list.

CALLING STATEMENT ARGUMENT LIST			
Mnemonic	Symbol Ref. (1)	Type	
DARRAY		R*4	Array containing elements to be sorted
KEY		I*4	Array containing integer flags which identify order in which elements of DARRAY are to be sorted.
N		I*4	Number of elements in DARRAY

3.1.2.24 SHELLM

Subroutine SHELLM is called by subroutine PAPLOT. In this subroutine elements of the array M are reordered in accordance with the locations specified by the elements in KEY.

All data are passed through the calling statement argument list.

CALLING STATEMENT ARGUMENT LIST			
Mnemonic	Symbol Ref. (1)	Type	
KEY		I*4	Array containing integer flags which identify order in which elements of M are to be sorted.
M		I*4	Array containing elements to be sorted
N		I*4	Number of elements in M

3.2 COMMON BLOCK REGIONS

3.2.1 Common Block/Subroutine Cross Reference

Program KRASH is designed so that data storage and transfer is accomplished using the many common block regions defined within the program. A cross reference of the common block names and using subroutines is given in Table 3-3. Included in the cross reference summary are the core sizes required by the IBM 360 computer system for each of the regions.

3.2.2 Symbol Definitions

All of the common block regions allocated in program KRASH are summarized in Table 3-4. Included in the summary are the symbols used to identify the variables which make-up each block along with the symbol type, array dimension, and a brief definition.

3.1.2.22 FSHELL

Subroutine FSHELL is called by subroutine PAPLOT. In this subroutine elements located in ARRAY are sorted and relocated in ARRAY in ascending order (algebraically least first). The array KEY identifies and returns the original location of the corresponding element in ARRAY.

All data are passed through the calling statement argument list.

CALLING STATEMENT ARGUMENT LIST			
Mnemonic	Symbol Ref. (1)	Type	
ARRAY		R*4	Array containing elements to be sorted
KEY		I*4	Array containing integer flags which identify the location of corresponding ARRAY elements prior to sorting
N		I*4	Number of elements in ARRAY

3.1.2.23 SHELLX

Subroutine SHELLX is called by subroutine PAPLOT. In this subroutine elements of the array DARRAY are reordered in accordance with the locations specified by the elements in KEY.

All data are passed through the calling statement argument list.

CALLING STATEMENT ARGUMENT LIST			
Mnemonic	Symbol Ref. (1)	Type	
DARRAY		R*4	Array containing elements to be sorted
KEY		I*4	Array containing integer flags which identify order in which elements of DARRAY are to be sorted.
N		I*4	Number of elements in DARRAY

TABLE 3-3. COMMON BLOCK/SUBROUTINE CROSS REFERENCE SUMMARY

Common Block Region Name	Size in Bytes Fortran H Compiler (OPT = 2)	Subroutines																									
		ACCELT	CDATE	CFORCE	DATIN	DATOUT	DERIV	DOAIJ	ECHO	EULER	FSHELL	GENMOD	IC	INPRNT	INPUT	INTERP	JOBAC	MAIN	MATMUL	MATVEC	PAPLOT	PLOTT	PREPLT	PRINT	RC	RSIN	RSOUT	SHELLM	SHELLX
BLANKCOM	9980						•											•								•	•		
CFIC	58			•									•												•				
CFIR	640			•										•															
CFPR	B4D			•																				•		•	•		
COMALL	1C088			•			•	•				•	•	•	•			•						•	•	•	•		
COMNEW	18											•		•	•			•											
COMMI2	8D4											•		•	•														
COMMI4	268											•		•	•											•	•		
COMMR4	2FDO											•		•	•														
COMMR8	4B0											•		•	•														
DEIC	260						•						•											•	•				
DEIN	1022C						•					•		•	•									•		•	•		
DEIR	12CO						•							•															
DEINPR	48B0						•					•	•	•	•									•	•				
DEMA	8						•																	•					
DEPR	67B0						•																	•		•	•		
DINICP	2044						•					•	•	•	•									•	•	•	•		
DOIN	4B0						•					•		•	•														
ENERGY	16B8						•																	•		•	•		
IBALL	50													•	•														
INAC	15E4	•												•	•														
INCF	DC8			•								•		•	•														
INCFIC	8			•								•	•	•	•										•				
INDEAC	4	•					•					•		•	•														
INIC	CD8							•				•	•	•	•										•				
INIDCP	280			•			•	•				•	•	•	•									•	•				
ININPR	20													•	•									•					
INOUT	E													•	•									•					

TABLE 3-3. COMMON BLOCK/SUBROUTINE CROSS REFERENCE SUMMARY (Continued)

Common Block Regions	Fortran H Compiler (OPT = 2)	Subroutines																								
		ACCELT	CDATE	CFORCE	DATIN	DATOUT	DERIV	DOAIJ	ECHO	EULER	FSHELL	GENMOD	IC	INPRNT	INPUT	INTERP	JOBAC	MAIN	MATMUL	MATVEC	PAPLOT	PLOTT	PREPLT	PRINT	RC	RSIN	RSOUT	SHELIM	SHELIX
INPR	8			•			•					•	•	•	•			•						•		•	•		
IPIC	4												•	•	•										•				
IRDE	8						•							•															
MACF	3E84			•								•						•								•	•		
MACFIN	C			•			•					•		•	•			•					•						
MADE	1134						•											•								•	•		
MAPR	12CC																	•						•		•	•		
MAPR1	976																	•						•					
MAX	2B98						•																	•		•	•		
MCFIII	8			•			•						•	•	•			•						•	•				
NP00I2	320			•			•	•				•	•	•	•			•						•	•				
NP00I4	4			•			•	•				•	•	•	•			•						•	•	•	•		
NP00R8	4B0			•			•						•												•				
NP01I2	F0			•			•					•	•	•	•									•					
NP01R8	1C20						•	•					•											•	•	•	•		
NP0212	780											•		•	•														
NP02R8	4B0			•				•				•	•	•	•										•				
OLEO	82C						•					•	•	•	•											•	•		
OTPLT	F72														•			•					•	•					
PPLTS	4CA													•	•									•					
PRMA	2490						•											•						•		•	•		
RESTRT	30													•	•			•											
STUFF	3A0											•		•															
UB	70C						•					•		•	•														
VARINT	40						•							•	•			•						•					

TABLE 3-4. COMMON BLOCK SUMMARY

Common Name	Mnemonic	Type	Array Size	
BLANKCOM	XX	R*8	80	Total strain forces acting on mass resulting from summing over all beams attached to mass.
	XY	R*8	80	
	XZ	R*8	80	
	XL	R*8	80	
	XM	R*8	80	
	XN	R*8	80	
	DPX	R*8	80	Total damping forces acting on mass resulting from summing over all beams attached to mass.
	DPY	R*8	80	
	DPZ	R*8	80	
	DPL	R*8	80	
	DPM	R*8	80	
	DPN	R*8	80	
	PIN	R*8	80	Integral of angular velocities of mass.
	QIN	R*8	80	
	RIN	R*8	80	
	XI1	R*8	80	Integral terms in rigid body equations of motion
	XI2	R*8	80	
	XI3	R*8	80	
	XI4	R*8	80	
	XI5	R*8	80	
	XI6	R*8	80	
	DELI	R*8	80	Determinant of inertia matrix
	POLD	R*8	80	Previous Value for P
	QOLD	R*8	80	Previous Value for Q
	ROLD	R*8	80	Previous Value for R
	UOLD	R*8	80	Previous Value for U
	VOLD	R*8	80	Previous Value for V

TABLE 3-4. COMMON BLOCK SUMMARY (Continued)

Common Name	Mnemonic	Type	Array Size	
BLANKCOM (Cont'd)				
	WOLD	R*8	80	Previous Value for W
	XOLD	R*8	80	Previous Value for X
	YOLD	R*8	80	Previous Value for Y
	ZOLD	R*8	80	Previous Value for Z
	PINO	R*8	80	Previous Value for PIN
	QINO	R*8	80	Previous Value for QIN
	RINO	R*8	80	Previous Value for RIN
	PHIOLD	R*8	80	Previous Value for PHI
	THEOLD	R*8	80	Previous Value for THETA
	PSIOLD	R*8	80	Previous Value for PSI
	XACFD	R*8	80	Time Derivative of XACF
	YACFD	R*8	80	Time Derivative of YACF
	ZACFD	R*8	80	Time Derivative of ZACF
	XAFOLD	R*8	80	Previous Value for XACF
	YAFOLD	R*8	80	Previous Value for YACF
	ZAFOLD	R*8	80	Previous Value for ZACF
	XNPFD	R*8	50	Time Derivative of XNPF
	YNPFD	R*8	50	Time Derivative of YNPF
	ZNPFD	R*8	50	Time Derivative of ZNPF
	XANPFO	R*8	50	Previous Value for XACNPF
	YANPFO	R*8	50	Previous Value for YACNPF
	ZANPFO	R*8	50	Previous Value for ZACNPF
	TKR	R*8	200	Times for beam yielding and rupture summary table.
	TPEN	R*8	80	Penetration times.
	DTHALF	R*8		Half of time interval.

TABLE 3-4. COMMON BLOCK SUMMARY (Continued)

Common Name	Mnemonic	Type	Array Size	
BLANKCOM (Cont'd)	KRBEAM	I*4	4,200	1. Beam number for yield + rupture summary table. 2. Direction of yielding. 3. Direction of rupture. 4. Tension or compression code.
	KRFLAG	I*4	6,150	Set to 1.0 when i^{th} beam ($i = 1 \rightarrow 150$) yield in ℓ^{th} direction ($\ell = 1 \rightarrow 6$)
	IPEN	I*4	80	Mass which penetrates control volume.
	KPEN	I*4		Number of mass penetrations.
	KRCONT	I*4		Total number of lines of print in yielding and rupturing table.
CFIC	SINBET	R*8		Sin (Beta)
	COSBET	R*8		Cos (Beta)
	ABETA	R*8	9	Rotational transformation - ground to slope axis.
CFIR	SIFL	R*8	40	External spring deflection values at: Initial end of first load level
	SAFL	R*8	40	External spring deflection values at: start of second load level
	SBFL	R*8	40	External spring deflection values at: final
	SFFL	R*8	40	
	XKEFL	R*8	40	bottoming spring stiffness.
CFPR	FSPRNG	R*8	40, 7	External spring output print quantities.
	DELG	R*8	40	Ground deflection.
COMALL	C	R*8	6,150	Damping coefficients
	P	R*8	80	Angular Velocity about X Axes
	Q	R*8	80	Angular Velocity about Y Axes
	R	R*8	80	Angular Velocity about Z Axes

TABLE 3-4. COMMON BLOCK SUMMARY (Continued)

Common Name	Mnemonic	Type	Array Size	
COMALL (Cont'd)				Damping coefficients
	U	R*8	80	Linear Velocity along {X, Y, Z} Axes
	V	R*8	80	
	W	R*8	80	
	X	R*8	81	Ground Coordinate of mass
	Y	R*8	81	
	Z	R*8	81	
	AI	R*8	9	Rotational transformation for mass I body axis to ground axis.
	AJ	R*8	9	Rotational transformation for mass J body axis to ground axis.
	SC	R*8	40	Spring axial deflection.
	XC	R*8	6	Six spring forces for mass I.
	XK	R*8	5400	Stiffness matrix for all beams.
	XI	R*8	80	Mass moment of inertia I_{XX}
	YI	R*8	80	I_{YY}
	ZI	R*8	80	I_{ZZ}
	XYI	R*8	80	I_{XY}
	XZI	R*8	80	I_{XZ}
	YZI	R*8	80	I_{YZ}
	AIJ	R*8	9	Rotation transformation, beam axis into ground axis.
	BIJ	R*8	720	All elements of Ai matrix.
	DRI	R*8	150	Dynamic Response Index for beam.
	OAI	R*8	720	OLD AI matrix.

TABLE 3-4. COMMON BLOCK SUMMARY (Continued)

Common Name	Mnemonic	Type	Array Size	
COMALL (Cont'd)	VEE	R*8	900	Beam relative deflection vector.
	WGT	R*8	80	Mass weight.
	PHI	R*8	80	Euler angles defining orientation of mass I relative to ground.
	THETA	R*8	80	
	PSI	R*8	80	
	PDOT	R*8	80	Time derivative of P
	QDOT	R*8	80	Time derivative of Q
	RDOT	R*8	80	Time derivative of R
	UDOT	R*8	80	Time derivative of U
	VDOT	R*8	80	Time derivative of V
	WDOT	R*8	80	Time derivative of W
	XDOT	R*8	80	Time derivative of X
	YDOT	R*8	80	Time derivative of Y
	ZDOT	R*8	80	Time derivative of Z
	PHIDOT	R*8	80	Time derivative of PHI
	THEDOT	R*8	80	Time derivative of THETA
	PSIDOT	R*8	80	Time derivative of PSI
	TIME	R*8		Time.
	DFLTAT	R*8		Integration time interval.
	XACC	R*8	80	Acceleration in body axis.
	YACC	R*8	80	
	ZACC	R*8	80	
	AIDOT	R*8	9	
	PHIIJ	R*8	150	Euler angles defining beam axis relative to ground. Used to calculate AIJ.
	THEIJ	R*8	150	
	PSIIJ	R*8	150	
	SUMDF	R*8	6,150	Summation of incremental strain forces over time.

TABLE 3-4. COMMON BLOCK SUMMARY (Continued)

Common Name	Mnemonic	Type	Array Size	
COMALL (Cont'd)	TITLE	I*4	40	Run title.
	XLBAR	R*8	40	External spring length.
	FSPBAR	R*8	40	External spring axial load when unloading occurred.
	VEEDOT	R*8	3, 3	Spring contact point velocities relative to ground.
	DX	R*8	81	change, over time Δt of X
	DY	R*8	81	change, over time Δt of Y
	DZ	R*8	81	change, over time Δt of Z
	DPIN	R*8	81	change in $\int pdt$ incremental rotation
	DQIN	R*8	81	change in $\int qdt$ incremental rotation
	DRIN	R*8	81	change in $\int rdt$ incremental rotation
	SEIJ	R*8	150	Strain energy for beam IJ.
	DEIJ	R*8	150	Damping energy for beam IJ.
	CEIK	R*8	40	Crushing energy for external spring IK
	CEIKF	R*8	40	Friction energy for external spring IK
	SBAR	R*8	40	Unloading deflection for external spring IK
	KUN	R*8	40	Unloading stiffness for external spring IK
	MAXNM	I*4		Maximum number of masses.
	MAXIGS	I*4		Maximum number of beams.
	MAXTBL	I*4		Maximum number of KR tables.
	NM	I*4		Number of mass elements.
	NB	I*4		Number of beam elements.
	I	I*4		Mass number.
	J	I*4		Mass number.
	IG	I*2	150	Mass at i^{th} end of beam IJ
	JG	I*2	150	Mass at j^{th} end of beam IJ
	N1	I*2	900	Unloading - reloading beam spring
	NN	I*2	40	Flag for
	IJPR	I*2	150	DRI element flag

TABLE 3-4. COMMON BLOCK SUMMARY (Continued)

Common Name	Mnemonic	Type	Array Size	
COMM12	IQ	I*2	180	Mass number I for KR table.
	JQ	I*2	180	Mass number J of KR table.
	LQ	I*2	180	Direction identification for KR table.
	NPQ	I*2	180	No. of points in KR table.
	INBUF	I*2	80	Mass numbers for nonstandard HE's.
	NKMVEC	I*2	150	Beams with directly input K matrices.
	ISAVE	I*2	180	Beams with KR tables.
COMMI4	ND	I*4		No. of nonstandard damping values for beams.
	NVBMN	I*4		No. of beams having nonstandard maximum negative deflection cut-off.
	NFBMN	I*4		No. of beams having nonstandard maximum negative load cut-off.
	NHI	I*4		No of nonstandard He's or non zero I_{XY}, I_{YZ}, I_{ZX}.
	NKM	I*4		No. of user supplied stiffness matrices.
	NLB	I*4		No or nonlinear beam KR curves.
	NPH	I*4		No. of masses having nonstandard Euler angles.
	NMTL	I*4		No. of nonstandard materials.
	NPTS	I*4	50	No. of points in accel. history table.
	NVBM	I*4		No. of beams having nonstandard maximum positive deflection cut-off.
	IJPRT	I*4	14	DRI element identification numbers.
	IPHDP	I*4	80	Mass number for nonzero Euler angles.
	NFBM	I*4		No. of beams having nonstandard maximum positive load cut-off.
COMMR4	KR	R*4	2700	Stiffness reduction factor.
	LDP	R*4	180	Linear deflection point.
	LDP1	R*4	180	Linear deflection point for reloading.
COMMR8	G	R*8	150	Beam material shear modulus.
COMNEW	DAMPC	R*8		Default critical damping coefficient for all beams.
	RUNMOD	R*8		Run mode control flag.
	PUNMOD	R*8		Punch mode control flag.

TABLE 3-4. COMMON BLOCK SUMMARY (Continued)

Common Name	Mnemonic	Type	Array Size	
DEIC	WTOT	R*8		Total vehicle weight.
	CLTEST	R*4	150	Beam elements which lie in the airplane plane of symmetry.
DEIN	XNBAR	R*8		Coordinates defining volume for MASS penetration calculations.
	XPBAR	R*8		
	YNBAR	R*8		
	YPBAR	R*8		
	ZNBAR	R*8		
	ZPBAR	R*8		
	VOLENZ	R*8	5, 3	Volume change reference volumes time zero lengths.
	HEX	R*8	80	Angular momenta of rotating masses.
	HEY	R*8	80	
	HEZ	R*8	80	
	ALIFT	R*8	80	Aerodynamic lift constant for mass I.
	VMAX	R*8	900	Maximum allowable beam positive deflections - rupture.
	VMAXN	R*8	900	Maximum allowable beam negative deflections - rupture.
	FMAXN	R*8	900	Maximum allowable beam negative force - rupture.
	XKS	R*4	2700	Slopes for KR table calculations.
	XKI	R*4	2700	Intercepts
	XKR	R*4	2700	Deflections
	NLSFLG	I*2	900	Nonlinear beam table member.
	CHUG	I*2	180	Starting point in KR table for beam IJ.
	MVP	I*4		Mass volume penetration identification.
	FMAX	R*8	900	Maximum allowable beam positive force - rupture.

TABLE 3-4. COMMON BLOCK SUMMARY (Continued)

Common Name	Mnemonic	Type	Array Size	
DEINPR	AA	R*8	150	Beam cross sectional area.
	E	R*8	150	Beam material elastic mod.
	YY	R*8	150	Area moment of inertia I_Y.
	ZZ	R*8	150	Area moment of inertia I_Z.
	XIQ	R*8	150	Torsional stress parameter.
	XLB	R*8	150	Beam length.
	Z1	R*8	150	Distance to extreme fiber.
	Z2	R*8	150	Distance to extreme fiber.
	MC	I*4	150	Material code.
	XJ	R*8	150	Beam polar area moment of inertia.
	SF26	R*8	150	Shape factor for moment about Z azis at beam i^{th} end.
	SF35	R*8	150	Shape factor for moment about Y axis at beam i^{th} end.
	SF26J	R*8	150	Shape factor for moment about Z axis at beam j^{th} end.
	SF35J	R*8	150	Shape factor for moment about Y axis at beam j^{th} end.
	PY	I*4	150	} Designates beam pinned at i^{th} end.
	PZ	I*4	150	
	PYJ	I*4	150	} Designates beam pinned at j^{th} end.
	PZJ	I*4	150	
	NSC	I*4		Flag to call for stress calculation.
	NPIN	I*4	150	No. of pin-ended beams.
DEIR	PLM26	R*8	150	Plastic moment about Z axis at beam i^{th} end.
	PLM35	R*8	150	Plastic moment about Y axis at beam i^{th} end.
	PLM26J	R*8	150	Plastic moment about Z axis at beam j^{th} end.
	PLM35J	R*8	150	Plastic moment about Y axis at beam j^{th} end.
DEMA	DEVMAX	R*8		Maximum percent deviation for mass energy calculations.

TABLE 3-4. COMMON BLOCK SUMMARY (Continued)

Common Name	Mnemonic	Type	Array Size	
DEPR	XDOTAP	R*8		Overall vehicle velocity parallel to ground axis. X
	YDOTAP	R*8		Y
	ZDOTAP	R*8		Z
	DLVOC	R*8	5, 3	Volume length changes.
	FRD	R*8	150,4	Ratio of current max. stress to failure stress - constant energy at dist. theory.
	FRS	R*8	150,4	Ratio of current max. stress to failure stress - max. shear theory.
	SUMDFI	R*8	6,150	Strain force at i^{th} mass.
	FINTI	R*8	6,150	Total of strain and damping force at i^{th} mass.
	VEEN	R*8	2,150	Sum of θ and ψ deflections at i^{th} and j^{th} ends of the beam.
DINICP	STENS	R*8	20	Tension yield stress.
	SCOMP	R*8	20	Compression yield stress.
	SHEAR	R*8	20	Shear yield stress.
	EE	R*8	20	Young's modulus.
	GG	R*8	20	Torsional modulus.
	FINT	R*8	6,150	Total beam force.
	VOL	R*8	5	Current volume for volume change calculations
	VZERO	R*8	5	Initial volume for volume change calculations
	KMATR	I*4	6, 4	Volume corner numbers.
	NVCH	I*4		Number of volumes.
	INBUFF	I*2	5, 8	Mass numbers forming volumes.
DOIN	CBAR	R*8	150	Damping coefficient for beam IJ.
ENERGY	XPCT	R*8	80	Percent of total energy change at mass.
	XETOT	R*8	80	Total energy (by masses and for system).
	XETOTO	R*8	80	Initial total energy (by masses and for system).
	XSE	R*8	80	Mass related strain energy.
	XDE	R*8	80	Mass related damping energy.
	XCE	R*8	80	Mass related crushing energy.
	XFE	R*8	80	Mass related friction energy.
	KEI	R*8	80	Mass related kinetic energy.

TABLE 3-4. COMMON BLOCK SUMMARY (Continued)

Common Name	Mnemonic	Type	Array Size	
ENERGY (Cont'd)	PEI	R*8	80	Mass related potential energy.
	XETOTL	R*8		Total system energy.
	KETOTL	R*8		Total system kinetic energy.
	PETOTL	R*8		Total system potential energy.
	SETOTL	R*8		Total system strain energy.
	DETOTL	R*8		Total system damping energy.
	CETOTL	R*8		Total system crushing energy.
	FETOTL	R*8		Total system friction energy-
IBALL	IBUF1	I*4	20	Index for new materials.
INAC	ACCEL	R*8	300	Table of option mass acceleration levels.
	TIM	R*8	300	Time at which acceleration levels are input.
	INDEX	I*4	50, 2	Mass number and direction index for acceleration data.
	JAY	I*4	50, 2	Table number and number of acceleration points in table.
	KOUNT	I*4		Counter for number of acceleration pulse points.
INCF	SA	R*8	40	} External spring input table parameters.
	SB	R*8	40	
	SF	R*8	40	
	SI	R*8	40	
	XMU	R*8	40	External spring coeff. of friction.
	XKE	R*8	40	Bottoming spring stiffeners.
	XMAX	R*8	40	} External spring { plowing force
	FSPOF	R*8	40	{ load-defl. par.
	FSPOI	R*8	40	{ load-defl. par.
	GFLEX	R*8	40	Ground stiffness
	CDAMP	R*8	40	External spring damping coefficient
	PLOWT	R*8		Starting time for plowing force.
INCFIC	BETA	R*8		Ground slope angle - degrees.
INDEAC	NACC	I*4		Number of acceleration input tables.
INIC	XDP	R*8	80	F.S. } coordinates of mass points
	ZDP	R*8	80	W.L. }

TABLE 3-4. COMMON BLOCK SUMMARY (Continued)

Common Name	Mnemonic	Type	Array Size	
INIC (Cont'd)	PHIDP	R*8	80	Euler angles for body axis to airplane axis at t = 0.0.
	PSIDP	R*8	80	
	THEDP	R*8	80	
	PPR	R*8		Initial airplane angular velocities.
	QPR	R*8		
	RPR	R*8		
	XGIN	R*8		Distance aft of initial c.g. position
	ZGIN	R*8		Distance up of vehicle
	PHIPR	R*8		Initial airplane attitude relative to ground.
	PSIPR	R*8		
	THEPR	R*8		
	XGDOT	R*8		Initial airplane c.g. velocity in ground axis.
	YGDOT	R*8		
	ZGDOT	R*8		
INIDCP	YDP	R*8	80	Mass "Y" coordinate.
ININPR	NSF	I*4		Print flags for beam strain forces
	NTF	I*4		total beam forces
	NDE	I*4		beam deflections
	NSPD	I*4		spring loads and deflections
	NED	I*4		
	NS	I*4		energy breakdown by mass
	NRP	I*4		beam & spring beam stresses
	NIMP	I*4		mass displacements, velocities, and accelerations
				mass impulses
INOUT	FCUT	R*8		Cutoff frequency for digital filter.
	NTOL1	I*2		Tolerances for total energy growth.
	NTOL2	I*2		Tolerance for negative train, damping, crushing and friction length.
	NTOL3	I*2		Tolerance for mass energy deviation.
INPR	NDRI	I84		Number of DRI beam elements.
	NSP	I*4		Number of external springs.

TABLE 3-4. COMMON BLOCK SUMMARY (Continued)

Common Name	Mnemonic	Type	Array Size	
IPIC	NIC	I*4		Flag to call for print out of preliminary failure loads and deflections.
IRDE	PFIL	R*8		Tire constant.
MACF	FSOP	R*8	40	Maximum spring force - previous value.
	SCP	R*8	40	Maximum spring deflection - previous value.
	EXSP	R*8	5,200	1. Initial deflection value. 2. Maximum force value. 3. Maximum deflection value. 4. Unloaded deflection value. 5. Unloaded force value.
	TSP	R*8	200	Time for external spring loading or unloading event.
	STEMP1	R*8	40	Temporary tracking of external spring deflections and forces for use in restart.
	STEMP2	R*8	40	
	STEMP3	R*8	40	
	STEMP4	R*8	40	
	STEMP5	R*8	40	
	KKSP	I*4	5,200	1. Spring mass number. 2. Massless node number. 3. Spring direction. 4. Type = JBS. 5. Not used.
	KKONT	I*4		Total number of lines of print for external spring behavior summary.
	IBS	I*2	40	Flag cut to 1 when external spring has bottomed.
	JBS	I*2	40	Flag used in summary of external spring behavior: 1. Initial loading. 2. Max. loading. 3. Unload to zero. 4. Start of reload.
MACFIN	IPRINT	I*4		Multiple of time increment defining print time.
	TMAX	R*8		Maximum run time.
MADE	KFL26	I*4	150	Flag that indicates whether direction 2 or 6 went nonlinear first.
	KFL35	I*4	150	Flag that indicates whether direction 3 or 5 went nonlinear first.

TABLE 3-4. COMMON BLOCK SUMMARY (Continued)

Common Name	Mnemonic	Type	Array Size	
MADE (Cont'd)	FL26I	I*2	150	Flag to indicate occurrence of plastic hinge formation about Z axis at i^{th} & j^{th} end and about Y axis at i^{th} and j^{th} end, respectively.
	FL26J	I*2	150	
	FL35I	I*2	150	
	FL35J	I*2	150	
	BPL	I*4	100,3	Plastic hinge summary beam number direction, and i^{th} or j^{th} end.
	KPL	I*4	—	Counter for number of plastic hinge formations.
	TPL	R*8	100	Time of plastic hinge formation.
MAPR	ETOTTO	R*8		Total system energy for time zero.
	ENGSMY	R*4	6,200	Energy summary terms printed at end of run.
	INGSCT	I*4		Total number of time cuts printed in energy summary.
MAPR1	DEV	R*8	200	Absolute value of mass energy deviation.
	ETIME	R*4	200	Summary table for energy print.
	IEER	I*2		Error flag.
	IESE	I*2		Error flags for: total strain energy
	IEPSE	I*2		element strain energy
	IEDE	I*2		total damping energy
	IEPDE	I*2		element damping energy
	IECE	I*2		total crushing energy
	IEPCE	I*2		mass crushing energy
	IEFE	I*2		total friction energy
	IEPFE	I*2		mass friction
	IEDEV	I*2		mass deviation
	IETOT	I*2		total energy change
MAX	IRUPSW	I*4	150	Identification of "rupture" beams.
	IPENSW	I*4	80	Identifies mass volume penetration occurrence.
	VEEBAR	R*8	900	Absolute value of beam deflection.
	ZINIT	R*8	80	Initial value (time = 0) of mass ground "Z" coordinate value.
	DPHIIJ	R*8	150	Incremental value of Euler angle for ϕ direction.

TABLE 3-4. COMMON BLOCK SUMMARY (Continued)

Common Name	Mnemonic	Type	Array Size	
MAX (Cont'd)	FUB	R*8	150	Total axial load for an unsymmetrical beam.
MCFIII	SYMFLG	R*8		Flag defining symmetry option.
NPOOI2	MG	I*2	150	Node point number at i^{th} end of beam.
	NG	I*2	150	Node point number at j^{th} end of beam.
	INP	I*2	50	Mass to which node is rigidly attached.
	MNP	I*2	50	Node point number.
NPOOI4	NMP	I*4		Number of mass less node elements.
NPOOR8	RX	R*8	50	X } component of vector from mass to node point, mass axes
	RY	R*8	50	Y
	RZ	R*8	50	Z
NPO1I1	II	I*2	40	Mass number for } IKM^{th} spring
	KK	I*2	40	Direction of
	MM	I*2	40	Node point for
NPO1R8	XNP	R*8	50	X } coordinates of node points
	YNP	R*8	50	Y
	ZNP	R*8	50	Z
	UNP	R*8	50	X } component of node point velocity, mass axes
	VNP	R*8	50	Y
	WNP	R*8	50	Z
	XNDP	R*8	50	X } component of node point velocity, ground axes
	YNDP	R*8	50	Y
	ZNDP	R*8	50	Z
	XACCNP	R*8	50	X } component of node point acceleration, mass axes
	YACCNP	R*8	50	Y
	ZACCNP	R*8	50	Z
	SBUCKR	R*8	150	Beam critical buckling stress
	PCR	R*8	150	Beam critical buckling load
NPO2I2	MQ	I*2	180	} Node points for spec. of KR tables.
	NQ	I*2	180	
	IJVM	I*2	150	} Index for beams which have positive deflection or force for a rupture value, respectively.
	IJFM	I*2	150	

TABLE 3-4. COMMON BLOCK SUMMARY (Continued)

Common Name	Mnemonic	Type	Array Size	
NPO2I2	IJVMN	I*2	150	Index for beams which have negative deflection or force for a rupture value, respectively.
	IJFMN	I*2	150	
NPO2R8	XNPDP	R*8	50	Node point coordinates (F.S.)
	YNPDP	R*8	50	Node point coordinates (B.L.)
	ZNPDP	R*8	50	Node point coordinates (W.L.)
OLEO	EOLEO	R*8	20	Effective total strut cylinder length.
	FAO	R*8	20	Fully extended gear preload
	FAA	R*8	20	Ambient air preload.
	EXPOLE	R*8	20	Polytropic exponent
	YMAX	R*8	20	Maximum strut stroke
	YOLEO	R*8	20	Strut stroke at any time.
	BOLEO	R*8	20	Strut orifice damping.
	BROLEO	R*8	20	Strut rebound valve damping
	XKEXT	R*8	20	Linear spring stiffness at extended end of strut travel.
	XKCOMP	R*8	20	Linear spring stiffness at compressed end of strut travel.
	FCOUL	R*8	20	Coulomb or constant friction force value.
	ALPHAP	R*8		Constant used in computing shock strut friction force.
	IGOLEO	I*4	20	i^{th} end of beam identification.
	JGOLEO	I*4	20	j^{th} end of beam identification.
	MGOLEO	I*4	20	m^{th} massless node identification.
	NGOLEO	I*4	20	n^{th} massless node identification.
	NOLEO	I*4		Number of shock struts.
OTPLT	NMEP	I*2		Number of mass plots requested
	NNEP	I*2		Number of node plots requested
	NBFP	I*2		Number of beam force plots requested
	NBDP	I*2		Number of beam deflection plots requested
	NSEP			Number of spring plots requested
	NDRP	I*2		Number of DRI plots requested
	NSTP	I*2		Number of beam stress plots requested
	NENP	I*2		Number of beam energy plots requested

TABLE 3-4. COMMON BLOCK SUMMARY (Continued)

Common Name	Mnemonic	Type	Array Size	
OTPLT (Cont'd)	JMASS	I*2	50,10	Plot flag for: mass plot
	JNODE	I*2	50,8	Plot flag for: node plot
	JBMF	I*2	50,4	Plot flag for: beam force plot
	JBMD	I*2	50,4	Plot flag for: beam deflection plot
	JBMS	I*2	50,6	Plot flag for: beam stress plot
	JSPR	I*2	50,4	Plot flag for: spring plot
	JENG	I*2	50,3	Plot flag for: beam energy plot
	JDRI	I*2	10	Plot flag for: DRI plot
	NMEW	I*2		Counters which are indexed when plot data is written: mass
	NNEW	I*2		Counters which are indexed when plot data is written: node
	NBFW	I*2		Counters which are indexed when plot data is written: beam force
	NBDW	I*2		Counters which are indexed when plot data is written: beam deflection
	NSEW	I*2		Counters which are indexed when plot data is written: spring
	NDRW	I*2		Counters which are indexed when plot data is written: DRI
	NSTW	I*2		Counters which are indexed when plot data is written: beam stress
	NENW	I*2		Counters which are indexed when plot data is written: beam energy
	NPRINT	I*2		Flag which controls counters.
PPLTS	XSCALE	R*8	10	X axis scale factor for position plots
	YSCALE	R*8	10	Y axis scale factor for position plots
	NPLT	I*2		Number of plots.
	NPFCT	I*2		Plot print factor.
	IPFCT	I*2		Counter for plot print.
	ITPL	I*2	10	Plot plane.
	NMPTS	I*2	10	Number of points in plot.
	MNUM	I*2	50,10	Mass point identification of plot points.
	ISCALE	I*2	10	Scale option.
PRMA	XACF	R*8	80	Mass point filtered acceleration.
	YACF	R*8	80	Mass point filtered acceleration.
	ZACF	R*8	80	Mass point filtered acceleration.
	XACNPF	R*8	50	Node point filtered acceleration.
	YACNPF	R*8	50	Node point filtered acceleration.
	ZACNPF	R*8	50	Node point filtered acceleration.

TABLE 3-4. COMMON BLOCK SUMMARY (Continued)

Common Name	Mnemonic	Type	Array Size	
PRMA (Cont'd)	XIMP	R*8	80	Mass point filtered impulses.
	YIMP	R*8	80	
	ZIMP	R*8	80	
	XIMPNP	R*8	50	Massless node point filtered impulses.
	YIMPNP	R*8	50	
	ZIMPNP	R*8	50	
	XIMPOL	R*8	80	Mass point filtered impulses - previous value
	YIMPOL	R*8	80	
	ZIMPOL	R*8	80	
	XIMPNL	R*8	50	Massless node point filtered impulses - previous value.
	YIMNPL	R*8	50	
	ZIMNPL	R*8	50	
RESTRT	CASEIN	R*8		Checkpoint title.
	RUNIN	I*4		Check point case number.
	MSECIN	I*4		Check point save times.
	CASOUT	R*8		Restart title.
	RUNOUT	I*4		Restart case number.
	MSCOUT	I*4	5	Restart time.
STUFF	NEWI	I*4	80	Beam and mass numbering correspondence (left/right) data.
	NEWIJ	I*4	150	
	NMOLD	I*4		
	NBOLD	I*4		
UB	DB	R*8	150	Deadband.
	IJUB	I*4	150	Type; 1 - tension -1 - compression
	NUB	I*4		Number of unsymmetrical beams.
**VARINT	MINDT	R*8		Minimum integration interval.
	DT2	R*8		Half of integral interval.
	TPRINT	R*8		Print time.
	EL	R*8		Lower limit.
	EU	R*8		Upper limit.
	RATMIN	R*8		Minimum rate of change of DT.

TABLE 3-4. COMMON BLOCK SUMMARY (Continued)

Common Name	Mnemonic	Type	Array Size	
**VARINT (Cont'd)	RATMAX	R*8		Maximum rate of change of DT.
	IPC	I*4		
	IVAR	I*4		
**Terms in common statement available for future use only.				

3.3 PERMANENT DATA STORAGE AND RETRIEVAL

The tape data management routines included in program KRASH are executed when the restart option is invoked. The routines provide a systematic means by which data can be stored on and retrieved from magnetic tape. A general description of the management system and routines involved is provided in the following sections.

3.3.1 Tape Data Management

3.3.1.1 Data Storage

Before any data can be stored, it is necessary to first place an end of file (EOF) mark at the beginning of the reserved tape allocated for the permanent storage of restart data. This is necessary because when data are stored the routines search for an EOF mark before storing.

Data are,stored in blocks which are referred to as "user data sets". These data sets are made up of the state vector data referred to in Section 2.3. Prior to storing a user data set, a header is generated and placed at the beginning of the user data set along with restart information supplied as input which uniquely identifies the data set. See Section 2.1 of Reference (2) and line 6 of the Example Input Data, Figure 4-2 of this manual.

3.3.1.2 Data Retrieval

A user data set previously stored as part of the restart option may be retrieved by searching the stored data for the header information which identifies the desired data set. The header information identifying the desired data set is supplied as input data. See Section 2.1 of Reference (2) and line 5 of the Example Input Data, Figure 4-3 of this manual.

3.3.2 Data Management Routines

3.3.2.1 Data Storage

3.3.2.1.1 OPNOUT

OPNOUT is an entry point in subroutine DATOUT. The call to OPNOUT is made from subroutine RSOUT to open a new data set.

OPNOUT reads through the data on the restart tape until an EOF mark is located. The tape is backspaced over the EOF mark and the user data set mark (**START*) and header is written over the EOF mark. The header consists of a 24-word (96 byte) record containing the following information:

- Words 1-2 Date in the form MM-DD-YY supplied by a call to subroutine CDATE
- Words 3-24 Data supplied by a call to subroutine JOBAC

CALLING STATEMENT ARGUMENT LIST			
Mnemonic	Symbol Ref. (1)	Type	
UNIT		I*4	Unit allocated for the reversed restart tape (Unit 21)

3.3.2.1.2 DATOUT

Subroutine DATOUT is called by subroutine RSOUT. Data are collected within DATEOUT. To these data are added an 8-character literal used to name the data set and a four byte word which specifies the number of words to be stored. Thus, the total data set consists of (1) an 8-character literal, (2) a 4 byte word, and (3) the state vector data. All data are stored in blocks of 250 words in core. When the block is filled, the data are written onto the reserved restart tape.

CALLING STATEMENT ARGUMENT LIST			
Mnemonic	Symbol Ref. (1)	Type	
X		I*4	State vector data to be saved
NAME	NAME	R*8	Check point run name identifier
NWDS		I*4	Number of words to be stored
UNIT		I*4	Unit allocated for the reserved restart tape (Unit 21)
ERROR		I*4	Error flag returned by the tape write routine

3.3.2.1.3 CLSOUT

CLSOUT is an entry point in subroutine DATOUT. The call to CLSOUT is made from subroutine RSOUT to close a new data set.

CLSOUT fills any remaining space in the 250-word block used by DATOUT with end of data set marks (*END). After the block is filled and written onto the reserved restart tape an EOF mark is placed on the tape. The tape is then backspaced over the EOF mark in anticipation of a further extension of the tape.

CALLING STATEMENT ARGUMENT LIST			
Mnemonic	Symbol Ref. (1)	Type	
UNIT		I*4	Unit allocated for the reserved restart tape (Unit 21)

3.3.2.1.4 JOBAC

Subroutine JOBAC is supplied as a dummy subroutine. It provides a means by which user supplied accounting or other pertinent information can be returned to the calling subroutine DATOUT as a 22-word array named ACCARD. As supplied, JOBAC returns blank data.

CALLING STATEMENT ARGUMENT LIST			
Mnemonic	Symbol Ref. (1)	Type	
ACCARD		R*4	Twenty-two word blank array

3.3.2.1.5 CDATE

Subroutine CDATE is supplied as a dummy subroutine. It provides a means by which the current date, to be supplied by the user, can be returned to the calling subroutine DATOUT by way of the calling statement agreement list. As supplied, this subroutine returns the character strings MM-D and D-YY.

CALLING STATEMENT ARGUMENT LIST			
Mnemonic	Symbol Ref. (1)	Type	
DATE		R*4	Dummy array name
ITYPE		I*4	Dummy name

3.3.2.2 Data Retrieval

3.3.2.2.1 OPNIN

OPNIN is an entry point in subroutine DATIN. The call to OPNIN is made from subroutine RSIN to open an existing user data set prior to the retrieval of data.

OPNIN reads the reserved restart tape until a user data set mark (**START*) is found. The first 250 word block after the user data set mark is read and the header and data set identifiers are recovered and returned to RSIN.

CALLING STATEMENT ARGUMENT LIST			
Mnemonic	Symbol Ref. (1)	Type	
HEADER		I*4	Header array
NWDS		I*4	Number of words to be retrieved
UNIT		I*4	Unit allocated for the reserved restart tape (Unit 21)
ERROR		I*4	Error flag returned by tape read routine

3.3.2.2.2 DATIN

Subroutine DATIN is called from subroutine RSIN. DATIN receives header and user data set identifiers from OPNIN. The identifiers are compared with corresponding identifiers supplied as input data. See Section 2.1 of Reference (2). If agreement is achieved, the remaining data in the user data set are read from the reserved restart tape and returned to RSIN. If the comparison fails, execution is passed to CLSIN where the data set is closed and OPNIN called again.

CALLING STATEMENT ARGUMENT LIST			
Mnemonic	Symbol Ref. (1)	Type	
X		R*8	State vector quantity retrieved
NAME		R*8	Restart run name identifier
NWDS		I*4	Number of words to be returned
UNIT		I*4	Unit allocated for the reserved restart tape (Unit 21)
ERROR		I*4	Error flag returned by tape read routine

3.3.2.2.3 CLSIN

CLSIN is an entry point in subroutine DATIN. The call to CLSIN is made from subroutine RSIN to close a currently opened user data set by scanning the data set until an end of data mark (*END) is found.

CALLING STATEMENT ARGUMENT LIST			
Mnemonic	Symbol Ref. (1)	Type	
UNIT		I*4	Unit allocated for reserved restart tape
ERROR		I*4	Error flag returned by tape read routine

3.4 ERROR/WARNING MESSAGES

Tests of pertinent data are made at strategic locations throughout progra KRASH. These checks are designed to identify erroneous input data and inconsistent system operations and computational results. A summary of the error messages resulting from the failure of any of these tests is presented in Table 3-5. Referenced in the table is the subroutine and format statement generating the message.

TABLE 3-5. ERROR/WARNING MESSAGE SUMMARY

Message No.	Error/Warning Message	Format Label	Sub-Routine
1	IDER OUT OF RANGE, VALUE = _____ Degree of freedom flag assigned to tabulated input acceleration data not within the allowable range of 1 through 6. Control returned to calling routine.	6106	ACCELT
2*	NO SUCH NODE POINT I, M = _____ External spring attached to node which has not previously been defined. Run terminated.	9	CFORCE
3*	DATA ERROR IN GENMOD AT 2030 Unable to find specified node point. Run terminated.	2030	GENMOD
4*	DATA ERROR IN GENMOD AT 2040 Unable to find specified node point. Run terminated.	2040	GENMOD
5*	NON-EXISTENT I, J PAIR IN KR TABLE SPECS = ____ ____ ____ ____ Unable to locate beam I, J in KR table. Run terminated.	5910	INPUT
6*	TOO MANY KR TABLES Number of KR tables exceeds program limit. Run terminated.	5920	INPUT
7	ERROR IN ACCEL TIME DATA INPUT NUMACL, KOUNT = _____ Number of tabulated acceleration tables or the total number of tabulated acceleration points exceeds the program limit. Run execution continues.	7005	INPUT
8*	___POINTS IN KR TABLE _____(MAX IS 15) Too many points have been specified in KR table. Run terminated.	5980	INPRNT
9*	NUMBER OF LINEAR DEFLECTION POINTS NOT ACCEPTABLE, VALUE = _____ Number of linear deflection points (LDP) defining KR curve exceeds program limit. Run terminated.	5088	INPRNT
10	I/O ERROR ON READ - WILL REWIND INPUT FILE AND RETURN. Run continues.	60	ECHO

*Error causing run to terminate execution

TABLE 3-5. ERROR/WARNING MESSAGE SUMMARY (Continued)

Message No.	Error/Warning Message	Format Label	Sub-Routine
11*	****ERROR - END OF DATA REACHED AT VARIABLE ____ **** A greater amount of data requested from restart tape than available. Run terminated.	1000	DATIN
12*	***ERROR - END OF FILE REACHED AT VARIABLE ___ *** The data set currently read from restart tape was not closed after it was created. Run terminated.	3000	DATIN
13*	****ERROR - END OF FILE REACHED TRYING TO OPEN DATA SET FOR READING The restart tape does not contain a previously saved data set. Run terminated.	4000	DATIN
14*	****ERROR - EOF TRYING TO CLOSE DATA SET AFTER READING**** The data set currently read from restart tape was not closed after it was created. Run terminated.	5000	DATIN
15*	****ERROR - CANNOT READ DATA WITHOUT FIRST OPENING DESIRED DATA SET**** The data set to be read from restart tape was not opened prior to request. Run terminated.	6000	DATIN
16*	****ERROR - MUST OPEN DATA SET BEFORE WRITING DATA OUT**** Data set not opened prior to writing on restart tape. Run terminated.	1000	DATOUT
17	**WARNING - REQUESTED STORING _____ VALUES. STORE FAILED** The number of words to be written on the restart tape exceeds the space allocated by the program. Run continues.	2000	DATOUT
18	UNABLE TO FIND DATA FOR MASS____ . PLOTS FOR THIS MASS WILL BE SUPPRESSED. Data for indicated mass summary plots not found on unit 1. Run continues.	6023	PREPLT

TABLE 3-5. ERROR/WARNING MESSAGE SUMMARY (Continued)

Message No.	Error/Warning Message	Format Label	Sub-Routine
19	UNABLE TO FIND DATA FOR MASS_____ NODE _____. PLOTS FOR THIS NODE WILL BE SUPPRESSED. Data for indicated node point summary plots not found on unit 2. Run continues.	6024	PREPLT
20	UNABLE TO FIND DATA FOR BEAM____. FORCE PLOTS FOR THIS BEAM WILL BE SUPPRESSED. Data for indicated beam summary force plots not found on unit 3. Run continues.	6025	PREPLT
21	UNABLE TO FIND DATA FOR BEAM_____. DEFLECTION PLOTS FOR THIS BEAM WILL BE SUPPRESSED. Data for indicated beam summary deflection plots not found on unit 4. Run continues.	6026	PREPLT
22	UNABLE TO FIND DATA FOR BEAM_____. STRESS PLOTS FOR THIS BEAM WILL BE SUPPRESSED. Data for indicated beam summary stress plots not found on unit 13. Run continues.	6029	PREPLT
23	UNABLE TO FIND DATA FOR SPRING_____ NODE ____. PLOTS FOR THIS SPRING WILL BE SUPPRESSED. Data for indicated spring summary plots not found on unit 8. Run continues.	6027	PREPLT
24	UNABLE TO FIND DATA FOR DRI MASS_____. PLOTS FOR THIS DRI MASS WILL BE SUPPRESSED. Date for indicated DRI mass summary plots not found on unit 9. Run continues.	6028	PREPLT
25	***ERROR PLOT*** I = _____ NOT =_____ Error in reading vehicle velocity data from unit 10. Run continues.	1000	PREPLT
26	UNABLE TO FIND DATA FOR BEAM_____. ENERGY PLOTS FOR THIS BEAM WILL BE SUPPRESSED. Data for indicated beam energy plots not found on unit 11. Run continues	6040	PREPLT
27*	IESE = 1 TOTAL STRAIN ENERGY IS NEGATIVE. The total strain energy associated with the model is less than zero.	7301	MAIN

TABLE 3-5. ERROR/WARNING MESSAGE SUMMARY (Continued)

Message No.	Error/Warning Message	Format Label	Sub-Routine
28*	IEPSE = 1 ELEMENT STRAIN ENERGY EXCEEDS NTOL2 VALUE. The strain energy of any element exceeds a prescribed percentage of the total strain energy of the model.	7302	MAIN
29*	IEDE = TOTAL DAMPING ENERGY IS NEGATIVE. The total damping energy associated with the model is less than zero.	7303	MAIN
30*	IEPDE = 1 ELEMENT DAMPING ENERGY EXCEEDS NTOL2 VALUE. The damping energy of any element exceeds a prescribed percentage of the total damping energy of the model.	7304	MAIN
31*	IECE = 1 TOTAL CRUSHING ENERGY IS NEGATIVE. The total crushing energy associated with the model is less than zero.	7305	MAIN
32*	IEPCE = 1 MASS CRUSHING ENERGY EXCEEDS NTOL2 VALUE. The crushing energy associated with any mass exceeds a prescribed percentage of the total crushing energy of the model.	7306	MAIN
33*	IEFE = 1 TOTAL FRICTION ENERGY IS NEGATIVE. The total friction energy associated with the model is less than zero.	7307	MAIN
34*	IEPFE = 1 MASS FRICTION ENERGY EXCEEDS NTOL2 VALUE. The friction energy associated with any mass exceeds a prescribed percentage of the total friction energy of the model.	7308	MAIN
35*	IEDEV = 1 MASS DEVIATION EXCEEDS NTOL3 VALUE. The total energy associated with any mass exceeds the total initial energy associated with that mass by a prescribed percentage.	7309	MAIN
36*	IETOT = 1 TOTAL ENERGY CHANGE EXCEEDS NTOL1 VALUE. The total energy associated with the model exceeds the total initial energy by a prescribed percentage.	7310	MAIN

SECTION 4

DEMONSTRATION PROBLEM

The example problem included in this section has been designed to meet two objectives. The first is to illustrate an input data card deck which exercises some commonly used options available to the user of the program. The second is to provide output data to be used as an operational and numerical check of the program. The model used in the example does not represent any particular vehicle nor any particular crash condition.

4.1 MODEL DESCRIPTION

The left side of the model developed for this example is shown in Figure 4-1. The composite model consists of 20 external springs (NSP), 4 nonlinear beams (NLB), 12 massless node points (NNP), 10 pin-ended beams (NPIN), 8 unsymmetrical beams (NUB), 2 DRI's (DRI), 2 beam damping inputs (ND) and a RUNMOD = 2, which is a half model input and subsequent full vehicle analysis. The impact is with a flat surface at a vertical sink velocity of 27.5 ft/sec and a 0.75-degree nose-up pitch angle. The computer run is performed with a 1×10^{-5} integration interval and a maximum time of 2×10^{-5} seconds. The RUNMOD = 2 is chosen to demonstrate how centerline and opposite side members are automatically selected by program KRASH. The impact condition is symmetrical, so for this type of analysis the user will normally use the RUNMOD = 1 option, which is more economical to perform.

4.2 INPUT DATA DECK

The input data deck used in the demonstration run is shown in Figure 4-2. The card identification numbers (columns 73-80) used in this deck does not follow the numbering convention used in the program KRASH User's Manual, Figure 2-1 of Reference (2). Use of the system shown in the User's Manual is not mandatory. Note that the last card of the input deck contains the work "END" beginning in column one.

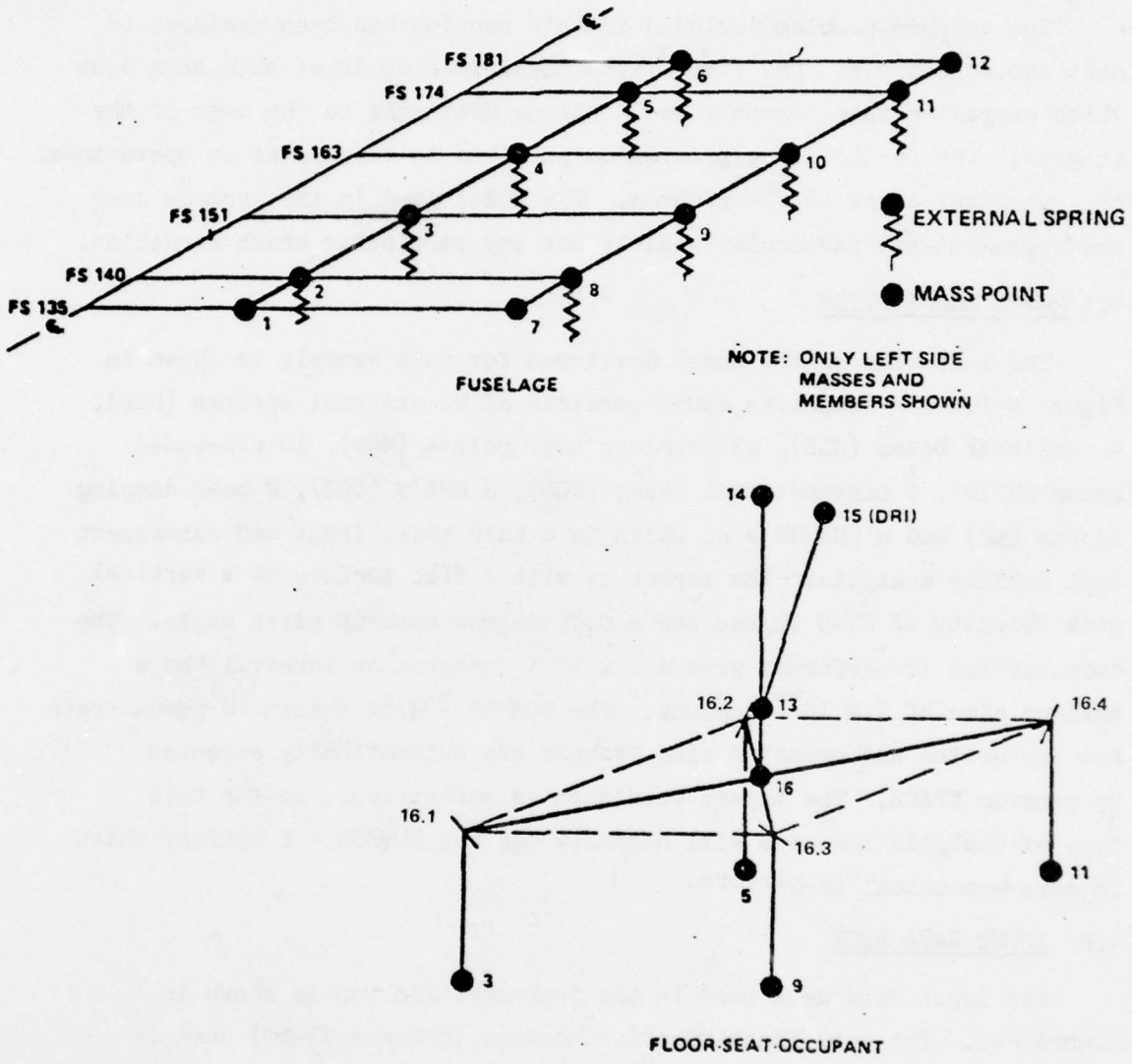


Figure 4-1. Demonstration Problem Model

ECHO OF THE INPUT DATA IN CARD IMAGE FORMAT

```
                1         2         3         4         5         6         7         8
CARD NO. 12345678901234567890123456789012345678901234567890123456789012345678901234567890

    1  SAMPLE CASE SUBSECTIN DROP TEST SIMULATION  16MASS/32MEMBER MODEL          00000010
    2  6-1-79 KRASH.F79.DATA 27.5 FT./SEC                                        00000020
    3  12345678901234567890123456789012345678901234567890123456789012345678901200000030
    4    16   10   32    2    6    5    4    1    0    0    0    0    0    1    00000040
    5     0    0    0    0    0    0    0   10   50  100    1    1               00000050
    6                                                                           00000060
    7                                                                           00000070
    8          100 0.00001   0.002     0.0         85.0      2.0               00000080
    9                                                                           00000090
   10     1    1    1    1    1    1    1    1                                  00000100
   11     5    1    2    2    1    4    2    1    2   20                        00000110
   12  0.0         0.0        330.0                                            00000120
   13  0.0         0.0        0.0                                              00000130
   14  0.0         0.0131     0.0        0.0        0.0        0.0              00000140
   15  1.570       135.0      6.0       -16.0       0.13500    0.02380   0.05100 00000150
   16  5.030       140.0      6.0       -16.0       0.43400    0.17420   0.27540 00000160
   17  17.21       151.0      6.0       -16.0       4.30       4.40      0.54600 00000170
   18  7.21        163.0      6.0       -16.0       0.62       0.30      0.441   00000180
   19  5.64        174.0      6.0       -16.0       0.486      0.199     0.29600 00000190
   20  2.2         181.0      6.0       -16.0       0.18930    0.05350   0.09140 00000200
   21  3.13        135.0      20.0      -16.0       1.816      1.700     0.1827  00000210
   22  10.029      140.0      20.0      -16.0       5.813      5.75      0.893   00000220
   23  24.42       151.0      20.0      -16.0       12.15      12.20     1.60    00000230
   24  14.42       163.0      20.0      -16.0       8.355      8.46      1.479   00000240
   25  11.2823     174.0      20.0      -16.0       6.538      7.17      1.136   00000250
   26  4.39        181.0      20.0      -16.0       2.540      2.3800    0.2560  00000260
   27  72.86       166.0      13.0       5.8        13.9511    14.7742   16.8341 00000270
   28  72.86       166.0      13.0       20.89      11.3116    10.7989   6.5318  00000280
   29  72.86       166.0      13.0       20.89      11.3116    10.7989   6.5318  00000290
   30  20.5        166.0      13.0      -1.7        5.95       6.6062    3.152   00000300
   31     1   13 166.0       13.0       5.8                                     00000310
   32     1   16 151.0       6.0       -1.7                                     00000320
   33     2   16 174.0       6.0       -1.7                                     00000330
   34     3   16 151.0       20.0      -1.7                                     00000340
   35     4   16 174.0       20.0      -1.7                                     00000350
   36     5   16 166.0       13.0      -1.7                                     00000360
   37     2    3 8.0         0.0        10000.0                                 00000370
   38     3    3 8.0         0.0        10000.0                                 00000380
   39     4    3 8.0         0.0        10000.0                                 00000390
   40     5    3 8.0         0.0        10000.0                                 00000400
   41     6    3 8.0         0.0        10000.0                                 00000410
   42     8    3 3.3         0.0        10000.0                                 00000420
   43     9    3 3.3         0.0        10000.0                                 00000430
   44    10    3 3.3         0.0        10000.0                                 00000440
   45    11    3 3.3         0.0        10000.0                                 00000450
   46    12    3 3.3         0.0        10000.0                                 00000460
   47  0.100       0.500      0.750      4.0        2290.0     2290.     .00     00000470
   48  0.100       0.500       .750      4.0        2650.0     2650.     .00     00000480
   49  0.100       0.500      0.750      4.0        2650.0     2650.     .00     00000490
   50  0.100       0.500      0.750      4.0        2410.0     2410.     .00     00000500
```

Figure 4-2 Example Input Data
(Sheet 1 Of 3)

ECHO OF THE INPUT DATA IN CARD IMAGE FORMAT

```
                    1         2         3         4         5         6         7         8
CARD NO. 1234567890123456789012345678901234567890123456789012345678901234567890123456789012345678900

    51   0.100     0.500     0.750     4.0       1760.0    1760.     .00                 00000510
    52   0.250     0.500     0.750     4.000     670.0     1380.     .00                 00000520
    53   0.250     0.500     0.750     4.000     670.0     1380.     .00                 00000530
    54   0.250     0.500     0.750     4.000     670.0     1380.     .00                 00000540
    55   0.250     0.500     0.750     4.000     670.0     1380.     .00                 00000550
    56   0.250     0.500     0.750     4.000     670.0     1380.     .00                 00000560
    57     1     2 0.615674            4.18228   0.060521            5.78 .667 400000570
    58     2     3 0.615674            4.18228   0.060521            5.78 .667 400000580
    59     3     4 0.615674            4.18228   0.060521            5.78 .667 400000590
    60     4     5 0.615674            4.18228   0.060521            5.78 .667 400000600
    61     5     6 0.615674            4.18228   0.060521            5.78 .667 400000610
    62     7     8 0.128               0.34176   0.042667            1.65 1.0  400000620
    63     8     9 0.128               0.34176   0.042667            1.65 1.0  400000630
    64     9    10 0.128               0.34176   0.042667            1.65 1.0  400000640
    65    10    11 0.128               0.34176   0.042667            1.65 1.0  400000650
    66    11    12 0.128               0.34176   0.042667            1.65 1.0  400000660
    67     1     0 0.28928             1.874     0.0042517           3.93 .564 400000670
    68     2     0 0.28928             1.874     0.0042517           3.93 .564 400000680
    69     3     0 0.28928             1.874     0.0042517           3.93 .564 400000690
    70     4     0 0.28928             1.874     0.0042517           3.93 .564 400000700
    71     5     0 0.28928             1.874     0.0042517           3.93 .564 400000710
    72     6     0 0.28928             1.874     0.0042517           3.93 .564 400000720
    73     1     7 0.21843             0.77791   0.0040931           2.82 .550 400000730
    74     2     8 0.21843             0.77791   0.0040931           2.82 .550 400000740
    75     3     9 0.21843             0.77791   0.0040931           2.82 .550 400000750
    76     4    10 0.21843             0.77791   0.0040931           2.82 .550 400000760
    77     5    11 0.21843             0.77791   0.0040931           2.82 .550 400000770
    78     6    12 0.21843             0.77791   0.0040931           2.82 .550 400000780
    79     3 1 16 0.1888              0.18000   0.54000             0.06 0.06 600000790
    80     5 2 16 0.1888              0.18000   0.54000             0.06 0.06 600000800
    81     9 3 16 0.1888              0.18000   0.54000             0.06 0.06 600000810
    82    11 4 16 0.1888              0.18000   0.54000             0.06 0.06 600000820
    83    13   14 0.02000             0.0075    0.0075                      400000830
    84    13   15 0.009504            0.0048    0.0048                     1000000840
    85     5   13 0.0021571                                                 400000850
    86    11   13 0.0021571                                                 400000860
    87    13   16 0.000381                                                  400000870
    88  1 13 5 16 0.00117                                                  400000880
    89     2    8    1        1          0.0       0.0                     00000890
    90     3    9    1    1   1    1     0.5       0.5       0.5     0.5   00000900
    91     4   10    1        1          0.25      0.0       0.75    0.    00000910
    92     5   11         1        1     0.0       0.5       0.      0.5   00000920
    93     6   12              1        0.0       0.0       0.3     0.    00000930
    94     5   13    1                                                    00000940
    95    11   13    1                                                    00000950
    96    13   16   -1                                                    00000960
    97  1 13 5 16   -1       0.75                                         00000970
    98  0.04                                                             00000980
    99    13   14   .41                                                  00000990
   100    13   16    1    8 .75                                          00001000
   101  1 13 5 16    1    5 2.75                                         00001010
```

Figure 4-2 Example Input Data
(Sheet 2 of 3)

ECHO OF THE INPUT DATA IN CARD IMAGE FORMAT

```
                1         2         3         4         5         6         7         8
CARD NO. 12345678901234567890123456789012345678901234567890123456789012345678901234567890

    102     13   15                                                                 00001020
    103      2    5    3      5.0          10.0                                    00001030
    104      3    5   13   14   16                                                 00001040
    105      2    5    3      5.0          10.0                                    00001050
    106      9   11   13   14   16                                                 00001060
    107      1    0    0    0    0    0    1    1    0    1                        00001070
    108      3    0    0    0    0    0    1    1    0    0                        00001080
    109     13    0    0    0    0    0    1    1    0    0                        00001090
    110     14    0    0    0    0    0    1    1    0                             00001100
    111     16    0    0    0    0    0    1    1    0    1                        00001110
    112      1   13    1    1    1    1    1                                       00001120
    113     19    1    1    1                                                      00001130
    114     20    1    1    1                                                      00001140
    115     19    1    1    1                                                      00001150
    116     20    1    1    1                                                      00001160
    117      8    1    1    1                                                      00001170
    118      3    0    1    1                                                      00001180
    119      4    0    1    1                                                      00001190
    120      5    0    1    1                                                      00001200
    121      6    0    1    1                                                      00001210
    122      2    1    1                                                           00001220
    123      4    1    1                                                           00001230
    124     15                                                                    00001240
    125  END                                                                      00001250
```

Figure 4-3 Example Input Data
(Sheet 3 of 3)

ECHO OF THE INPUT DATA IN CARD IMAGE FORMAT

```
                1         2         3         4         5         6         7         8
CARD NO. 12345678901234567890123456789012345678901234567890123456789012345678901234567890

    1  SAMPLE CASE SUBSECTIN DROP TEST SIMULATION  16MASS/32MEMBER MODEL        00000010
    2  6-1-79 KRASH.F79.DATA 27.5 FT./SEC                                      00000020
    3  12345678901234567890123456789012345678901234567890123456789012345678900000030
    4     16   10   32    2    6    5    4    1    0    0    0    0    0    1 00000040
    5      0    0    0    0    0    0    0   10   50  100    1    1           00000050
    6                                                                         00000060
    7  BPL              101          1         2                             00000070
    8          100 0.00001   0.002      0.0         85.0       2.0           00000080
    9                                                                         00000090
   10      1    1    1    1    1    1    1    1                              00000100
   11      5    1    2    2    1    4    2    1    2   20                    00000110
   12   0.0         0.0         330.0                                        00000120
   13   0.0         0.0         0.0                                          00000130
   14   0.0         0.0131      0.0        0.0        0.0        0.0         00000140
```

(a) Checkpoint data

ECHO OF THE INPUT DATA IN CARD IMAGE FORMAT

```
                1         2         3         4         5         6         7         8
CARD NO. 12345678901234567890123456789012345678901234567890123456789012345678901234567890

    1  SAMPLE CASE SUBSECTIN DROP TEST SIMULATION  16MASS/32MEMBER MODEL        00000010
    2  6-1-79 KRASH.F79.DATA 27.5 FT./SEC                                      00000020
    3  12345678901234567890123456789012345678901234567890123456789012345678900000030
    4     16   10   32    2    6    5    4    1    0    0    0    0    0    1 00000040
    5      0    0    0    0    0    0    0   10   50  100    1    1           00000050
    6  BPL              101          2                                       00000060
    7  BPL              102          4         6                             00000070
    8          100 0.00001   0.006      0.0         85.0       2.0           00000080
    9                                                                         00000090
   10      1    1    1    1    1    1    1    1                              00000100
   11      5    1    2    2    1    4    2    1    2   20                    00000110
   12   0.0         0.0         330.0                                        00000120
   13   0.0         0.0         0.0                                          00000130
   14   0.0         0.0131      0.0        0.0        0.0        0.0         00000140
```

(b) Restart data

Figure 4-3 Example Input Data-Checkpoint and Restart Runs

For illustrative purposes, Figure 4-3 shows a portion of the ECHO decks for a checkpoint run which generates data for a future restart run and a restart run which initiates at the previsouly designated save time. Output from these latter two data cases are not included in Appendix A.

4.3 OUTPUT

A complete listing of the output for the demonstration run is included in this report as Appendix A. The format of the data is discussed in detail in Section 2.2 of the User's Manual.

REFERENCES

1. Gamon, M. A.; General Aviation Airplane Structural Crashworthiness User's Manual, Volume I, Program "KRASH" Theory; U. S. Department of Transportation, Federal Aviation Administration; Report No.: FAA-RD-77-189, I; February 1978.

2. Wittlin, G., Gamon, M. A., LaBarge, W. L.; General Aviation Airplane Structural Crashworthiness User's Manual, Volume II, Input-Output, Techniques and Applications; U. S. Department of Transportation, Federal Aviation Administration; Report No.: FAA-RD-77-189, II; February 1978.

3. Wittlin, G.; General Aviation Airplane Structural Crashworthiness User's Manual, Volume III, Related Design Information; U. S. Department of Transportation, Federal Aviation Administration; Report No.: FAA-RD-77-189, III; February 1978.

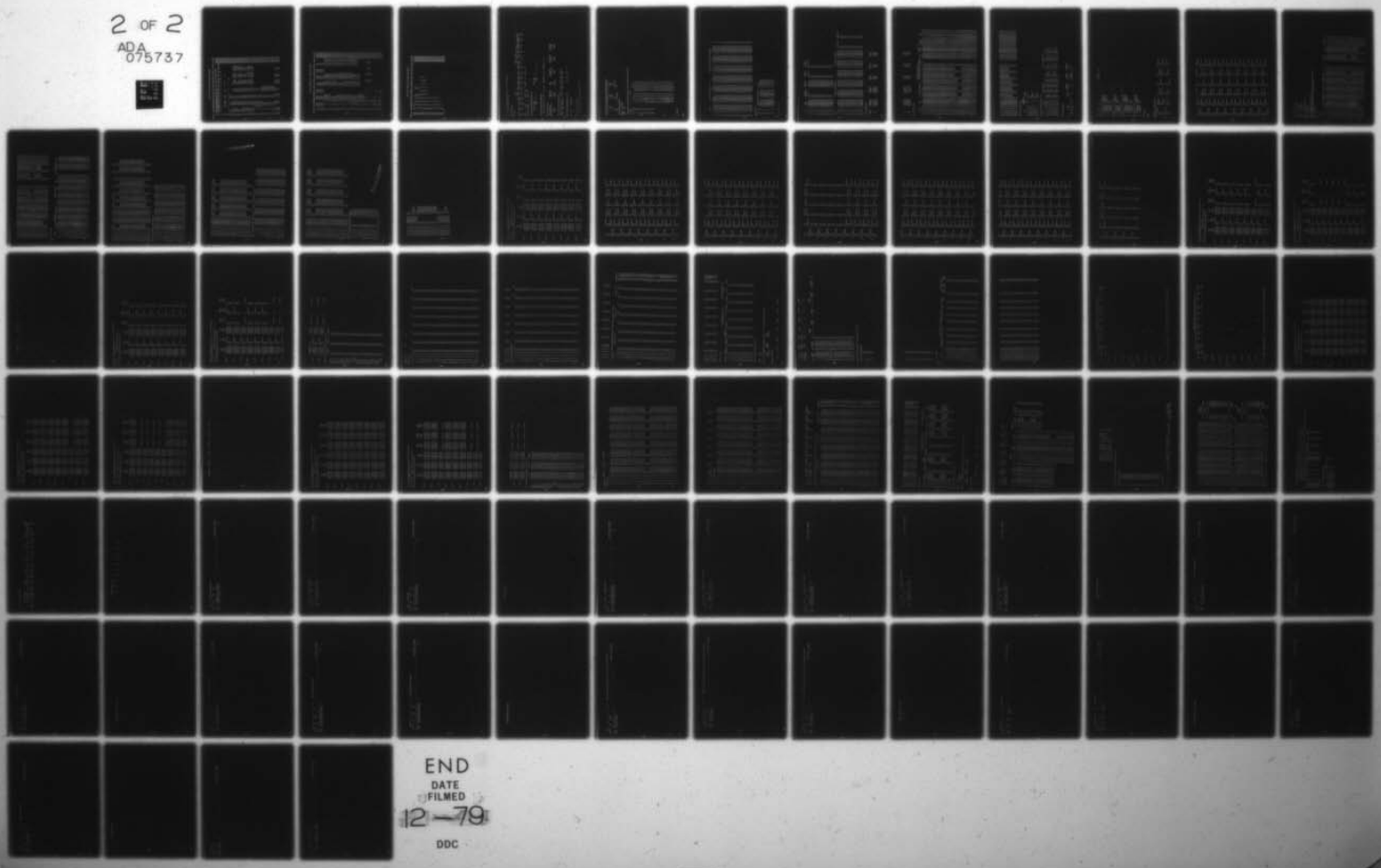
4. Laananen, D. H.; Program SOM-LA (Seat/Occupant Model - Light Aircraft) User's Manual.

APPENDIX A

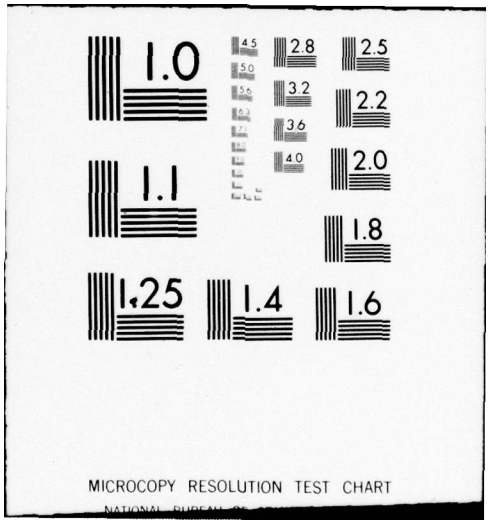
DEMONSTRATION OUTPUT PROBLEM

AD-A075 737 LOCKHEED-CALIFORNIA CO BURBANK F/G 13/12
GENERAL AVIATION AIRPLANE STRUCTURAL CRASHWORTHINESS PROGRAMMER--ETC(U)
JUN 79 W L LABARGE DOT-FA75WA-3707
UNCLASSIFIED LR-23683-REV FAA-RD-78-120-REV NL

2 OF 2
ADA 075737



END
DATE FILMED
12-79
DDC


1.0
1.1
1.25
1.4
1.6
1.8
2.0
2.2
2.5
2.8
3.2
3.6
4.0
4.5
5.0
MICROCOPY RESOLUTION TEST CHART

ECHO OF THE INPUT DATA IN CARD IMAGE FORMAT

```
                1         2         3         4         5         6         7         8
CARD NO. 12345678901234567890123456789012345678901234567890123456789012345678901234567890

    1  SAMPLE CASE SUBSECTIN DROP TEST SIMULATION  16MASS/32MEMBER MODEL        00000010
    2  6-1-79 KRASH.F79.DATA 27.5 FT./SEC                                      00000020
    3  12345678901234567890123456789012345678901234567890123456789012345678901200000030
    4    16   10   32    2    6    5    4    1    0    0    0    0    0    1  00000040
    5     0    0    0    0    0    0    0   10   50  100    1    1             00000050
    6                                                                         00000060
    7                                                                         00000070
    8          100 0.00001   0.002     0.0        85.0      2.0             00000080
    9                                                                         00000090
   10     1    1    1    1    1    1    1    1                               00000100
   11     5    1    2    2    1    4    2    1    2   20                     00000110
   12  0.0         0.0        330.0                                         00000120
   13  0.0         0.0        0.0                                           00000130
   14  0.0         0.0131     0.0        0.0        0.0       0.0           00000140
   15  1.570       135.0      6.0       -16.0       0.13500   0.02380   0.05100   00000150
   16  5.030       140.0      6.0       -16.0       0.43400   0.17420   0.27540   00000160
   17  17.21       151.0      6.0       -16.0       4.30      4.40      0.54600   00000170
   18  7.21        163.0      6.0       -16.0       0.62      0.30      0.441     00000180
   19  5.64        174.0      6.0       -16.0       0.486     0.199     0.29600   00000190
   20  2.2         181.0      6.0       -16.0       0.18930   0.05350   0.09140   00000200
   21  3.13        135.0      20.0      -16.0       1.816     1.700     0.1827    00000210
   22  10.029      140.0      20.0      -16.0       5.813     5.75      0.893     00000220
   23  24.42       151.0      20.0      -16.0       12.15     12.20     1.60      00000230
   24  14.42       163.0      20.0      -16.0       8.355     8.46      1.479     00000240
   25  11.2823     174.0      20.0      -16.0       6.533     7.17      1.136     00000250
   26  4.39        181.0      20.0      -16.0       2.540     2.3600    0.2560    00000260
   27  72.86       166.0      13.0       5.8        13.9511   14.7742   16.8341   00000270
   28  72.86       166.0      13.0       20.89      11.3116   10.7989   6.5318    00000280
   29  72.86       166.0      13.0       20.89      11.3116   10.7989   6.5318    00000290
   30  20.5        166.0      13.0      -1.7        5.95      6.6062    3.152     00000300
   31     1   13 166.0      13.0       5.8                                   00000310
   32     1   16 151.0      6.0       -1.7                                   00000320
   33     2   16 174.0      6.0       -1.7                                   00000330
   34     3   16 151.0      20.0      -1.7                                   00000340
   35     4   16 174.0      20.0      -1.7                                   00000350
   36     5   16 166.0      13.0      -1.7                                   00000360
   37     2    3 8.0        0.0        10000.0                               00000370
   38     3    3 8.0        0.0        10000.0                               00000380
   39     4    3 8.0        0.0        10000.0                               00000390
   40     5    3 8.0        0.0        10000.0                               00000400
   41     6    3 8.0        0.0        10000.0                               00000410
   42     8    3 3.3        0.0        10000.0                               00000420
   43     9    3 3.3        0.0        10000.0                               00000430
   44    10    3 3.3        0.0        10000.0                               00000440
   45    11    3 3.3        0.0        10000.0                               00000450
   46    12    3 3.3        0.0        10000.0                               00000460
   47  0.100       0.500      0.750      4.0        2290.0    2290.     .00     00000470
   48  0.100       0.500       .750      4.0        2650.0    2650.     .00     00000480
   49  0.100       0.500      0.750      4.0        2650.0    2650.     .00     00000490
   50  0.100       0.500      0.750      4.0        2410.0    2410.     .00     00000500
```

ECHO OF THE INPUT DATA IN CARD IMAGE FORMAT

```
                    1         2         3         4         5         6         7         8
CARD NO. 1234567890123456789012345678901234567890123456789012345678901234567890123456789012345678901234567890

      51  0.100     0.500     0.750     4.0       1760.0    1760.     .00           00000510
      52  0.250     0.500     0.750     4.000     670.0     1380.     .00           00000520
      53  0.250     0.500     0.750     4.000     670.0     1380.     .00           00000530
      54  0.250     0.500     0.750     4.000     670.0     1380.     .00           00000540
      55  0.250     0.500     0.750     4.000     670.0     1380.     .00           00000550
      56  0.250     0.500     0.750     4.000     670.0     1380.     .00           00000560
      57    1   2 0.615674              4.18228   0.060521            5.78 .667 400000570
      58    2   3 0.615674              4.18228   0.060521            5.78 .667 400000580
      59    3   4 0.615674              4.18228   0.060521            5.78 .667 400000590
      60    4   5 0.615674              4.18228   0.060521            5.78 .667 400000600
      61    5   6 0.615674              4.18228   0.060521            5.78 .667 400000610
      62    7   8 0.128                 0.34176   0.042667            1.65 1.0  400000620
      63    8   9 0.128                 0.34176   0.042667            1.65 1.0  400000630
      64    9  10 0.128                 0.34176   0.042667            1.65 1.0  400000640
      65   10  11 0.128                 0.34176   0.042667            1.65 1.0  400000650
      66   11  12 0.128                 0.34176   0.042667            1.65 1.0  400000660
      67    1   0 0.28928               1.874     0.0042517           3.93 .564 400000670
      68    2   0 0.28928               1.874     0.0042517           3.93 .564 400000680
      69    3   0 0.28928               1.874     0.0042517           3.93 .564 400000690
      70    4   0 0.28928               1.874     0.0042517           3.93 .564 400000700
      71    5   0 0.28928               1.874     0.0042517           3.93 .564 400000710
      72    6   0 0.28928               1.874     0.0042517           3.93 .564 400000720
      73    1   7 0.21843               0.77791   0.0040931           2.82 .550 400000730
      74    2   8 0.21843               0.77791   0.0040931           2.82 .550 400000740
      75    3   9 0.21843               0.77791   0.0040931           2.82 .550 400000750
      76    4  10 0.21843               0.77791   0.0040931           2.82 .550 400000760
      77    5  11 0.21843               0.77791   0.0040931           2.82 .550 400000770
      78    6  12 0.21843               0.77791   0.0040931           2.82 .550 400000780
      79    3 1 16 0.1888                0.18000   0.54000             0.06 0.06 600000790
      80    5 2 16 0.1888                0.18000   0.54000             0.06 0.06 600000800
      81    9 3 16 0.1888                0.18000   0.54000             0.06 0.06 600000810
      82   11 4 16 0.1888                0.18000   0.54000             0.06 0.06 600000820
      83   13  14 0.02000                0.0075    0.0075                       400000830
      84   13  15 0.009504               0.0048    0.0048                       1000000840
      85    5  13 0.0021571                                                     400000850
      86   11  13 0.0021571                                                     400000860
      87   13  16 0.000381                                                      400000870
      88 1 13 5 16 0.00117                                                     400000880
      89    2   8   1       1       0.0       0.0                            00000890
      90    3   9   1   1   1   1   0.5       0.5       0.5       0.5        00000900
      91    4  10   1       1       0.25      0.0       0.75      0.         00000910
      92    5  11       1       1   0.0       0.5       0.        0.5        00000920
      93    6  12           1       0.0       0.0       0.3       0.         00000930
      94    5  13   1                                                        00000940
      95   11  13   1                                                        00000950
      96   13  16  -1                                                        00000960
      97 1 13 5 16  -1     0.75                                              00000970
      98  0.04                                                               00000980
      99   13  14  .41                                                       00000990
     100   13  16   1   8 .75                                                00001000
     101 1 13 5 16   1   5 2.75                                              00001010
```

ECHO OF THE INPUT DATA IN CARD IMAGE FORMAT

```
                    1         2         3         4         5         6         7         8
CARD NO. 1234567890123456789012345678901234567890123456789012345678901234567890123456789012345678901234567890

   102    13   15                                                                          00001020
   103     2    5    3      5.0          10.0                                            00001030
   104     3    5   13   14   16                                                         00001040
   105     2    5    3      5.0          10.0                                            00001050
   106     9   11   13   14   16                                                         00001060
   107     1    0    0    0    0    0    1    1    0    1                               00001070
   108     3    0    0    0    0    0    1    1    0    0                               00001080
   109    13    0    0    0    0    0    1    1    0    0                               00001090
   110    14    0    0    0    0    0    1    1    0                                    00001100
   111    16    0    0    0    0    0    1    1    0    1                               00001110
   112     1   13    1    1    1    1    1                                             00001120
   113    19    1    1    1                                                           00001130
   114    20    1    1    1                                                           00001140
   115    19    1    1    1                                                           00001150
   116    20    1    1    1                                                           00001160
   117     8    1    1    1                                                           00001170
   118     3    0    1    1                                                           00001180
   119     4    0    1    1                                                           00001190
   120     5    0    1    1                                                           00001200
   121     6    0    1    1                                                           00001210
   122     2    1    1                                                                00001220
   123     4    1    1                                                                00001230
   124    15                                                                          00001240
   125   END                                                                          00001250
```

SAMPLE CASE SUBSECTIN DROP TEST SIMULATION 16MASS/32MEMBER MODEL
6-1-79 KRASH.679.DATA 27.5 FT./SEC

PROGRAM SIZE DATA

NUMBER OF:

MASSES	SPRINGS	BEAMS	KR TABLES	NON-ZERO HE OR IXY	MASS PENETR.	VOLUME CHANGE	DRI ELEMENTS	MTL TYPES	ACCEL. TABLES	NON-STANDARD MAX. DEFL. NVB +	NVB -	NON-STANDARD MAX. FORCE NFB +	NFB -	NON-ZERO PHI''	NON-STANDARD DAMPING	STIFFNESS MATRICES	NO. NODE PTS.
NM	NSP	NB	NLB	NHI	MVP	NVCH	NDRI	NMTL	NACC					NPH	ND	NKM	NNP
32	20	58	4	0	0	0	2	0	0	0	0	0	0	0	2	0	12

NSC= 1 NIC= 1 NTOL1= 10% NTOL2= 50% NTOL3= 100%

NO.OF OLEO STRUTS= 0 ALPHA= 0.0

PROGRAM DATA MANAGEMENT CONTROL DATA

RESTART: TITLE -
CASE - 0
TIME - 0

SAVE: TITLE -
CASE - 0
TIMES - 0 0 0 0 0

VARIABLE INTEGRATION CONTROL DATA

VAR. INT. FLAG = 0 EL = 0.0 EU = 0.0 LOWER RATIO = 0.0 UPPER RATIO = 0.0

PROGRAM CONTROL DATA

PRINT INTERVAL/ INTEGRATION INTERVAL	INTEGRATION INTERVAL	MAX. TIME	PLOW FORCE STARTING TIME	FILTER CUTOFF FREQUENCY	CASE TYPE INDICATOR
DP/DT	DT	TMAX	PLOWT	FCUT	RUNMOD
100	0.000010	0.002000	0.0	85.000	2.000

TIME HISTORY PRINT CONTROL CARDS

STRAIN FORCES	TOTAL FORCES	BEAM DEFLECTIONS	EXT.SPRING DATA	ENERGY DATA	STRESS DATA	ACCEL DATA	IMPULSE DATA
1	1	1	1	1	1	1	1

NO.OF MASS POSITION PLOTS EACH TIME= 2 PLOT PRINT FACTOR = 20

PLANE I.D.	NO.OF POINTS
2	5
3	5

VEHICLE INITIAL CONDITIONS

VEHICLE TRANSLATIONAL VELOCITIES IN GROUND AXES (IN/SEC)

VEHICLE ROTATIONAL VELOCITIES IN VEHICLE AXES (RAD/SEC)
EULER ANGLES OF VEHICLE RELATIVE TO GROUND (RADIANS)

XGDOT P' PHI'	YGDOT Q' THETA'	ZGDOT R' PSI'
0.0	0.0	3.30000D 02
0.0	0.0	0.0
0.0	1.31000D-02	0.0

GENERALIZED SURFACE DATA

BETA = 0.0 DEGREES
XGIN = 0.0
ZGIN = 0.0

CORRESPONDING MASS AND BEAM NUMBERS FOR LEFT AND RIGHT SIDES OF AIRPLANE

MASSES		BEAMS										
		LEFT					RIGHT					
LEFT I	RIGHT I	IJ	I	J	M	N	IJ	I	J	M	N
1	17	1	1	2	0	0	33	17	18	0	0
2	18	2	2	3	0	0	34	18	19	0	0
3	19	3	3	4	0	0	35	19	20	0	0
4	20	4	4	5	0	0	36	20	21	0	0
5	21	5	5	6	0	0	37	21	22	0	0
6	22	6	7	8	0	0	38	23	24	0	0
7	23	7	8	9	0	0	39	24	25	0	0
8	24	8	9	10	0	0	40	25	26	0	0
9	25	9	10	11	0	0	41	26	27	0	0
10	26	10	11	12	0	0	42	27	28	0	0
11	27	11	1	17	0	0	0	0	0	0	0
12	28	12	2	18	0	0	0	0	0	0	0
13	29	13	3	19	0	0	0	0	0	0	0
14	30	14	4	20	0	0	0	0	0	0	0
15	31	15	5	21	0	0	0	0	0	0	0
16	32	16	6	22	0	0	0	0	0	0	0
		17	1	7	0	0	43	17	23	0	0
		18	2	8	0	0	44	18	24	0	0
		19	3	9	0	0	45	19	25	0	0
		20	4	10	0	0	46	20	26	0	0
		21	5	11	0	0	47	21	27	0	0
		22	6	12	0	0	48	22	28	0	0
		23	3	16	0	1	49	19	32	0	1
		24	5	16	0	2	50	21	32	0	2
		25	9	16	0	3	51	25	32	0	3
		26	11	16	0	4	52	27	32	0	4
		27	13	14	0	0	53	29	30	0	0
		28	13	15	0	0	54	29	31	0	0
		29	5	13	0	0	55	21	29	0	0
		30	11	13	0	0	56	27	29	0	0
		31	13	16	0	0	57	29	32	0	0
		32	13	16	1	5	58	29	32	1	5

MASS DATA

I	WEIGHTS W	MASS COORDINATES F.S.,B.L.,W.L. X''	Y''	Z''	MASS MOMENTS OF INERTIA (LB-IN-SEC**2) IX	IY	IZ	I
1	1.570000D 00	1.350000D 02	6.000000D 00	-1.600000D 01	1.350000D-01	2.380000D-02	5.100000D-02	1
2	5.030000D 00	1.400000D 02	6.000000D 00	-1.600000D 01	4.340000D-01	1.742000D-01	2.754000D-01	2
3	1.721000D 01	1.510000D 02	6.000000D 00	-1.600000D 01	4.300000D 00	4.400000D 00	5.460000D-01	3
4	7.210000D 00	1.630000D 02	6.000000D 00	-1.600000D 01	6.200000D-01	3.000000D-01	4.410000D-01	4
5	5.640000D 00	1.740000D 02	6.000000D 00	-1.600000D 01	4.860000D-01	1.990000D-01	2.960000D-01	5
6	2.200000D 00	1.810000D 02	6.000000D 00	-1.600000D 01	1.893000D-01	5.350000D-02	9.140000D-02	6
7	3.130000D 00	1.350000D 02	2.000000D 01	-1.600000D 01	1.816000D 00	1.700000D 00	1.827000D-01	7
8	1.002990D 01	1.400000D 02	2.000000D 01	-1.600000D 01	5.813000D 00	5.750000D 00	8.930000D-01	8
9	2.442000D 01	1.510000D 02	2.000000D 01	-1.600000D 01	1.215000D 01	1.220000D 01	1.600000D 00	9
10	1.442000D 01	1.630000D 02	2.000000D 01	-1.600000D 01	8.355000D 00	8.460000D 00	1.479000D 00	10
11	1.128230D 01	1.740000D 02	2.000000D 01	-1.600000D 01	6.533000D 00	7.170000D 00	1.136000D 00	11
12	4.390000D 00	1.810000D 02	2.000000D 01	-1.600000D 01	2.540000D 00	2.380000D 00	2.560000D-01	12
13	7.286000D 01	1.660000D 02	1.300000D 01	5.800000D 00	1.395110D 01	1.477420D 01	1.683410D 01	13
14	7.286000D 01	1.660000D 02	1.300000D 01	2.089000D 01	1.131160D 01	1.079890D 01	6.531800D 00	14
15	7.286000D 01	1.660000D 02	1.300000D 01	2.089000D 01	1.131160D 01	1.079890D 01	6.531800D 00	15
16	2.050000D 01	1.660000D 02	1.300000D 01	-1.700000D 00	5.950000D 00	6.606200D 00	3.152000D 00	16
17	1.570000D 00	1.350000D 02	-6.000000D 00	-1.600000D 01	1.350000D-01	2.380000D-02	5.100000D-02	17
18	5.030000D 00	1.400000D 02	-6.000000D 00	-1.600000D 01	4.340000D-01	1.742000D-01	2.754000D-01	18
19	1.721000D 01	1.510000D 02	-6.000000D 00	-1.600000D 01	4.300000D 00	4.400000D 00	5.460000D-01	19
20	7.210000D 00	1.630000D 02	-6.000000D 00	-1.600000D 01	6.200000D-01	3.000000D-01	4.410000D-01	20
21	5.640000D 00	1.740000D 02	-6.000000D 00	-1.600000D 01	4.860000D-01	1.990000D-01	2.960000D-01	21
22	2.200000D 00	1.810000D 02	-6.000000D 00	-1.600000D 01	1.893000D-01	5.350000D-02	9.140000D-02	22
23	3.130000D 00	1.350000D 02	-2.000000D 01	-1.600000D 01	1.816000D 00	1.700000D 00	1.827000D-01	23
24	1.002990D 01	1.400000D 02	-2.000000D 01	-1.600000D 01	5.813000D 00	5.750000D 00	8.930000D-01	24
25	2.442000D 01	1.510000D 02	-2.000000D 01	-1.600000D 01	1.215000D 01	1.220000D 01	1.600000D 00	25
26	1.442000D 01	1.630000D 02	-2.000000D 01	-1.600000D 01	8.355000D 00	8.460000D 00	1.479000D 00	26
27	1.128230D 01	1.740000D 02	-2.000000D 01	-1.600000D 01	6.533000D 00	7.170000D 00	1.136000D 00	27
28	4.390000D 00	1.810000D 02	-2.000000D 01	-1.600000D 01	2.540000D 00	2.380000D 00	2.560000D-01	28
29	7.286000D 01	1.660000D 02	-1.300000D 01	5.800000D 00	1.395110D 01	1.477420D 01	1.683410D 01	29
30	7.286000D 01	1.660000D 02	-1.300000D 01	2.089000D 01	1.131160D 01	1.079890D 01	6.531800D 00	30
31	7.286000D 01	1.660000D 02	-1.300000D 01	2.089000D 01	1.131160D 01	1.079890D 01	6.531800D 00	31
32	2.050000D 01	1.660000D 02	-1.300000D 01	-1.700000D 00	5.950000D 00	6.606200D 00	3.152000D 00	32

NODE POINT DATA

MASS I	N.P. M	NODE POINT COORDINATES F.S.,B.L.,W.L. X''	Y''	Z''
13	1	1.660000D 02	1.300000D 01	5.800000D 00
16	1	1.510000D 02	6.000000D 00	-1.700000D 00
16	2	1.740000D 02	6.000000D 00	-1.700000D 00
16	3	1.510000D 02	2.000000D 01	-1.700000D 00
16	4	1.740000D 02	2.000000D 01	-1.700000D 00
16	5	1.660000D 02	1.300000D 01	-1.700000D 00
29	1	1.660000D 02	-1.300000D 01	5.800000D 00
32	1	1.510000D 02	-6.000000D 00	-1.700000D 00
32	2	1.740000D 02	-6.000000D 00	-1.700000D 00
32	3	1.510000D 02	-2.000000D 01	-1.700000D 00
32	4	1.740000D 02	-2.000000D 01	-1.700000D 00
32	5	1.660000D 02	-1.300000D 01	-1.700000D 00

EXTERNAL SPRING DATA

SPRING I	K	M	FREE LENGTH LBAR(IKM)	FRICTION COEFFICIENT MU(IKM)	BOTTOMING SPRING KE(IKM)	PLOWING FORCE FORCE(IKM)	GROUND FLEXIBILITY GFLEX(IKM)
2	3	0	8.000000D 00	0.0	1.000000D 04	0.0	0.0
3	3	0	8.000000D 00	0.0	1.000000D 04	0.0	0.0
4	3	0	8.000000D 00	0.0	1.000000D 04	0.0	0.0
5	3	0	8.000000D 00	0.0	1.000000D 04	0.0	0.0
6	3	0	6.000000D 00	0.0	1.000000D 04	0.0	0.0
8	3	0	3.300000D 00	0.0	1.000000D 04	0.0	0.0
9	3	0	3.300000D 00	0.0	1.000000D 04	0.0	0.0
10	3	0	3.300000D 00	0.0	1.000000D 04	0.0	0.0
11	3	0	3.300000D 00	0.0	1.000000D 04	0.0	0.0
12	3	0	3.300000D 00	0.0	1.000000D 04	0.0	0.0
18	3	0	8.000000D 00	0.0	1.000000D 04	0.0	0.0
19	3	0	8.000000D 00	0.0	1.000000D 04	0.0	0.0
20	3	0	8.000000D 00	0.0	1.000000D 04	0.0	0.0
21	3	0	8.000000D 00	0.0	1.000000D 04	0.0	0.0
22	3	0	8.000000D 00	0.0	1.000000D 04	0.0	0.0
24	3	0	3.300000D 00	0.0	1.000000D 04	0.0	0.0
25	3	0	3.300000D 00	0.0	1.000000D 04	0.0	0.0
26	3	0	3.300000D 00	0.0	1.000000D 04	0.0	0.0
27	3	0	3.300000D 00	0.0	1.000000D 04	0.0	0.0
28	3	0	3.300000D 00	0.0	1.000000D 04	0.0	0.0

SPRING			DEFLECTION COORDINATES			SPRING AXIAL FORCES				
I	K	M	SI(IKM)	SA(IKM)	SB(IKM)	SF(IKM)	FSPOI(IKM)	FSPOF(IKM)	CRIT.DAMP	CDAMP(IKM)
2	3	0	1.000000D-01	5.000000D-01	7.500000D-01	4.000000 00	2.290000 03	2.290000 03	0.0	0.0
3	3	0	1.000000D-01	5.000000D-01	7.500000D-01	4.000000 00	2.650000 03	2.650000 03	0.0	0.0
4	3	0	1.000000D-01	5.000000D-01	7.500000D-01	4.000000 00	2.650000 03	2.650000 03	0.0	0.0
5	3	0	1.000000D-01	5.000000D-01	7.500000D-01	4.000000 00	2.410000 03	2.410000 03	0.0	0.0
6	3	0	1.000000D-01	5.000000D-01	7.500000D-01	4.000000 00	1.760000 03	1.760000 03	0.0	0.0
8	3	0	2.500000D-01	5.000000D-01	7.500000D-01	4.000000 00	6.700000 02	1.380000 03	0.0	0.0
9	3	0	2.500000D-01	5.000000D-01	7.500000D-01	4.000000 00	6.700000 02	1.380000 03	0.0	0.0
10	3	0	2.500000D-01	5.000000D-01	7.500000D-01	4.000000 00	6.700000 02	1.380000 03	0.0	0.0
11	3	0	2.500000D-01	5.000000D-01	7.500000D-01	4.000000 00	6.700000 02	1.380000 03	0.0	0.0
12	3	0	2.500000D-01	5.000000D-01	7.500000D-01	4.000000 00	6.700000 02	1.380000 03	0.0	0.0
18	3	0	1.000000D-01	5.000000D-01	7.500000D-01	4.000000 00	2.290000 03	2.290000 03	0.0	0.0
19	3	0	1.000000D-01	5.000000D-01	7.500000D-01	4.000000 00	2.650000 03	2.650000 03	0.0	0.0
20	3	0	1.000000D-01	5.000000D-01	7.500000D-01	4.000000 00	2.650000 03	2.650000 03	0.0	0.0
21	3	0	1.000000D-01	5.000000D-01	7.500000D-01	4.000000 00	2.410000 03	2.410000 03	0.0	0.0
22	3	0	1.000000D-01	5.000000D-01	7.500000D-01	4.000000 00	1.760000 03	1.760000 03	0.0	0.0
24	3	0	2.500000D-01	5.000000D-01	7.500000D-01	4.000000 00	6.700000 02	1.380000 03	0.0	0.0
25	3	0	2.500000D-01	5.000000D-01	7.500000D-01	4.000000 00	6.700000 02	1.380000 03	0.0	0.0
26	3	0	2.500000D-01	5.000000D-01	7.500000D-01	4.000000 00	6.700000 02	1.380000 03	0.0	0.0
27	3	0	2.500000D-01	5.000000D-01	7.500000D-01	4.000000 00	6.700000 02	1.380000 03	0.0	0.0
28	3	0	2.500000D-01	5.000000D-01	7.500000D-01	4.000000 00	6.700000 02	1.380000 03	0.0	0.0

MATERIAL PROPERTIES

MATERIAL NO.	MODULUS OF ELASTICITY	MODULUS OF RIGIDITY	TENSION STRESS	COMPRESS. STRESS	SHEAR STRESS
1	3.0000D 07	1.1000D 07	75000.	75000.	37500.
2	3.0000D 07	1.1000D 07	205000.	205000.	80000.
3	2.8000D 07	1.2500D 07	70000.	46000.	36000.
4	1.0500D 07	4.0000D 06	47000.	39000.	22000.

5	1.0000D 07	3.8000D 06	35000.	34000.	17000.
6	1.0000D 07	3.8000D 06	16000.	16000.	17000.
7	1.0000D 06	3.0000D 05	16000.	16000.	17000.
8	1.0000D 06	0.0	16000.	16000.	17000.
9	1.0000D 06	3.0000D 05	16000.	16000.	17000.
10	1.0000D 06	3.0000D 05	16000.	16000.	17000.

INTERNAL BEAM DATA

BEAM					AREA	MOMENTS OF INERTIA			DISTANCES FROM NEUTRAL AXIS TO EXTREME FIBRES ZBIJ AXIS	YBIJ AXIS	TORSION PARAMETER	LENGTH	DAMPING RATIO	M T L	P-CODES Y Z Y Z				BEAM			
IJ	I	J	M	N	A	IYY	IZZ	JX	Z1	Z2	XIQ	XLB	CBAR	MC	I	I	J	J	IJ	I	J	M	N
1	1	2	0	0	6.157D-01	4.182D 00	6.052D-02	4.243D 00	5.780D 00	6.670D-01	0.0	5.000D 00	4.000D-02	4	0	0	0	0	1	1	2	0	0
2	2	3	0	0	6.157D-01	4.182D 00	6.052D-02	4.243D 00	5.780D 00	6.670D-01	0.0	1.100D 01	4.000D-02	4	0	0	0	0	2	2	3	0	0
3	3	4	0	0	6.157D-01	4.182D 00	6.052D-02	4.243D 00	5.780D 00	6.670D-01	0.0	1.200D 01	4.000D-02	4	0	0	0	0	3	3	4	0	0
4	4	5	0	0	6.157D-01	4.182D 00	6.052D-02	4.243D 00	5.780D 00	6.670D-01	0.0	1.100D 01	4.000D-02	4	0	0	0	0	4	4	5	0	0
5	5	6	0	0	6.157D-01	4.182D 00	6.052D-02	4.243D 00	5.780D 00	6.670D-01	0.0	7.000D 00	4.000D-02	4	0	0	0	0	5	5	6	0	0
6	7	8	0	0	1.280D-01	3.418D-01	4.267D-02	3.844D-01	1.650D 00	1.000D 00	0.0	5.000D 00	4.000D-02	4	0	0	0	0	6	7	8	0	0
7	8	9	0	0	1.280D-01	3.418D-01	4.267D-02	3.844D-01	1.650D 00	1.000D 00	0.0	1.100D 01	4.000D-02	4	0	0	0	0	7	8	9	0	0
8	9	10	0	0	1.280D-01	3.418D-01	4.267D-02	3.844D-01	1.650D 00	1.000D 00	0.0	1.200D 01	4.000D-02	4	0	0	0	0	8	9	10	0	0
9	10	11	0	0	1.280D-01	3.418D-01	4.267D-02	3.844D-01	1.650D 00	1.000D 00	0.0	1.100D 01	4.000D-02	4	0	0	0	0	9	10	11	0	0
10	11	12	0	0	1.280D-01	3.418D-01	4.267D-02	3.844D-01	1.650D 00	1.000D 00	0.0	7.000D 00	4.000D-02	4	0	0	0	0	10	11	12	0	0
11	1	17	0	0	2.893D-01	1.874D 00	4.252D-03	1.878D 00	3.930D 00	5.640D-01	0.0	1.200D 01	4.000D-02	4	0	0	0	0	11	1	17	0	0
12	2	18	0	0	2.893D-01	1.874D 00	4.252D-03	1.878D 00	3.930D 00	5.640D-01	0.0	1.200D 01	4.000D-02	4	0	0	0	0	12	2	18	0	0
13	3	19	0	0	2.893D-01	1.874D 00	4.252D-03	1.878D 00	3.930D 00	5.640D-01	0.0	1.200D 01	4.000D-02	4	0	0	0	0	13	3	19	0	0
14	4	20	0	0	2.893D-01	1.874D 00	4.252D-03	1.878D 00	3.930D 00	5.640D-01	0.0	1.200D 01	4.000D-02	4	0	0	0	0	14	4	20	0	0
15	5	21	0	0	2.893D-01	1.874D 00	4.252D-03	1.878D 00	3.930D 00	5.640D-01	0.0	1.200D 01	4.000D-02	4	0	0	0	0	15	5	21	0	0
16	6	22	0	0	2.893D-01	1.874D 00	4.252D-03	1.878D 00	3.930D 00	5.640D-01	0.0	1.200D 01	4.000D-02	4	0	0	0	0	16	6	22	0	0
17	1	7	0	0	2.184D-01	7.779D-01	4.093D-03	7.820D-01	2.820D 00	5.500D-01	0.0	1.400D 01	4.000D-02	4	0	0	0	0	17	1	7	0	0
18	2	8	0	0	2.184D-01	7.779D-01	4.093D-03	7.820D-01	2.820D 00	5.500D-01	0.0	1.400D 01	4.000D-02	4	1	0	1	0	18	2	8	0	0
19	3	9	0	0	2.184D-01	7.779D-01	4.093D-03	7.820D-01	2.820D 00	5.500D-01	0.0	1.400D 01	4.000D-02	4	1	1	1	1	19	3	9	0	0
20	4	10	0	0	2.184D-01	7.779D-01	4.093D-03	7.820D-01	2.820D 00	5.500D-01	0.0	1.400D 01	4.000D-02	4	1	0	1	0	20	4	10	0	0
21	5	11	0	0	2.184D-01	7.779D-01	4.093D-03	7.820D-01	2.820D 00	5.500D-01	0.0	1.400D 01	4.000D-02	4	0	1	0	1	21	5	11	0	0
22	6	12	0	0	2.184D-01	7.779D-01	4.093D-03	7.820D-01	2.820D 00	5.500D-01	0.0	1.400D 01	4.000D-02	4	0	0	1	0	22	6	12	0	0
23	3	16	0	1	1.889D-01	1.800D-01	5.400D-01	7.200D-01	6.000D-02	6.000D-02	0.0	1.430D 01	4.000D-02	6	0	0	0	0	23	3	16	0	1
24	5	16	0	2	1.889D-01	1.800D-01	5.400D-01	7.200D-01	6.000D-02	6.000D-02	0.0	1.430D 01	4.000D-02	6	0	0	0	0	24	5	16	0	2
25	9	16	0	3	1.889D-01	1.800D-01	5.400D-01	7.200D-01	6.000D-02	6.000D-02	0.0	1.430D 01	4.000D-02	6	0	0	0	0	25	9	16	0	3
26	11	16	0	4	1.889D-01	1.800D-01	5.400D-01	7.200D-01	6.000D-02	6.000D-02	0.0	1.430D 01	4.000D-02	6	0	0	0	0	26	11	16	0	4
27	13	14	0	0	2.000D-02	7.500D-03	7.500D-03	1.500D-02	0.0	0.0	0.0	1.509D 01	4.100D-01	4	0	0	0	0	27	13	14	0	0
28	13	15	0	0	7.197D-03	4.800D-03	4.800D-03	9.600D-03	0.0	0.0	0.0	1.509D 01	3.111D-0110		0	0	0	0	28	13	15	0	0
29	5	13	0	0	2.157D-03	0.0	0.0	0.0	0.0	0.0	0.0	2.425D 01	4.000D-02	4	0	0	0	0	29	5	13	0	0
30	11	13	0	0	2.157D-03	0.0	0.0	0.0	0.0	0.0	0.0	2.425D 01	4.000D-02	4	0	0	0	0	30	11	13	0	0
31	13	16	0	0	3.810D-04	0.0	0.0	0.0	0.0	0.0	0.0	7.500D 00	4.000D-02	4	0	0	0	0	31	13	16	0	0
32	13	16	1	5	1.170D-03	0.0	0.0	0.0	0.0	0.0	0.0	7.500D 00	4.000D-02	4	0	0	0	0	32	13	16	1	5
33	17	18	0	0	6.157D-01	4.182D 00	6.052D-02	4.243D 00	5.780D 00	6.670D-01	0.0	5.000D 00	4.000D-02	4	0	0	0	0	33	17	18	0	0
34	18	19	0	0	6.157D-01	4.182D 00	6.052D-02	4.243D 00	5.780D 00	6.670D-01	0.0	1.100D 01	4.000D-02	4	0	0	0	0	34	18	19	0	0
35	19	20	0	0	6.157D-01	4.182D 00	6.052D-02	4.243D 00	5.780D 00	6.670D-01	0.0	1.200D 01	4.000D-02	4	0	0	0	0	35	19	20	0	0
36	20	21	0	0	6.157D-01	4.182D 00	6.052D-02	4.243D 00	5.780D 00	6.670D-01	0.0	1.100D 01	4.000D-02	4	0	0	0	0	36	20	21	0	0
37	21	22	0	0	6.157D-01	4.182D 00	6.052D-02	4.243D 00	5.780D 00	6.670D-01	0.0	7.000D 00	4.000D-02	4	0	0	0	0	37	21	22	0	0
38	23	24	0	0	1.280D-01	3.418D-01	4.267D-02	3.844D-01	1.650D 00	1.000D 00	0.0	5.000D 00	4.000D-02	4	0	0	0	0	38	23	24	0	0
39	24	25	0	0	1.280D-01	3.418D-01	4.267D-02	3.844D-01	1.650D 00	1.000D 00	0.0	1.100D 01	4.000D-02	4	0	0	0	0	39	24	25	0	0
40	25	26	0	0	1.280D-01	3.418D-01	4.267D-02	3.844D-01	1.650D 00	1.000D 00	0.0	1.200D 01	4.000D-02	4	0	0	0	0	40	25	26	0	0
41	26	27	0	0	1.280D-01	3.418D-01	4.267D-02	3.844D-01	1.650D 00	1.000D 00	0.0	1.100D 01	4.000D-02	4	0	0	0	0	41	26	27	0	0
42	27	28	0	0	1.280D-01	3.418D-01	4.267D-02	3.844D-01	1.650D 00	1.000D 00	0.0	7.000D 00	4.000D-02	4	0	0	0	0	42	27	28	0	0
43	17	23	0	0	2.184D-01	7.779D-01	4.093D-03	7.820D-01	2.820D 00	5.500D-01	0.0	1.400D 01	4.000D-02	4	0	0	0	0	43	17	23	0	0
44	18	24	0	0	2.184D-01	7.779D-01	4.093D-03	7.820D-01	2.820D 00	5.500D-01	0.0	1.400D 01	4.000D-02	4	1	0	1	0	44	18	24	0	0

45	19	25	0	0	2.184D-01	7.779D-01	4.093D-03	7.820D-01	2.820D 00	5.500D-01	0.0		1.400D 01	4.000D-02	4	1	1	1	1	45	19	25	0	0
46	20	26	0	0	2.184D-01	7.779D-01	4.093D-03	7.820D-01	2.820D 00	5.500D-01	0.0		1.400D 01	4.000D-02	4	1	0	1	0	46	20	26	0	0
47	21	27	0	0	2.184D-01	7.779D-01	4.093D-03	7.820D-01	2.820D 00	5.500D-01	0.0		1.400D 01	4.000D-02	4	0	1	0	1	47	21	27	0	0
48	22	28	0	0	2.184D-01	7.779D-01	4.093D-03	7.820D-01	2.820D 00	5.500D-01	0.0		1.400D 01	4.000D-02	4	0	0	1	0	48	22	28	0	0
49	19	32	0	1	1.888D-01	1.800D-01	5.400D-01	7.200D-01	6.000D-02	6.000D-02	0.0		1.430D 01	4.000D-02	6	0	0	0	0	49	19	32	0	1
50	21	32	0	2	1.888D-01	1.800D-01	5.400D-01	7.200D-01	6.000D-02	6.000D-02	0.0		1.430D 01	4.000D-02	6	0	0	0	0	50	21	32	0	2
51	25	32	0	3	1.888D-01	1.800D-01	5.400D-01	7.200D-01	6.000D-02	6.000D-02	0.0		1.430D 01	4.000D-02	6	0	0	0	0	51	25	32	0	3
52	27	32	0	4	1.888D-01	1.800D-01	5.400D-01	7.200D-01	6.000D-02	6.000D-02	0.0		1.430D 01	4.000D-02	6	0	0	0	0	52	27	32	0	4
53	29	30	0	0	2.000D-02	7.500D-03	7.500D-03	1.500D-02	0.0	0.0	0.0		1.509D 01	4.100D-01	4	0	0	0	0	53	29	30	0	0
54	29	31	0	0	7.197D-03	4.800D-03	4.800D-03	9.600D-03	0.0	0.0	0.0		1.509D 01	3.111D-0110	0	0	0	0	0	54	29	31	0	0
55	21	29	0	0	2.157D-03	0.0	0.0	0.0	0.0	0.0	0.0		2.425D 01	4.000D-02	4	0	0	0	0	55	21	29	0	0
56	27	29	0	0	2.157D-03	0.0	0.0	0.0	0.0	0.0	0.0		2.425D 01	4.000D-02	4	0	0	0	0	56	27	29	0	0
57	29	32	0	0	3.810D-04	0.0	0.0	0.0	0.0	0.0	0.0		7.500D 00	4.000D-02	4	0	0	0	0	57	29	32	0	0
58	29	32	1	5	1.170D-03	0.0	0.0	0.0	0.0	0.0	0.0		7.500D 00	4.000D-02	4	0	0	0	0	58	29	32	1	5

UNSYMMETRICAL BEAM DATA

BEAM					TENSION-COMPRESSION FLAG	DEADBAND
IJ	I	J	M	N	IJUB	DB
29	5	13	0	0	1	0.0
30	11	13	0	0	1	0.0
31	13	16	0	0	-1	0.0
32	13	16	1	5	-1	7.500D-01
55	21	29	0	0	1	0.0
56	27	29	0	0	1	0.0
57	29	32	0	0	-1	0.0
58	29	32	1	5	-1	7.500D-01

PLASTIC HINGE AND END-FIXITY DATA

BEAM					P-CODES	SHAPE FACTORS				PLASTIC HINGE MOMENTS			
IJ	I	J	M	N	IYIZJYJZ	SF35	SF26	SF35J	SF26J	PLM35	PLM26	PLM35J	PLM26J
18	2	8	0	0	1 0 1 0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
19	3	9	0	0	1 1 1 1	0.500	0.500	0.500	0.500	6.483D 03	1.749D 02	6.483D 03	1.749D 02
20	4	10	0	0	1 0 1 0	0.250	0.0	0.750	0.0	3.241D 03	0.0	9.724D 03	0.0
21	5	11	0	0	0 1 0 1	0.0	0.500	0.0	0.500	0.0	1.749D 02	0.0	1.749D 02
22	6	12	0	0	0 0 1 0	0.0	0.0	0.300	0.0	0.0	0.0	3.890D 03	0.0
44	18	24	0	0	1 0 1 0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
45	19	25	0	0	1 1 1 1	0.500	0.500	0.500	0.500	6.483D 03	1.749D 02	6.483D 03	1.749D 02
46	20	26	0	0	1 0 1 0	0.250	0.0	0.750	0.0	3.241D 03	0.0	9.724D 03	0.0
47	21	27	0	0	0 1 0 1	0.0	0.500	0.0	0.500	0.0	1.749D 02	0.0	1.749D 02
48	22	28	0	0	0 0 1 0	0.0	0.0	0.300	0.0	0.0	0.0	3.890D 03	0.0

NONLINEAR BEAM DATA

BEAM					DIRECTION	STANDARD TABLE NO.	LINEAR DEFLECTION	BOTTOMING DEFLECTION
IJ	I	J	M	N	L	NP	LDP	LDP1
31	13	16	0	0	1	8	7.50000E-01	0.0
32	13	16	1	5	1	5	2.75000E 00	0.0

```
   57   29   32    0    0        1            8          7.50000E-01    0.0
   58   29   32    1    5        1            5          2.75000E 00    0.0

KR TABLE FOR I,J,M,N,L =   13   16    0    0    1
  1    0.0              1.00000E 00
  2    7.50000E-01      1.00000E 00
  3    7.50750E-01     -1.00000E 00
  4    1.50000E 00     -1.00000E 00
  5    1.50075E 00      0.0
  6    7.50000E 00      0.0
  7    1.12500E 01      0.0
  8    1.50000E 01      0.0

KR TABLE FOR I,J,M,N,L =   13   16    1    5    1
  1    0.0              1.00000E 00
  2    2.75000E 00      1.00000E 00
  3    2.75275E 00      0.0
  4    2.75000E 01      0.0
  5    5.50000E 01      0.0

KR TABLE FOR I,J,M,N,L =   29   32    0    0    1
  1    0.0              1.00000E 00
  2    7.50000E-01      1.00000E 00
  3    7.50750E-01     -1.00000E 00
  4    1.50000E 00     -1.00000E 00
  5    1.50075E 00      0.0
  6    7.50000E 00      0.0
  7    1.12500E 01      0.0
  8    1.50000E 01      0.0

KR TABLE FOR I,J,M,N,L =   29   32    1    5    1
  1    0.0              1.00000E 00
  2    2.75000E 00      1.00000E 00
  3    2.75275E 00      0.0
  4    2.75000E 01      0.0
  5    5.50000E 01      0.0

DRI ELEMENTS

 I  J
13 15
29 31


I,J,M,N
K-MATRIX FOR INTERNAL BEAM IJ
  1  2  0  0
    1.29292D 06    0.0            0.0            0.0            0.0            0.0
    0.0            6.10052D 04    0.0            0.0            0.0           -1.52513D 05
    0.0            0.0            4.21574D 06    0.0            1.05393D 07    0.0
    0.0            0.0            0.0            3.39424D 06    0.0            0.0
    0.0            0.0            1.05393D 07    0.0            3.51312D 07    0.0
    0.0           -1.52513D 05    0.0            0.0            0.0            5.08376D 05
  2  3  0  0
    5.87680D 05    0.0            0.0            0.0            0.0            0.0
    0.0            5.72926D 03    0.0            0.0            0.0           -3.15109D 04
    0.0            0.0            3.95916D 05    0.0            2.17755D 06    0.0
    0.0            0.0            0.0            1.54284D 06    0.0            0.0
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   0.0            0.0            2.[illegible]50 06    0.0            1.59687D 07    0.0
   0.0           -3.15109D 04                          0.0            0.0            2.31080D 05
 3  4  0  0
   5.38715D 05    0.0            0.0                   0.0            0.0            0.0
   0.0            4.41299D 03    0.0                   0.0            0.0           -2.64779D 04
   0.0            0.0            3.04958D 05           0.0            1.82975D 06    0.0
   0.0            0.0            0.0                   1.41427D 06    0.0            0.0
   0.0            0.0            1.82975D 06           0.0            1.46380D 07    0.0
   0.0           -2.64779D 04    0.0                   0.0            0.0            2.11824D 05
 4  5  0  0
   5.87689D 05    0.0            0.0                   0.0            0.0            0.0
   0.0            5.72926D 03    0.0                   0.0            0.0           -3.15109D 04
   0.0            0.0            3.95918D 05           0.0            2.17755D 06    0.0
   0.0            0.0            0.0                   1.54284D 06    0.0            0.0
   0.0            0.0            2.17755D 06           0.0            1.59687D 07    0.0
   0.0           -3.15109D 04    0.0                   0.0            0.0            2.31080D 05
 5  6  0  0
   9.23511D 05    0.0            0.0                   0.0            0.0            0.0
   0.0            2.22322D 04    0.0                   0.0            0.0           -7.78127D 04
   0.0            0.0            1.53635D 06           0.0            5.37722D 06    0.0
   0.0            0.0            0.0                   2.42446D 06    0.0            0.0
   0.0            0.0            5.37722D 06           0.0            2.50937D 07    0.0
   0.0           -7.78127D 04    0.0                   0.0            0.0            3.63126D 05
 7  8  0  0
   2.68800D 05    0.0            0.0                   0.0            0.0            0.0
   0.0            4.30083D 04    0.0                   0.0            0.0           -1.07521D 05
   0.0            0.0            3.44494D 05           0.0            8.61235D 05    0.0
   0.0            0.0            0.0                   3.07542D 05    0.0            0.0
   0.0            0.0            8.61235D 05           0.0            2.87078D 06    0.0
   0.0           -1.07521D 05    0.0                   0.0            0.0            3.58403D 05
 8  9  0  0
   1.22182D 05    0.0            0.0                   0.0            0.0            0.0
   0.0            4.03910D 03    0.0                   0.0            0.0           -2.22150D 04
   0.0            0.0            3.23529D 04           0.0            1.77941D 05    0.0
   0.0            0.0            0.0                   1.39792D 05    0.0            0.0
   0.0            0.0            1.77941D 05           0.0            1.30490D 06    0.0
   0.0           -2.22150D 04    0.0                   0.0            0.0            1.62910D 05
 9 10  0  0
   1.12000D 05    0.0            0.0                   0.0            0.0            0.0
   0.0            3.11114D 03    0.0                   0.0            0.0           -1.86668D 04
   0.0            0.0            2.49200D 04           0.0            1.49520D 05    0.0
   0.0            0.0            0.0                   1.28142D 05    0.0            0.0
   0.0            0.0            1.49520D 05           0.0            1.19616D 06    0.0
   0.0           -1.86668D 04    0.0                   0.0            0.0            1.49335D 05
10 11  0  0
   1.22182D 05    0.0            0.0                   0.0            0.0            0.0
   0.0            4.03910D 03    0.0                   0.0            0.0           -2.22150D 04
   0.0            0.0            3.23529D 04           0.0            1.77941D 05    0.0
   0.0            0.0            0.0                   1.39792D 05    0.0            0.0
   0.0            0.0            1.77941D 05           0.0            1.30490D 06    0.0
   0.0           -2.22150D 04    0.0                   0.0            0.0            1.62910D 05
11 12  0  0
   1.92000D 05    0.0            0.0                   0.0            0.0            0.0
   0.0            1.56736D 04    0.0                   0.0            0.0           -5.48576D 04
   0.0            0.0            1.25544D 05           0.0            4.39406D 05    0.0
   0.0            0.0            0.0                   2.19673D 05    0.0            0.0
   0.0            0.0            4.39406D 05           0.0            2.05056D 06    0.0
   0.0           -5.48576D 04    0.0                   0.0            0.0            2.56002D 05
 1 17  0  0
   2.53120D 05    0.0            0.0                   0.0            0.0            0.0
```

MODEL PARAMETERS

VEHICLE WT = 5.4550260 02

VEHICLE CG POSITION
X (FS) = 1.6236200 02
Y (BL) = -7.2894260-16
Z (WL) = 7.5266370-01

VEHICLE INERTIAS (IN-LB-SEC**2)
I(XX) = 7.6049830 02
I(YY) = 5.8851100 02
I(ZZ) = 4.8035700 02

VEHICLE CG INITIAL GROUND COORDINATES
XCG IS THE DISTANCE FROM SLOPE/GROUND INTERSECTION TO VEHICLE CG,+FORWARD
ZCG IS THE DISTANCE FROM GROUND PLANE TO VEHICLE CG,+DOWN
XCG = 0.0
ZCG = -2.4995700 01

BEAM LOADS

BEAM IJ	I	J	M	N	AXIAL LOAD BUCKLING	TENSION	COMPRESSION	SHEAR FORCE LATERAL(Y)	VERTICAL(Z)	ROLL(X)	MOMENT PITCH(Y)	YAW(Z)	BEAM IJ	I	J	M	N
1	1	2	0	0	1.0035D 06	2.8937D 04	2.4011D 04	9.0750D 03	9.0750D 03	0.0	2.8220D 04	3.5387D 03	1	1	2	0	0
2	2	3	0	0	2.0733D 05	2.8937D 04	2.4011D 04	9.0750D 03	9.0750D 03	0.0	2.8220D 04	3.5387D 03	2	2	3	0	0
3	3	4	0	0	1.7422D 05	2.8937D 04	2.4011D 04	9.0750D 03	9.0750D 03	0.0	2.8220D 04	3.5387D 03	3	3	4	0	0
4	4	5	0	0	2.0733D 05	2.8937D 04	2.4011D 04	9.0750D 03	9.0750D 03	0.0	2.8220D 04	3.5387D 03	4	4	5	0	0
5	5	6	0	0	5.1199D 05	2.8937D 04	2.4011D 04	9.0750D 03	9.0750D 03	0.0	2.8220D 04	3.5387D 03	5	5	6	0	0
6	7	8	0	0	7.0746D 05	6.0160D 03	4.9920D 03	1.8867D 03	1.8867D 03	0.0	8.0780D 03	1.6640D 03	6	7	8	0	0
7	8	9	0	0	1.4617D 05	6.0160D 03	4.9920D 03	1.8867D 03	1.8867D 03	0.0	8.0780D 03	1.6640D 03	7	8	9	0	0
8	9	10	0	0	1.2282D 05	6.0160D 03	4.9920D 03	1.8867D 03	1.8867D 03	0.0	8.0780D 03	1.6640D 03	8	9	10	0	0
9	10	11	0	0	1.4617D 05	6.0160D 03	4.9920D 03	1.8867D 03	1.8867D 03	0.0	8.0780D 03	1.6640D 03	9	10	11	0	0
10	11	12	0	0	3.6095D 05	6.0160D 03	4.9920D 03	1.8867D 03	1.8867D 03	0.0	8.0780D 03	1.6640D 03	10	11	12	0	0
11	1	17	0	0	1.2239D 04	1.3596D 04	1.1282D 04	4.2640D 03	4.2640D 03	0.0	1.8597D 04	2.9400D 02	11	1	17	0	0
12	2	18	0	0	1.2239D 04	1.3596D 04	1.1282D 04	4.2640D 03	4.2640D 03	0.0	1.8597D 04	2.9400D 02	12	2	18	0	0
13	3	19	0	0	1.2239D 04	1.3596D 04	1.1282D 04	4.2640D 03	4.2640D 03	0.0	1.8597D 04	2.9400D 02	13	3	19	0	0
14	4	20	0	0	1.2239D 04	1.3596D 04	1.1282D 04	4.2640D 03	4.2640D 03	0.0	1.8597D 04	2.9400D 02	14	4	20	0	0
15	5	21	0	0	1.2239D 04	1.3596D 04	1.1282D 04	4.2640D 03	4.2640D 03	0.0	1.8597D 04	2.9400D 02	15	5	21	0	0
16	6	22	0	0	1.2239D 04	1.3596D 04	1.1282D 04	4.2640D 03	4.2640D 03	0.0	1.8597D 04	2.9400D 02	16	6	22	0	0
17	1	7	0	0	8.6566D 03	1.0266D 04	8.5168D 03	3.2197D 03	3.2197D 03	0.0	1.0758D 04	2.9024D 02	17	1	7	0	0
18	2	8	0	0	8.6566D 03	1.0266D 04	8.5168D 03	3.2197D 03	0.0	0.0	0.0	2.9024D 02	18	2	8	0	0
19	3	9	0	0	2.1641D 03	1.0266D 04	8.5168D 03	0.0	0.0	0.0	0.0	0.0	19	3	9	0	0
20	4	10	0	0	8.6566D 03	1.0266D 04	8.5168D 03	3.2197D 03	0.0	0.0	0.0	2.9024D 02	20	4	10	0	0
21	5	11	0	0	2.1641D 03	1.0266D 04	8.5168D 03	0.0	3.2197D 03	0.0	1.0758D 04	0.0	21	5	11	0	0
22	6	12	0	0	8.6566D 03	1.0266D 04	8.5168D 03	3.2197D 03	3.2197D 03	0.0	1.0758D 04	2.9024D 02	22	6	12	0	0
23	3	16	0	1	3.4750D 05	3.0208D 03	3.0208D 03	2.1504D 03	2.1504D 03	0.0	4.8000D 04	1.4400D 05	23	3	16	0	1
24	5	16	0	2	3.4750D 05	3.0208D 03	3.0208D 03	2.1504D 03	2.1504D 03	0.0	4.8000D 04	1.4400D 05	24	5	16	0	2
25	9	16	0	3	3.4750D 05	3.0208D 03	3.0208D 03	2.1504D 03	2.1504D 03	0.0	4.8000D 04	1.4400D 05	25	9	16	0	3
26	11	16	0	4	3.4750D 05	3.0208D 03	3.0208D 03	2.1504D 03	2.1504D 03	0.0	4.8000D 04	1.4400D 05	26	11	16	0	4
27	13	14	0	0	1.3653D 04	9.4000D 02	7.8000D 02	2.9480D 02	2.9480D 02	0.0	0.0	0.0	27	13	14	0	0
28	13	15	0	0	8.3219D 02	1.1515D 02	1.1515D 02	8.1969D 01	8.1969D 01	0.0	0.0	0.0	28	13	15	0	0
29	5	13	0	0	0.0	1.0133D 02	8.4127D 01	3.1796D 01	3.1796D 01	0.0	0.0	0.0	29	5	13	0	0
30	11	13	0	0	0.0	1.0133D 02	8.4127D 01	3.1796D 01	3.1796D 01	0.0	0.0	0.0	30	11	13	0	0
31	13	16	0	0	0.0	1.7907D 01	1.4859D 01	5.6159D 00	5.6159D 00	0.0	0.0	0.0	31	13	16	0	0
32	13	16	1	5	0.0	5.4990D 01	4.5630D 01	1.7246D 01	1.7246D 01	0.0	0.0	0.0	32	13	16	1	5

33	17	18	0	0	1.0035D 06	2.8937D 04	2.4011D 04	9.0750D 03	9.0750D 03	0.0		2.8220D 04	3.5387D 03	33	17	18	0	0
34	18	19	0	0	2.0733D 05	2.8937D 04	2.4011D 04	9.0750D 03	9.0750D 03	0.0		2.8220D 04	3.5387D 03	34	18	19	0	0
35	19	20	0	0	1.7422D 05	2.8937D 04	2.4011D 04	9.0750D 03	9.0750D 03	0.0		2.8220D 04	3.5387D 03	35	19	20	0	0
36	20	21	0	0	2.0733D 05	2.8937D 04	2.4011D 04	9.0750D 03	9.0750D 03	0.0		2.8220D 04	3.5387D 03	36	20	21	0	0
37	21	22	0	0	5.1199D 05	2.8937D 04	2.4011D 04	9.0750D 03	9.0750D 03	0.0		2.8220D 04	3.5387D 03	37	21	22	0	0
38	23	24	0	0	7.0746D 05	6.0160D 03	4.9920D 03	1.8867D 03	1.8867D 03	0.0		8.0780D 03	1.6640D 03	38	23	24	0	0
39	24	25	0	0	1.4617D 05	6.0160D 03	4.9920D 03	1.8867D 03	1.8867D 03	0.0		8.0780D 03	1.6640D 03	39	24	25	0	0
40	25	26	0	0	1.2282D 05	6.0160D 03	4.9920D 03	1.8867D 03	1.8867D 03	0.0		8.0780D 03	1.6640D 03	40	25	26	0	0
41	26	27	0	0	1.4617D 05	6.0160D 03	4.9920D 03	1.8867D 03	1.8867D 03	0.0		8.0780D 03	1.6640D 03	41	26	27	0	0
42	27	28	0	0	3.6095D 05	6.0160D 03	4.9920D 03	1.8867D 03	1.8867D 03	0.0		8.0780D 03	1.6640D 03	42	27	28	0	0
43	17	23	0	0	8.6566D 03	1.0266D 04	8.5188D 03	3.2197D 03	3.2197D 03	0.0		1.0758D 04	2.9024D 02	43	17	23	0	0
44	18	24	0	0	8.6566D 03	1.0266D 04	8.5188D 03	3.2197D 03	0.0	0.0		0.0	2.9024D 02	44	18	24	0	0
45	19	25	0	0	2.1641D 03	1.0266D 04	8.5188D 03	0.0	0.0	0.0		0.0	0.0	45	19	25	0	0
46	20	26	0	0	8.6566D 03	1.0266D 04	8.5188D 03	3.2197D 03	0.0	0.0		0.0	2.9024D 02	46	20	26	0	0
47	21	27	0	0	2.1641D 03	1.0266D 04	8.5188D 03	0.0	3.2197D 03	0.0		1.0758D 04	0.0	47	21	27	0	0
48	22	28	0	0	8.6566D 03	1.0266D 04	8.5188D 03	3.2197D 03	3.2197D 03	0.0		1.0758D 04	2.9024D 02	48	22	28	0	0
49	19	32	0	1	3.4750D 05	3.0208D 03	3.0208D 03	2.1504D 03	2.1504D 03	0.0		4.8000D 04	1.4400D 05	49	19	32	0	1
50	21	32	0	2	3.4750D 05	3.0208D 03	3.0208D 03	2.1504D 03	2.1504D 03	0.0		4.8000D 04	1.4400D 05	50	21	32	0	2
51	25	32	0	3	3.4750D 05	3.0208D 03	3.0208D 03	2.1504D 03	2.1504D 03	0.0		4.8000D 04	1.4400D 05	51	25	32	0	3
52	27	32	0	4	3.4750D 05	3.0208D 03	3.0208D 03	2.1504D 03	2.1504D 03	0.0		4.8000D 04	1.4400D 05	52	27	32	0	4
53	29	30	0	0	1.3653D 04	9.4000D 02	7.8000D 02	2.9480D 02	2.9480D 02	0.0		0.0	0.0	53	29	30	0	0
54	29	31	0	0	8.3219D 02	1.1515D 02	1.1515D 02	8.1969D 01	8.1969D 01	0.0		0.0	0.0	54	29	31	0	0
55	21	29	0	0	0.0	1.0133D 02	8.4127D 01	3.1796D 01	3.1796D 01	0.0		0.0	0.0	55	21	29	0	0
56	27	29	0	0	0.0	1.0133D 02	8.4127D 01	3.1796D 01	3.1796D 01	0.0		0.0	0.0	56	27	29	0	0
57	29	32	0	0	0.0	1.7907D 01	1.4859D 01	5.6159D 00	5.6159D 00	0.0		0.0	0.0	57	29	32	0	0
58	29	32	1	5	0.0	5.4990D 01	4.5630D 01	1.7246D 01	1.7246D 01	0.0		0.0	0.0	58	29	32	1	5

BEAM DEFLECTIONS

IJ	BEAM I	J	M	N	DEFLECTION BUCKLING	TENSION	COMPRESSION	F(Y)	TRANSLATION DUE TO F(Z)	BM(Z)	BM(Y)	ROTATION ABOUT X-AXIS	Y-AXIS	Z-AXIS
1	1	2	0	0	7.761D-01	2.238D-02	1.857D-02	1.488D-01	2.153D-03	4.641D-02	5.355D-03	0.0	3.213D-03	2.784D-02
2	2	3	0	0	3.528D-01	4.924D-02	4.086D-02	1.584D 00	2.292D-02	2.246D-01	2.592D-02	0.0	7.069D-03	6.126D-02
3	3	4	0	0	3.234D-01	5.371D-02	4.457D-02	2.056D 00	2.976D-02	2.673D-01	3.085D-02	0.0	7.711D-03	6.682D-02
4	4	5	0	0	3.528D-01	4.924D-02	4.086D-02	1.584D 00	2.292D-02	2.246D-01	2.592D-02	0.0	7.069D-03	6.126D-02
5	5	6	0	0	5.544D-01	3.133D-02	2.600D-02	4.082D-01	5.907D-03	9.095D-02	1.050D-02	0.0	4.498D-03	3.899D-02
6	7	8	0	0	2.632D 00	2.238D-02	1.857D-02	4.387D-02	5.477D-03	3.095D-02	1.876D-02	0.0	1.126D-02	1.857D-02
7	8	9	0	0	1.196D 00	4.924D-02	4.086D-02	4.671D-01	5.832D-02	1.499D-01	9.079D-02	0.0	2.476D-02	4.086D-02
8	9	10	0	0	1.097D 00	5.371D-02	4.457D-02	6.064D-01	7.571D-02	1.783D-01	1.081D-01	0.0	2.701D-02	4.457D-02
9	10	11	0	0	1.196D 00	4.924D-02	4.086D-02	4.671D-01	5.832D-02	1.499D-01	9.079D-02	0.0	2.476D-02	4.086D-02
10	11	12	0	0	1.880D 00	3.133D-02	2.600D-02	1.204D-01	1.503D-02	6.067D-02	3.677D-02	0.0	1.576D-02	2.600D-02
11	1	17	0	0	4.835D-02	5.371D-02	4.457D-02	1.375D 01	3.120D-02	3.161D-01	4.537D-02	0.0	1.134D-02	7.903D-02
12	2	18	0	0	4.835D-02	5.371D-02	4.457D-02	1.375D 01	3.120D-02	3.161D-01	4.537D-02	0.0	1.134D-02	7.903D-02
13	3	19	0	0	4.835D-02	5.371D-02	4.457D-02	1.375D 01	3.120D-02	3.161D-01	4.537D-02	0.0	1.134D-02	7.903D-02
14	4	20	0	0	4.835D-02	5.371D-02	4.457D-02	1.375D 01	3.120D-02	3.161D-01	4.537D-02	0.0	1.134D-02	7.903D-02
15	5	21	0	0	4.835D-02	5.371D-02	4.457D-02	1.375D 01	3.120D-02	3.161D-01	4.537D-02	0.0	1.134D-02	7.903D-02
16	6	22	0	0	4.835D-02	5.371D-02	4.457D-02	1.375D 01	3.120D-02	3.161D-01	4.537D-02	0.0	1.134D-02	7.903D-02
17	1	7	0	0	5.284D-02	6.267D-02	5.200D-02	1.713D 01	9.014D-02	4.412D-01	8.605D-02	0.0	1.844D-02	9.455D-02
18	2	8	0	0	5.284D-02	6.267D-02	5.200D-02	1.713D 01	9.014D-02	4.412D-01	8.605D-02	0.0	1.844D-02	9.455D-02
19	3	9	0	0	1.321D-02	6.267D-02	5.200D-02	1.713D 01	9.014D-02	4.412D-01	8.605D-02	0.0	1.844D-02	9.455D-02
20	4	10	0	0	5.284D-02	6.267D-02	5.200D-02	1.713D 01	9.014D-02	4.412D-01	8.605D-02	0.0	1.844D-02	9.455D-02
21	5	11	0	0	1.321D-02	6.267D-02	5.200D-02	1.713D 01	9.014D-02	4.412D-01	8.605D-02	0.0	1.844D-02	9.455D-02
22	6	12	0	0	5.284D-02	6.267D-02	5.200D-02	1.713D 01	9.014D-02	4.412D-01	8.605D-02	0.0	1.844D-02	9.455D-02
23	3	16	0	1	2.632D 00	2.288D-02	2.288D-02	9.704D-02	2.911D-01	1.818D 00	1.818D 00	0.0	3.813D-01	3.813D-01
24	5	16	0	2	2.632D 00	2.288D-02	2.288D-02	9.704D-02	2.911D-01	1.818D 00	1.818D 00	0.0	3.813D-01	3.813D-01
25	9	16	0	3	2.632D 00	2.288D-02	2.288D-02	9.704D-02	2.911D-01	1.818D 00	1.818D 00	0.0	3.813D-01	3.813D-01
26	11	16	0	4	2.632D 00	2.288D-02	2.288D-02	9.704D-02	2.911D-01	1.818D 00	1.818D 00	0.0	3.813D-01	3.813D-01

27	13	14	0	0	9.811D-01	6.755D-02	5.605D-02	1.072D 00	1.072D 00	0.0	0.0	0.0	0.0	0.0
28	13	15	0	0	1.745D 00	2.414D-01	2.414D-01	4.890D 00	4.890D 00	0.0	0.0	0.0	0.0	0.0
29	5	13	0	0	0.0	1.086D-01	9.009D-02	0.0	0.0	0.0	0.0	0.0	0.0	0.0
30	11	13	0	0	0.0	1.086D-01	9.009D-02	0.0	0.0	0.0	0.0	0.0	0.0	0.0
31	13	16	0	0	0.0	3.357D-02	2.786D-02	0.0	0.0	0.0	0.0	0.0	0.0	0.0
32	13	16	1	5	0.0	3.357D-02	2.786D-02	0.0	0.0	0.0	0.0	0.0	0.0	0.0
33	17	18	0	0	7.701D-01	2.238D-02	1.857D-02	1.488D-01	2.153D-03	4.641D-02	5.355D-03	0.0	3.213D-03	2.784D-02
34	18	19	0	0	3.528D-01	4.924D-02	4.086D-02	1.584D 00	2.292D-02	2.246D-01	2.592D-02	0.0	7.068D-03	6.126D-02
35	19	20	0	0	3.234D-01	5.371D-02	4.457D-02	2.056D 00	2.976D-02	2.673D-01	3.085D-02	0.0	7.711D-03	6.682D-02
36	20	21	0	0	3.528D-01	4.924D-02	4.086D-02	1.584D 00	2.292D-02	2.246D-01	2.592D-02	0.0	7.068D-03	6.126D-02
37	21	22	0	0	5.544D-01	3.133D-02	2.600D-02	4.088D-01	5.907D-03	9.095D-02	1.050D-02	0.0	4.498D-03	3.898D-02
38	23	24	0	0	2.632D 00	2.238D-02	1.857D-02	4.387D-02	5.477D-03	3.095D-02	1.876D-02	0.0	1.126D-02	1.857D-02
39	24	25	0	0	1.196D 00	4.924D-02	4.086D-02	4.671D-01	5.830D-02	1.492D-01	9.079D-02	0.0	2.476D-02	4.086D-02
40	25	26	0	0	1.097D 00	5.371D-02	4.457D-02	6.064D-01	7.571D-02	1.783D-01	1.081D-01	0.0	2.701D-02	4.457D-02
41	26	27	0	0	1.196D 00	4.924D-02	4.086D-02	4.671D-01	5.830D-02	1.492D-01	9.079D-02	0.0	2.476D-02	4.086D-02
42	27	28	0	0	1.880D 00	3.133D-02	2.600D-02	1.204D-01	1.503D-02	6.067D-02	3.677D-02	0.0	1.576D-02	2.600D-02
43	17	23	0	0	5.284D-02	6.267D-02	5.200D-02	1.713D 01	9.014D-02	4.412D-01	8.605D-02	0.0	1.844D-02	9.455D-02
44	18	24	0	0	5.284D-02	6.267D-02	5.200D-02	1.713D 01	9.014D-02	4.412D-01	8.605D-02	0.0	1.844D-02	9.455D-02
45	19	25	0	0	1.321D-02	6.267D-02	5.200D-02	1.713D 01	9.014D-02	4.412D-01	8.605D-02	0.0	1.844D-02	9.455D-02
46	20	26	0	0	5.284D-02	6.267D-02	5.200D-02	1.713D 01	9.014D-02	4.412D-01	8.605D-02	0.0	1.844D-02	9.455D-02
47	21	27	0	0	1.321D-02	6.267D-02	5.200D-02	1.713D 01	9.014D-02	4.412D-01	8.605D-02	0.0	1.844D-02	9.455D-02
48	22	28	0	0	5.284D-02	6.267D-02	5.200D-02	1.713D 01	9.014D-02	4.412D-01	8.605D-02	0.0	1.844D-02	9.455D-02
49	19	32	0	1	2.632D 00	2.288D-02	2.288D-02	9.704D-02	2.911D-01	1.818D 00	1.818D 00	0.0	3.813D-01	3.813D-01
50	21	32	0	2	2.632D 00	2.288D-02	2.288D-02	9.704D-02	2.911D-01	1.818D 00	1.818D 00	0.0	3.813D-01	3.813D-01
51	25	32	0	3	2.632D 00	2.288D-02	2.288D-02	9.704D-02	2.911D-01	1.818D 00	1.818D 00	0.0	3.813D-01	3.813D-01
52	27	32	0	4	2.632D 00	2.288D-02	2.288D-02	9.704D-02	2.911D-01	1.818D 00	1.818D 00	0.0	3.813D-01	3.813D-01
53	29	30	0	0	9.811D-01	6.755D-02	5.605D-02	1.072D 00	1.072D 00	0.0	0.0	0.0	0.0	0.0
54	29	31	0	0	1.745D 00	2.414D-01	2.414D-01	4.890D 00	4.890D 00	0.0	0.0	0.0	0.0	0.0
55	21	29	0	0	0.0	1.086D-01	9.009D-02	0.0	0.0	0.0	0.0	0.0	0.0	0.0
56	27	29	0	0	0.0	1.086D-01	9.009D-02	0.0	0.0	0.0	0.0	0.0	0.0	0.0
57	29	32	0	0	0.0	3.357D-02	2.786D-02	0.0	0.0	0.0	0.0	0.0	0.0	0.0
58	29	32	1	5	0.0	3.357D-02	2.786D-02	0.0	0.0	0.0	0.0	0.0	0.0	0.0

BEAM UNCOUPLED,UNDAMPED FREQUENCIES (CPS)

IJ	I	J	M	N	(1)	(2)	(3)	(4)	(5)	(6)
1	1	2	0	0	3.2504D 03	7.0605D 02	5.8693D 03	9.1377D 02	6.5191D 03	5.4704D 02
2	2	3	0	0	1.2150D 03	1.1997D 02	9.972eD 02	3.1486D 02	1.5537D 03	1.7881D 02
3	3	4	0	0	1.0181D 03	9.2150D 01	7.6603D 02	2.5712D 02	1.1490D 03	1.4830D 02
4	4	5	0	0	1.3475D 03	1.3305D 02	1.1060D 03	3.787.D 02	1.8387D 03	1.8179D 02
5	5	6	0	0	2.3886D 03	3.7061D 02	3.0309D 03	6.7140D 02	3.8327D 03	3.6292D 02
6	7	8	0	0	1.0496D 03	4.1986D 02	1.1683D 03	7.5032D 01	2.3542D 02	2.4486D 02
7	8	9	0	0	4.0992D 02	7.4532D 01	2.1094D 02	3.0010D 01	9.1966D 01	8.4854D 01
8	9	10	0	0	3.4754D 02	5.7924D 01	1.6394D 02	2.5606D 01	7.7872D 01	7.0155D 01
9	10	11	0	0	4.3443D 02	7.8988D 01	2.2355D 02	3.1071D 01	9.2289D 01	8.0141D 01
10	11	12	0	0	7.7073D 02	2.2021D 02	6.2323D 02	5.5152D 01	1.7049D 02	1.7610D 02
11	1	17	0	0	1.7756D 03	6.2140D 01	1.3046D 03	1.1544D 03	1.5689D 03	1.2152D 02
12	2	18	0	0	9.9196D 02	3.4717D 01	7.2886D 02	4.2670D 02	8.7500D 02	5.2320D 01
13	3	19	0	0	5.3629D 02	1.8769D 01	3.9404D 02	8.4903D 01	2.7798D 02	3.7150D 01
14	4	20	0	0	8.2856D 02	2.8997D 01	6.0878D 02	3.2516D 02	7.3208D 02	4.1346D 01
15	5	21	0	0	9.3681D 02	3.2786D 01	6.8832D 02	3.9923D 02	8.2687D 02	5.0457D 01
16	6	22	0	0	1.5000D 03	5.2494D 01	1.1021D 03	7.6997D 02	1.3249D 03	9.0819D 01
17	1	7	0	0	1.2377D 03	4.1924D 01	5.7796D 02	4.9104D 02	6.8588D 02	8.8325D 01
18	2	8	0	0	6.9149D 02	2.3422D 01	3.2289D 02	1.8296D 02	3.8259D 02	3.8441D 01
19	3	9	0	0	3.9833D 02	1.3492D 01	1.8600D 02	4.1835D 01	1.3643D 02	2.7642D 01
20	4	10	0	0	5.7727D 02	1.9553D 01	2.6956D 02	1.3976D 02	3.2003D 02	3.0159D 01
21	5	11	0	0	6.5267D 02	2.2107D 01	3.0476D 02	1.7097D 02	3.6146D 02	3.6368D 01
22	6	12	0	0	1.0454D 03	3.5411D 01	4.8817D 02	3.2893D 02	5.7927D 02	6.7958D 01
23	3	16	0	1	3.7146D 02	1.5216D 02	8.7661D 01	1.0205D 02	6.9492D 01	1.2331D 02
24	5	16	0	2	5.4024D 02	2.2133D 02	1.2776D 02	1.3383D 02	2.5694D 02	2.9102D 02
25	9	16	0	3	3.4034D 02	1.3943D 02	8.0502D 01	6.7576D 01	5.4552D 01	9.7375D 01

26	11	16	0	4	4.2116D 02	1.7255D 02	9.9622D 01	7.6183D 01	6.0904D 01	1.1083D 02
27	13	14	0	0	6.1115D 01	8.5914D 00	8.5914D 00	4.6263D 00	9.2062D 00	9.2004D 00
28	13	15	0	0	1.1314D 01	2.1211D 00	2.1211D 00	1.0136D 00	2.2729D 00	2.2714D 00
29	5	13	0	0	4.1764D 01	0.0	0.0	0.0	0.0	0.0
30	11	13	0	0	3.0572D 01	0.0	0.0	0.0	0.0	0.0
31	13	16	0	0	1.8055D 01	0.0	0.0	0.0	0.0	0.0
32	13	16	1	5	3.1640D 01	0.0	0.0	0.0	0.0	0.0
33	17	18	0	0	3.2504D 03	7.0605D 02	5.8693D 03	9.1377D 02	6.5191D 03	5.4704D 02
34	18	19	0	0	1.2150D 03	1.1997D 02	9.9726D 02	3.1486D 02	1.5537D 03	1.7881D 02
35	19	20	0	0	1.0181D 03	9.2150D 01	7.6603D 02	2.5712D 02	1.1490D 03	1.4830D 02
36	20	21	0	0	1.3475D 03	1.3305D 02	1.1060D 03	3.7874D 02	1.8367D 03	1.8179D 02
37	21	22	0	0	2.3386D 03	3.7061D 02	3.0809D 03	6.7140D 02	3.8807D 03	3.6292D 02
38	23	24	0	0	1.0496D 03	4.1986D 02	1.1883D 03	7.5032D 01	2.3542D 02	2.4466D 02
39	24	25	0	0	4.0992D 02	7.4532D 01	2.1094D 02	3.0010D 01	9.1966D 01	8.4854D 01
40	25	26	0	0	3.4754D 02	5.7924D 01	1.6394D 02	2.5606D 01	7.7878D 01	7.0155D 01
41	26	27	0	0	4.3443D 02	7.8989D 01	2.2355D 02	3.1071D 01	9.2289D 01	8.0141D 01
42	27	28	0	0	7.7073D 02	2.2021D 02	6.2323D 02	5.5152D 01	1.7049D 02	1.7618D 02
43	17	23	0	0	1.2377D 03	4.1924D 01	5.7796D 02	4.9104D 02	6.8588D 02	8.8305D 01
44	18	24	0	0	6.9149D 02	2.3422D 01	3.2289D 02	1.8296D 02	3.8259D 02	3.8441D 01
45	19	25	0	0	3.9833D 02	1.3492D 01	1.8600D 02	4.1835D 01	1.3643D 02	2.7642D 01
46	20	26	0	0	5.7727D 02	1.9553D 01	2.6956D 02	1.3976D 02	3.2003D 02	3.0259D 01
47	21	27	0	0	6.5267D 02	2.2107D 01	3.0476D 02	1.7097D 02	3.6149D 02	3.6395D 01
48	22	28	0	0	1.0454D 03	3.5411D 01	4.8817D 02	3.2888D 02	5.7927D 02	6.7956D 01
49	19	32	0	1	3.7146D 02	1.5218D 02	8.7861D 01	1.0205D 02	6.9492D 01	1.2381D 02
50	21	32	0	2	5.4024D 02	2.2133D 02	1.2778D 02	1.3383D 02	2.5694D 02	2.9182D 02
51	25	32	0	3	3.4034D 02	1.3943D 02	8.0502D 01	6.7576D 01	5.4552D 01	9.7875D 01
52	27	32	0	4	4.2118D 02	1.7255D 02	9.9622D 01	7.6183D 01	6.0904D 01	1.1083D 02
53	29	30	0	0	6.1115D 01	8.5914D 00	8.5914D 00	4.6263D 00	9.2062D 00	9.2004D 00
54	29	31	0	0	1.1314D 01	2.1211D 00	2.1211D 00	1.0136D 00	2.2729D 00	2.2714D 00
55	21	29	0	0	4.1764D 01	0.0	0.0	0.0	0.0	0.0
56	27	29	0	0	3.0572D 01	0.0	0.0	0.0	0.0	0.0
57	29	32	0	0	1.8055D 01	0.0	0.0	0.0	0.0	0.0
58	29	32	1	5	3.1640D 01	0.0	0.0	0.0	0.0	0.0

DAMPING TERMS (LB/IN/SEC TRANSLATIONS (1)-(3) AND LB-IN-SEC,ROTATIONS (4)-(6))

IJ	I	J	M	N	(1)	(2)	(3)	(4)	(5)	(6)
1	1	2	0	0	3.91718D-06	1.80333D-05	2.16931D-06	1.39340D-05	1.95310D-06	2.32750D-05
2	2	3	0	0	1.04792D-05	1.06134D-04	1.27673D-05	4.04385D-05	8.19498D-06	7.12049D-05
3	3	4	0	0	1.25055D-05	1.38170D-04	1.66210D-05	4.95190D-05	1.10812D-05	8.58539D-05
4	4	5	0	0	9.44883D-06	9.56980D-05	1.15100D-05	3.36176D-05	6.92456D-06	7.00390D-05
5	5	6	0	0	5.33050D-06	3.43556D-05	4.13280D-06	1.89639D-05	3.27930D-06	3.50833D-05
6	7	8	0	0	1.21303D-05	3.03256D-05	1.07151D-05	1.69692D-04	5.40841D-05	5.20420D-05
7	8	9	0	0	3.10604D-05	1.70831D-04	6.03605D-05	4.24276D-04	1.33447D-04	1.50051D-04
8	9	10	0	0	3.66356D-05	2.19813D-04	7.76673D-05	4.97250D-04	1.63492D-04	1.81489D-04
9	10	11	0	0	2.93082D-05	1.61194D-04	5.69554D-05	4.09733D-04	1.37964D-04	1.58374D-04
10	11	12	0	0	1.65200D-05	5.78193D-05	2.04297D-05	2.30859D-04	7.46793D-05	7.22700D-05
11	1	17	0	0	7.17081D-06	2.04897D-04	9.75962D-06	1.10293D-05	8.11565D-06	1.04724D-04
12	2	18	0	0	1.28352D-05	3.66750D-04	1.74690D-05	2.90388D-05	1.45513D-05	2.43356D-04
13	3	19	0	0	2.37415D-05	6.78386D-04	3.23127D-05	1.49963D-04	4.58026D-05	3.42654D-04
14	4	20	0	0	1.53669D-05	4.39091D-04	2.09147D-05	3.91579D-05	1.73921D-05	3.07949D-04
15	5	21	0	0	1.35912D-05	3.88353D-04	1.84976D-05	3.18923D-05	1.53984D-05	2.52293D-04
16	6	22	0	0	8.48847D-06	2.42548D-04	1.15530D-05	1.65362D-05	9.61018D-06	1.40195D-04
17	1	7	0	0	1.02869D-05	3.03704D-04	2.20298D-05	2.59292D-05	1.85635D-05	1.44154D-04
18	2	8	0	0	1.84130D-05	5.43615D-04	3.94324D-05	6.95926D-05	3.32793D-05	3.31219D-04
19	3	9	0	0	3.19646D-05	9.43707D-04	6.84539D-05	3.04349D-04	9.33263D-05	4.60622D-04
20	4	10	0	0	2.20562D-05	6.51177D-04	4.72346D-05	9.10990D-05	3.97847D-05	4.20781D-04
21	5	11	0	0	1.95082D-05	5.75951D-04	4.17779D-05	7.44735D-05	3.52219D-05	3.49839D-04
22	6	12	0	0	1.21790D-05	3.59565D-04	2.60819D-05	3.87141D-05	2.19802D-05	1.87362D-04
23	3	16	0	1	3.42770D-05	8.36666D-05	1.44915D-04	1.24769D-04	1.83221D-04	1.02640D-04
24	5	16	0	2	2.35682D-05	5.75276D-05	9.96408D-05	9.51383D-05	4.95534D-05	4.36315D-05

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25	9	16	0	3	3.74105D-05	9.13151D-05	1.58162D-04	1.88415D-04	2.33398D-04	1.30080D-04
26	11	16	0	4	3.02306D-05	7.37897D-05	1.27808D-04	1.67130D-04	2.09056D-04	1.14886D-04
27	13	14	0	0	2.13543D-03	1.51903D-02	1.51903D-02	2.82100D-02	1.41760D-02	1.41850D-02
28	13	15	0	0	8.75355D-03	4.66902D-02	4.66902D-02	9.77093D-02	4.35724D-02	4.36001D-02
29	5	13	0	0	3.04863D-04	0.0	0.0	0.0	0.0	0.0
30	11	13	0	0	4.16477D-04	0.0	0.0	0.0	0.0	0.0
31	13	16	0	0	7.05198D-04	0.0	0.0	0.0	0.0	0.0
32	13	16	1	5	4.02421D-04	0.0	0.0	0.0	0.0	0.0
33	17	18	0	0	3.91718D-06	1.80333D-05	2.16931D-06	1.39340D-05	1.95310D-06	2.32750D-05
34	18	19	0	0	1.04792D-05	1.06134D-04	1.27673D-05	4.04385D-05	8.19498D-06	7.12049D-05
35	19	20	0	0	1.25055D-05	1.38170D-04	1.66212D-05	4.95190D-05	1.10312D-05	8.58539D-05
36	20	21	0	0	9.44883D-06	9.56980D-05	1.15120D-05	3.36178D-05	6.92456D-06	7.00390D-05
37	21	22	0	0	5.33058D-06	3.43558D-05	4.13280D-06	1.89639D-05	3.27930D-06	3.50833D-05
38	23	24	0	0	1.21303D-05	3.03256D-05	1.07151D-05	1.69692D-04	5.40841D-05	5.20420D-05
39	24	25	0	0	3.10604D-05	1.70831D-04	6.03605D-05	4.24276D-04	1.38447D-04	1.50051D-04
40	25	26	0	0	3.66356D-05	2.19813D-04	7.76673D-05	4.97250D-04	1.63490D-04	1.81489D-04
41	26	27	0	0	2.93082D-05	1.61194D-04	5.69554D-05	4.09783D-04	1.37964D-04	1.58074D-04
42	27	28	0	0	1.65200D-05	5.78198D-05	2.04297D-05	2.30859D-04	7.46793D-05	7.22700D-05
43	17	23	0	0	1.02859D-05	3.03704D-04	2.20298D-05	2.59290D-05	1.85635D-05	1.44154D-04
44	18	24	0	0	1.84130D-05	5.43615D-04	3.94324D-05	6.95926D-05	3.32793D-05	3.31219D-04
45	19	25	0	0	3.19646D-05	9.43707D-04	6.84539D-05	3.04349D-04	9.33263D-05	4.60622D-04
46	20	26	0	0	2.20562D-05	6.51177D-04	4.72346D-05	9.10990D-05	3.97847D-05	4.20781D-04
47	21	27	0	0	1.95082D-05	5.75951D-04	4.17779D-05	7.44735D-05	3.50219D-05	3.49838D-04
48	22	28	0	0	1.21790D-05	3.59565D-04	2.60819D-05	3.87141D-05	2.19802D-05	1.87362D-04
49	19	32	0	1	3.42770D-05	8.36666D-05	1.44915D-04	1.24769D-04	1.83021D-04	1.02840D-04
50	21	32	0	2	2.35682D-05	5.75278D-05	9.96408D-05	9.51383D-05	4.95534D-05	4.36315D-05
51	25	32	0	3	3.74105D-05	9.13151D-05	1.58162D-04	1.88415D-04	2.33398D-04	1.30080D-04
52	27	32	0	4	3.02306D-05	7.37897D-05	1.27808D-04	1.67130D-04	2.09056D-04	1.14886D-04
53	29	30	0	0	2.13543D-03	1.51903D-02	1.51903D-02	2.82100D-02	1.41760D-02	1.41850D-02
54	29	31	0	0	8.75355D-03	4.66902D-02	4.66902D-02	9.77093D-02	4.35724D-02	4.36001D-02
55	21	29	0	0	3.04863D-04	0.0	0.0	0.0	0.0	0.0
56	27	29	0	0	4.16477D-04	0.0	0.0	0.0	0.0	0.0
57	29	32	0	0	7.05198D-04	0.0	0.0	0.0	0.0	0.0
58	29	32	1	5	4.02421D-04	0.0	0.0	0.0	0.0	0.0

EULER ANGLES, BEAM IJ TO AIRPLANE (RADIANS)

IJ	I	J	M	N	THEIJ0(IJ)	PSIIJ0(IJ)
1	1	2	0	0	0.0	3.14159D 00
2	2	3	0	0	0.0	3.14159D 00
3	3	4	0	0	0.0	3.14159D 00
4	4	5	0	0	0.0	3.14159D 00
5	5	6	0	0	0.0	3.14159D 00
6	7	8	0	0	0.0	3.14159D 00
7	8	9	0	0	0.0	3.14159D 00
8	9	10	0	0	0.0	3.14159D 00
9	10	11	0	0	0.0	3.14159D 00
10	11	12	0	0	0.0	3.14159D 00
11	1	17	0	0	0.0	1.57080D 00
12	2	18	0	0	0.0	1.57080D 00
13	3	19	0	0	0.0	1.57080D 00
14	4	20	0	0	0.0	1.57080D 00
15	5	21	0	0	0.0	1.57080D 00
16	6	22	0	0	0.0	1.57080D 00
17	1	7	0	0	0.0	-1.57080D 00
18	2	8	0	0	0.0	-1.57080D 00
19	3	9	0	0	0.0	-1.57080D 00
20	4	10	0	0	0.0	-1.57080D 00
21	5	11	0	0	0.0	-1.57080D 00
22	6	12	0	0	0.0	-1.57080D 00
23	3	16	0	1	1.57080D 00	0.0

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24  5 16  0  2   1.570800D 00    0.0
25  9 16  0  3   1.570800D 00    0.0
26 11 16  0  4   1.570800D 00    0.0
27 13 14  0  0   1.570800D 00    0.0
28 13 15  0  0   1.570800D 00    0.0
29  5 13  0  0   1.117100D 00   -7.188300D-01
30 11 13  0  0   1.117100D 00    7.188300D-01
31 13 16  0  0  -1.570800D 00    0.0
32 13 16  1  5  -1.570800D 00    0.0
33 17 18  0  0   0.0             3.141590D 00
34 18 19  0  0   0.0             3.141590D 00
35 19 20  0  0   0.0             3.141590D 00
36 20 21  0  0   0.0             3.141590D 00
37 21 22  0  0   0.0             3.141590D 00
38 23 24  0  0   0.0             3.141590D 00
39 24 25  0  0   0.0             3.141590D 00
40 25 26  0  0   0.0             3.141590D 00
41 26 27  0  0   0.0             3.141590D 00
42 27 28  0  0   0.0             3.141590D 00
43 17 23  0  0   0.0             1.570800D 00
44 18 24  0  0   0.0             1.570800D 00
45 19 25  0  0   0.0             1.570800D 00
46 20 26  0  0   0.0             1.570800D 00
47 21 27  0  0   0.0             1.570800D 00
48 22 28  0  0   0.0             1.570800D 00
49 19 32  0  1   1.570800D 00    0.0
50 21 32  0  2   1.570800D 00    0.0
51 25 32  0  3   1.570800D 00    0.0
52 27 32  0  4   1.570800D 00    0.0
53 29 30  0  0   1.570800D 00    0.0
54 29 31  0  0   1.570800D 00    0.0
55 21 29  0  0   1.117100D 00    7.188300D-01
56 27 29  0  0   1.117100D 00   -7.188300D-01
57 29 32  0  0  -1.570800D 00    0.0
58 29 32  1  5  -1.570800D 00    0.0
```

SAMPLE C[illegible]OSSECTION DROP TEST SIMULATION 16MASS/3CNEMBER MODEL
6-1-79 KRASH.F79.DATA 27.5 FT./SEC

TIME = 0.0 NUMBER OF INTEGRATION INTERVALS = 0

MASS DISPLACEMENTS,VELOCITIES,AND ACCELERATIONS

	X XDOT U UDOT XACCEL	Y YDOT V VDOT YACCEL	Z ZDOT W WDOT ZACCEL	PHI PHIDOT P PDOT XACFIL	THETA THETADOT Q QDOT YACFIL	PSI PSIDOT R RDOT ZACFIL
MASS 1	2.75788D 01	-6.00000D 00	-8.60290D 00	0.0	1.31000D-02	0.0
	-6.66134D-16	0.0	3.30000D 02	0.0	0.0	0.0
	-4.32288D 00	0.0	3.29972D 02	0.0	0.0	0.0
	-5.05646D 00	0.0	3.85967D 02	0.0	0.0	0.0
	-1.30996D-02	0.0	9.99914D-01	0.0	0.0	0.0
MASS 2	2.25793D 01	-6.00000D 00	-8.53740D 00	0.0	1.31000D-02	0.0
	-6.66134D-16	0.0	3.30000D 02	0.0	0.0	0.0
	-4.32288D 00	0.0	3.29972D 02	0.0	0.0	0.0
	-5.05646D 00	0.0	3.85967D 02	0.0	0.0	0.0
	-1.30996D-02	0.0	9.99914D-01	0.0	0.0	0.0
MASS 3	1.15800D 01	-6.00000D 00	-8.39330D 00	0.0	1.31000D-02	0.0
	-6.66134D-16	0.0	3.30000D 02	0.0	0.0	0.0
	-4.32288D 00	0.0	3.29972D 02	0.0	0.0	0.0
	-5.05646D 00	0.0	3.85967D 02	0.0	0.0	0.0
	-1.30996D-02	0.0	9.99914D-01	0.0	0.0	0.0
MASS 4	-4.18772D-01	-6.00000D 00	-8.23611D 00	0.0	1.31000D-02	0.0
	-6.66134D-16	0.0	3.30000D 02	0.0	0.0	0.0
	-4.32288D 00	0.0	3.29972D 02	0.0	0.0	0.0
	-5.05646D 00	0.0	3.85967D 02	0.0	0.0	0.0
	-1.30996D-02	0.0	9.99914D-01	0.0	0.0	0.0
MASS 5	-1.14178D 01	-6.00000D 00	-8.09201D 00	0.0	1.31000D-02	0.0
	-6.66134D-16	0.0	3.30000D 02	0.0	0.0	0.0
	-4.32288D 00	0.0	3.29972D 02	0.0	0.0	0.0
	-5.05646D 00	0.0	3.85967D 02	0.0	0.0	0.0
	-1.30996D-02	0.0	9.99914D-01	0.0	0.0	0.0
MASS 6	-1.84172D 01	-6.00000D 00	-8.00031D 00	0.0	1.31000D-02	0.0
	-6.66134D-16	0.0	3.30000D 02	0.0	0.0	0.0
	-4.32288D 00	0.0	3.29972D 02	0.0	0.0	0.0
	-5.05646D 00	0.0	3.85967D 02	0.0	0.0	0.0
	-1.30996D-02	0.0	9.99914D-01	0.0	0.0	0.0
MASS 7	2.75788D 01	-2.00000D 01	-8.60290D 00	0.0	1.31000D-02	0.0
	-6.66134D-16	0.0	3.30000D 02	0.0	0.0	0.0
	-4.32288D 00	0.0	3.29972D 02	0.0	0.0	0.0
	-5.05646D 00	0.0	3.85967D 02	0.0	0.0	0.0
	-1.30996D-02	0.0	9.99914D-01	0.0	0.0	0.0
MASS 8	2.25793D 01	-2.00000D 01	-8.53740D 00	0.0	1.31000D-02	0.0
	-6.66134D-16	0.0	3.30000D 02	0.0	0.0	0.0
	-4.32288D 00	0.0	3.29972D 02	0.0	0.0	0.0
	-5.05646D 00	0.0	3.85967D 02	0.0	0.0	0.0
	-1.30996D-02	0.0	9.99914D-01	0.0	0.0	0.0

```
  0.0             3.10020D 02     0.0             0.0             0.0             -1.86012D 03
  0.0             0.0             1.36646D 05     0.0             8.19875D 05     0.0
  0.0             0.0             0.0             6.26084D 05     0.0             0.0
  0.0             0.0             8.19875D 05     0.0             6.55900D 06     0.0
  0.0            -1.86012D 03     0.0             0.0             0.0             1.48810D 04
2 18  0  0
 2.53120D 05      0.0             0.0             0.0             0.0             0.0
  0.0             3.10020D 02     0.0             0.0             0.0             -1.86012D 03
  0.0             0.0             1.36646D 05     0.0             8.19875D 05     0.0
  0.0             0.0             0.0             6.26084D 05     0.0             0.0
  0.0             0.0             8.19875D 05     0.0             6.55900D 06     0.0
  0.0            -1.86012D 03     0.0             0.0             0.0             1.48810D 04
3 19  0  0
 2.53120D 05      0.0             0.0             0.0             0.0             0.0
  0.0             3.10020D 02     0.0             0.0             0.0             -1.86012D 03
  0.0             0.0             1.36646D 05     0.0             8.19875D 05     0.0
  0.0             0.0             0.0             6.26084D 05     0.0             0.0
  0.0             0.0             8.19875D 05     0.0             6.55900D 06     0.0
  0.0            -1.86012D 03     0.0             0.0             0.0             1.48810D 04
4 20  0  0
 2.53120D 05      0.0             0.0             0.0             0.0             0.0
  0.0             3.10020D 02     0.0             0.0             0.0             -1.86012D 03
  0.0             0.0             1.36646D 05     0.0             8.19875D 05     0.0
  0.0             0.0             0.0             6.26084D 05     0.0             0.0
  0.0             0.0             8.19875D 05     0.0             6.55900D 06     0.0
  0.0            -1.86012D 03     0.0             0.0             0.0             1.48810D 04
5 21  0  0
 2.53120D 05      0.0             0.0             0.0             0.0             0.0
  0.0             3.10020D 02     0.0             0.0             0.0             -1.86012D 03
  0.0             0.0             1.36646D 05     0.0             8.19875D 05     0.0
  0.0             0.0             0.0             6.26084D 05     0.0             0.0
  0.0             0.0             8.19875D 05     0.0             6.55900D 06     0.0
  0.0            -1.86012D 03     0.0             0.0             0.0             1.48810D 04
6 22  0  0
 2.53120D 05      0.0             0.0             0.0             0.0             0.0
  0.0             3.10020D 02     0.0             0.0             0.0             -1.86012D 03
  0.0             0.0             1.36646D 05     0.0             8.19875D 05     0.0
  0.0             0.0             0.0             6.26084D 05     0.0             0.0
  0.0             0.0             8.19875D 05     0.0             6.55900D 06     0.0
  0.0            -1.86012D 03     0.0             0.0             0.0             1.48810D 04
1  7  0  0
 1.63823D 05      0.0             0.0             0.0             0.0             0.0
  0.0             1.87948D 02     0.0             0.0             0.0             -1.31564D 03
  0.0             0.0             3.57204D 04     0.0             2.50043D 05     0.0
  0.0             0.0             0.0             2.23429D 05     0.0             0.0
  0.0             0.0             2.50043D 05     0.0             2.33373D 06     0.0
  0.0            -1.31564D 03     0.0             0.0             0.0             1.22793D 04
2  8  0  0
 1.63823D 05      0.0             0.0             0.0             0.0             0.0
  0.0             1.87948D 02     0.0             0.0             0.0             -1.31564D 03
  0.0             0.0             3.57204D 04     0.0             2.50043D 05     0.0
  0.0             0.0             0.0             2.23429D 05     0.0             0.0
  0.0             0.0             2.50043D 05     0.0             2.33373D 06     0.0
  0.0            -1.31564D 03     0.0             0.0             0.0             1.22793D 04
3  9  0  0
 1.63823D 05      0.0             0.0             0.0             0.0             0.0
  0.0             1.87948D 02     0.0             0.0             0.0             -1.31564D 03
  0.0             0.0             3.57204D 04     0.0             2.50043D 05     0.0
  0.0             0.0             0.0             2.23429D 05     0.0             0.0
  0.0             0.0             2.50043D 05     0.0             2.33373D 06     0.0
```

```
   0.0              -1.31564D 03   0.0            0.0            0.0            1.22793D 04
 4 10  0  0
   1.63823D 05      0.0            0.0            0.0            0.0            0.0
   0.0              1.87948D 02    0.0            0.0            0.0           -1.31564D 03
   0.0              0.0            3.57204D 04    0.0            2.50043D 05    0.0
   0.0              0.0            0.0            2.23429D 05    0.0            0.0
   0.0              0.0            2.50043D 05    0.0            2.33373D 06    0.0
   0.0             -1.31564D 03    0.0            0.0            0.0            1.22793D 04
 5 11  0  0
   1.63823D 05      0.0            0.0            0.0            0.0            0.0
   0.0              1.87948D 02    0.0            0.0            0.0           -1.31564D 03
   0.0              0.0            3.57204D 04    0.0            2.50043D 05    0.0
   0.0              0.0            0.0            2.23429D 05    0.0            0.0
   0.0              0.0            2.50043D 05    0.0            2.33373D 06    0.0
   0.0             -1.31564D 03    0.0            0.0            0.0            1.22793D 04
 6 12  0  0
   1.63823D 05      0.0            0.0            0.0            0.0            0.0
   0.0              1.87948D 02    0.0            0.0            0.0           -1.31564D 03
   0.0              0.0            3.57204D 04    0.0            2.50043D 05    0.0
   0.0              0.0            0.0            2.23429D 05    0.0            0.0
   0.0              0.0            2.50043D 05    0.0            2.33373D 06    0.0
   0.0             -1.31564D 03    0.0            0.0            0.0            1.22793D 04
 3 16  0  1
   1.32028D 05      0.0            0.0            0.0            0.0            0.0
   0.0              2.21599D 04    0.0            0.0            0.0           -1.58443D 05
   0.0              0.0            7.38662D 03    0.0            5.28143D 04    0.0
   0.0              0.0            0.0            1.91329D 05    0.0            0.0
   0.0              0.0            5.28143D 04    0.0            5.03497D 05    0.0
   0.0             -1.58443D 05    0.0            0.0            0.0            1.51049D 06
 5 16  0  2
   1.32028D 05      0.0            0.0            0.0            0.0            0.0
   0.0              2.21599D 04    0.0            0.0            0.0           -1.58443D 05
   0.0              0.0            7.38662D 03    0.0            5.28143D 04    0.0
   0.0              0.0            0.0            1.91329D 05    0.0            0.0
   0.0              0.0            5.28143D 04    0.0            5.03497D 05    0.0
   0.0             -1.58443D 05    0.0            0.0            0.0            1.51049D 06
 9 16  0  3
   1.32028D 05      0.0            0.0            0.0            0.0            0.0
   0.0              2.21599D 04    0.0            0.0            0.0           -1.58443D 05
   0.0              0.0            7.38662D 03    0.0            5.28143D 04    0.0
   0.0              0.0            0.0            1.91329D 05    0.0            0.0
   0.0              0.0            5.28143D 04    0.0            5.03497D 05    0.0
   0.0             -1.58443D 05    0.0            0.0            0.0            1.51049D 06
11 16  0  4
   1.32028D 05      0.0            0.0            0.0            0.0            0.0
   0.0              2.21599D 04    0.0            0.0            0.0           -1.58443D 05
   0.0              0.0            7.38662D 03    0.0            5.28143D 04    0.0
   0.0              0.0            0.0            1.91329D 05    0.0            0.0
   0.0              0.0            5.28143D 04    0.0            5.03497D 05    0.0
   0.0             -1.58443D 05    0.0            0.0            0.0            1.51049D 06
13 14  0  0
   1.39165D 04      0.0            0.0            0.0            0.0            0.0
   0.0              2.75020D 02    0.0            0.0            0.0           -2.07502D 03
   0.0              0.0            2.75020D 02    0.0            2.07502D 03    0.0
   0.0              0.0            0.0            3.97614D 03    0.0            0.0
   0.0              0.0            2.07502D 03    0.0            2.08748D 04    0.0
   0.0             -2.07502D 03    0.0            0.0            0.0            2.08748D 04
13 15  0  0
   4.76912D 02      0.0            0.0            0.0            0.0            0.0
   0.0              1.67631D 01    0.0            0.0            0.0           -1.26478D 02
```

```
      0.0             0.0             1.67631D 01     0.0             1.26478D 02     0.0
      0.0             0.0             0.0             1.90855D 02     0.0             0.0
      0.0             0.0             1.26478D 02     0.0             1.27237D 03     0.0
      0.0            -1.26478D 02     0.0             0.0             0.0             1.27237D 03
    5 13  0  0
      9.33861D 02     0.0             0.0             0.0             0.0             0.0
      0.0             0.0             0.0             0.0             0.0             0.0
      0.0             0.0             0.0             0.0             0.0             0.0
      0.0             0.0             0.0             0.0             0.0             0.0
      0.0             0.0             0.0             0.0             0.0             0.0
      0.0             0.0             0.0             0.0             0.0             0.0
   11 13  0  0
      9.33861D 02     0.0             0.0             0.0             0.0             0.0
      0.0             0.0             0.0             0.0             0.0             0.0
      0.0             0.0             0.0             0.0             0.0             0.0
      0.0             0.0             0.0             0.0             0.0             0.0
      0.0             0.0             0.0             0.0             0.0             0.0
      0.0             0.0             0.0             0.0             0.0             0.0
   13 16  0  0
      5.33400D 02     0.0             0.0             0.0             0.0             0.0
      0.0             0.0             0.0             0.0             0.0             0.0
      0.0             0.0             0.0             0.0             0.0             0.0
      0.0             0.0             0.0             0.0             0.0             0.0
      0.0             0.0             0.0             0.0             0.0             0.0
      0.0             0.0             0.0             0.0             0.0             0.0
   13 16  1  5
      1.63800D 03     0.0             0.0             0.0             0.0             0.0
      0.0             0.0             0.0             0.0             0.0             0.0
      0.0             0.0             0.0             0.0             0.0             0.0
      0.0             0.0             0.0             0.0             0.0             0.0
      0.0             0.0             0.0             0.0             0.0             0.0
      0.0             0.0             0.0             0.0             0.0             0.0
   17 18  0  0
      1.29292D 06     0.0             0.0             0.0             0.0             0.0
      0.0             6.10052D 04     0.0             0.0             0.0            -1.52513D 05
      0.0             0.0             4.21574D 06     0.0             1.05393D 07     0.0
      0.0             0.0             0.0             3.39424D 06     0.0             0.0
      0.0             0.0             1.05393D 07     0.0             3.51312D 07     0.0
      0.0            -1.52513D 05     0.0             0.0             0.0             5.08376D 05
   18 19  0  0
      5.87689D 05     0.0             0.0             0.0             0.0             0.0
      0.0             5.72926D 03     0.0             0.0             0.0            -3.15109D 04
      0.0             0.0             3.95918D 05     0.0             2.17755D 06     0.0
      0.0             0.0             0.0             1.54284D 06     0.0             0.0
      0.0             0.0             2.17755D 06     0.0             1.59687D 07     0.0
      0.0            -3.15109D 04     0.0             0.0             0.0             2.31080D 05
   19 20  0  0
      5.38715D 05     0.0             0.0             0.0             0.0             0.0
      0.0             4.41299D 03     0.0             0.0             0.0            -2.64779D 04
      0.0             0.0             3.04958D 05     0.0             1.82975D 06     0.0
      0.0             0.0             0.0             1.41427D 06     0.0             0.0
      0.0             0.0             1.82975D 06     0.0             1.46380D 07     0.0
      0.0            -2.64779D 04     0.0             0.0             0.0             2.11824D 05
   20 21  0  0
      5.87689D 05     0.0             0.0             0.0             0.0             0.0
      0.0             5.72926D 03     0.0             0.0             0.0            -3.15109D 04
      0.0             0.0             3.95918D 05     0.0             2.17755D 06     0.0
      0.0             0.0             0.0             1.54284D 06     0.0             0.0
      0.0             0.0             2.17755D 06     0.0             1.59687D 07     0.0
      0.0            -3.15109D 04     0.0             0.0             0.0             2.31080D 05
```

```
21 22  0  0
   9.235110 05    0.0            0.0            0.0            0.0            0.0
   0.0            2.22322D 04    0.0            0.0            0.0           -7.78127D 04
   0.0            0.0            1.53635D 06    0.0            5.37722D 06    0.0
   0.0            0.0            0.0            2.42446D 06    0.0            0.0
   0.0            0.0            5.37722D 06    0.0            2.50937D 07    0.0
   0.0           -7.78127D 04    0.0            0.0            0.0            3.63126D 05
23 24  0  0
   2.688000 05    0.0            0.0            0.0            0.0            0.0
   0.0            4.30083D 04    0.0            0.0            0.0           -1.07521D 05
   0.0            0.0            3.44494D 05    0.0            8.61235D 05    0.0
   0.0            0.0            0.0            3.07542D 05    0.0            0.0
   0.0            0.0            8.61235D 05    0.0            2.87078D 06    0.0
   0.0           -1.07521D 05    0.0            0.0            0.0            3.58403D 05
24 25  0  0
   1.221820 05    0.0            0.0            0.0            0.0            0.0
   0.0            4.03910D 03    0.0            0.0            0.0           -2.22150D 04
   0.0            0.0            3.23529D 04    0.0            1.77941D 05    0.0
   0.0            0.0            0.0            1.39792D 05    0.0            0.0
   0.0            0.0            1.77941D 05    0.0            1.30490D 06    0.0
   0.0           -2.22150D 04    0.0            0.0            0.0            1.62910D 05
25 26  0  0
   1.120000 05    0.0            0.0            0.0            0.0            0.0
   0.0            3.11114D 03    0.0            0.0            0.0           -1.86668D 04
   0.0            0.0            2.49200D 04    0.0            1.49520D 05    0.0
   0.0            0.0            0.0            1.28142D 05    0.0            0.0
   0.0            0.0            1.49520D 05    0.0            1.19616D 06    0.0
   0.0           -1.86668D 04    0.0            0.0            0.0            1.49335D 05
26 27  0  0
   1.221820 05    0.0            0.0            0.0            0.0            0.0
   0.0            4.03910D 03    0.0            0.0            0.0           -2.22150D 04
   0.0            0.0            3.23529D 04    0.0            1.77941D 05    0.0
   0.0            0.0            0.0            1.39792D 05    0.0            0.0
   0.0            0.0            1.77941D 05    0.0            1.30490D 06    0.0
   0.0           -2.22150D 04    0.0            0.0            0.0            1.62910D 05
27 28  0  0
   1.920000 05    0.0            0.0            0.0            0.0            0.0
   0.0            1.56736D 04    0.0            0.0            0.0           -5.48576D 04
   0.0            0.0            1.25544D 05    0.0            4.39406D 05    0.0
   0.0            0.0            0.0            2.19673D 05    0.0            0.0
   0.0            0.0            4.39406D 05    0.0            2.05056D 06    0.0
   0.0           -5.48576D 04    0.0            0.0            0.0            2.56002D 05
17 23  0  0
   1.638230 05    0.0            0.0            0.0            0.0            0.0
   0.0            1.87948D 02    0.0            0.0            0.0           -1.31564D 03
   0.0            0.0            3.57204D 04    0.0            2.50043D 05    0.0
   0.0            0.0            0.0            2.23429D 05    0.0            0.0
   0.0            0.0            2.50043D 05    0.0            2.33373D 06    0.0
   0.0           -1.31564D 03    0.0            0.0            0.0            1.22793D 04
18 24  0  0
   1.63323D 05    0.0            0.0            0.0            0.0            0.0
   0.0            1.87948D 02    0.0            0.0            0.0           -1.31564D 03
   0.0            0.0            3.57204D 04    0.0            2.50043D 05    0.0
   0.0            0.0            0.0            2.23429D 05    0.0            0.0
   0.0            0.0            2.50043D 05    0.0            2.33373D 06    0.0
   0.0           -1.31564D 03    0.0            0.0            0.0            1.22793D 04
19 25  0  0
   1.63323D 05    0.0            0.0            0.0            0.0            0.0
   0.0            1.87948D 02    0.0            0.0            0.0           -1.31564D 03
   0.0            0.0            3.57204D 04    0.0            2.50043D 05    0.0
```

```
    0.0             0.0             0.0             2.23429D 05     0.0             0.0
    0.0             0.0             2.50043D 05     0.0             2.33373D 06     0.0
    0.0            -1.31564D 03     0.0             0.0             0.0             1.22793D 04
20 26  0  0
    1.63823D 05     0.0             0.0             0.0             0.0             0.0
    0.0             1.87948D 02     0.0             0.0             0.0            -1.31564D 03
    0.0             0.0             3.57204D 04     0.0             2.50043D 05     0.0
    0.0             0.0             0.0             2.23429D 05     0.0             0.0
    0.0             0.0             2.50043D 05     0.0             2.33373D 06     0.0
    0.0            -1.31564D 03     0.0             0.0             0.0             1.22793D 04
21 27  0  0
    1.63823D 05     0.0             0.0             0.0             0.0             0.0
    0.0             1.87948D 02     0.0             0.0             0.0            -1.31564D 03
    0.0             0.0             3.57204D 04     0.0             2.50043D 05     0.0
    0.0             0.0             0.0             2.23429D 05     0.0             0.0
    0.0             0.0             2.50043D 05     0.0             2.33373D 06     0.0
    0.0            -1.31564D 03     0.0             0.0             0.0             1.22793D 04
22 28  0  0
    1.63823D 05     0.0             0.0             0.0             0.0             0.0
    0.0             1.87948D 02     0.0             0.0             0.0            -1.31564D 03
    0.0             0.0             3.57204D 04     0.0             2.50043D 05     0.0
    0.0             0.0             0.0             2.23429D 05     0.0             0.0
    0.0             0.0             2.50043D 05     0.0             2.33373D 06     0.0
    0.0            -1.31564D 03     0.0             0.0             0.0             1.22793D 04
19 32  0  1
    1.32028D 05     0.0             0.0             0.0             0.0             0.0
    0.0             2.21599D 04     0.0             0.0             0.0            -1.58443D 05
    0.0             0.0             7.38662D 03     0.0             5.28143D 04     0.0
    0.0             0.0             0.0             1.91329D 05     0.0             0.0
    0.0             0.0             5.28143D 04     0.0             5.03497D 05     0.0
    0.0            -1.58443D 05     0.0             0.0             0.0             1.51049D 06
21 32  0  2
    1.32028D 05     0.0             0.0             0.0             0.0             0.0
    0.0             2.21599D 04     0.0             0.0             0.0            -1.58443D 05
    0.0             0.0             7.38662D 03     0.0             5.28143D 04     0.0
    0.0             0.0             0.0             1.91329D 05     0.0             0.0
    0.0             0.0             5.28143D 04     0.0             5.03497D 05     0.0
    0.0            -1.58443D 05     0.0             0.0             0.0             1.51049D 06
25 32  0  3
    1.32028D 05     0.0             0.0             0.0             0.0             0.0
    0.0             2.21599D 04     0.0             0.0             0.0            -1.58443D 05
    0.0             0.0             7.38662D 03     0.0             5.28143D 04     0.0
    0.0             0.0             0.0             1.91329D 05     0.0             0.0
    0.0             0.0             5.28143D 04     0.0             5.03497D 05     0.0
    0.0            -1.58443D 05     0.0             0.0             0.0             1.51049D 06
27 32  0  4
    1.32028D 05     0.0             0.0             0.0             0.0             0.0
    0.0             2.21599D 04     0.0             0.0             0.0            -1.58443D 05
    0.0             0.0             7.38662D 03     0.0             5.28143D 04     0.0
    0.0             0.0             0.0             1.91329D 05     0.0             0.0
    0.0             0.0             5.28143D 04     0.0             5.03497D 05     0.0
    0.0            -1.58443D 05     0.0             0.0             0.0             1.51049D 06
29 30  0  0
    1.39165D 04     0.0             0.0             0.0             0.0             0.0
    0.0             2.75020D 02     0.0             0.0             0.0            -2.07502D 03
    0.0             0.0             2.75020D 02     0.0             2.07502D 03     0.0
    0.0             0.0             0.0             3.97614D 03     0.0             0.0
    0.0             0.0             2.07502D 03     0.0             2.08748D 04     0.0
    0.0            -2.07502D 03     0.0             0.0             0.0             2.08748D 04
29 31  0  0
```

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    4.76912D 02   0.0           0.0           0.0           0.0           0.0
    0.0           1.67631D 01   0.0           0.0           0.0          -1.26478D 02
    0.0           0.0           1.67631D 01   0.0           1.26478D 02   0.0
    0.0           0.0           0.0           1.90855D 02   0.0           0.0
    0.0           0.0           1.26478D 02   0.0           1.27237D 03   0.0
    0.0          -1.26478D 02   0.0           0.0           0.0           1.27237D 03
 21 29  0  0
    9.33861D 02   0.0           0.0           0.0           0.0           0.0
    0.0           0.0           0.0           0.0           0.0           0.0
    0.0           0.0           0.0           0.0           0.0           0.0
    0.0           0.0           0.0           0.0           0.0           0.0
    0.0           0.0           0.0           0.0           0.0           0.0
    0.0           0.0           0.0           0.0           0.0           0.0
 27 29  0  0
    9.33861D 02   0.0           0.0           0.0           0.0           0.0
    0.0           0.0           0.0           0.0           0.0           0.0
    0.0           0.0           0.0           0.0           0.0           0.0
    0.0           0.0           0.0           0.0           0.0           0.0
    0.0           0.0           0.0           0.0           0.0           0.0
    0.0           0.0           0.0           0.0           0.0           0.0
 29 32  0  0
    5.33400D 02   0.0           0.0           0.0           0.0           0.0
    0.0           0.0           0.0           0.0           0.0           0.0
    0.0           0.0           0.0           0.0           0.0           0.0
    0.0           0.0           0.0           0.0           0.0           0.0
    0.0           0.0           0.0           0.0           0.0           0.0
    0.0           0.0           0.0           0.0           0.0           0.0
 29 32  1  5
    1.63000D 03   0.0           0.0           0.0           0.0           0.0
    0.0           0.0           0.0           0.0           0.0           0.0
    0.0           0.0           0.0           0.0           0.0           0.0
    0.0           0.0           0.0           0.0           0.0           0.0
    0.0           0.0           0.0           0.0           0.0           0.0
    0.0           0.0           0.0           0.0           0.0           0.0
```

SAMPLE CASE SUBSECTIN DROP TEST SIMULATION 16MASS/30MEMBER MODEL
6-1-79 KRASH.F79.DATA 27.5 FT./SEC

TIME = 0.0 NUMBER OF INTEGRATION INTERVALS = 0

MASS DISPLACEMENTS,VELOCITIES,AND ACCELERATIONS

	X XDOT U UDOT XACCEL	Y YDOT V VDOT YACCEL	Z ZDOT W WDOT ZACCEL	PHI PHIDOT P PDOT XACFIL	THETA THETADOT Q QDOT YACFIL	PSI PSIDOT R RDOT ZACFIL
MASS 9	1.15802D 01	-2.00000D 01	-8.39330D 00	0.0	1.31000D-02	0.0
	-6.66134D-16	0.0	3.30000D 02	0.0	0.0	0.0
	-4.32288D 00	0.0	3.29972D 02	0.0	0.0	0.0
	-5.05646D 00	0.0	3.85967D 02	0.0	0.0	0.0
	-1.30996D-02	0.0	9.99914D-01	0.0	0.0	0.0
MASS 10	-4.18772D-01	-2.00000D 01	-8.23611D 00	0.0	1.31000D-02	0.0
	-6.66134D-16	0.0	3.30000D 02	0.0	0.0	0.0
	-4.32288D 00	0.0	3.29972D 02	0.0	0.0	0.0
	-5.05646D 00	0.0	3.85967D 02	0.0	0.0	0.0
	-1.30996D-02	0.0	9.99914D-01	0.0	0.0	0.0
MASS 11	-1.14178D 01	-2.00000D 01	-8.09201D 00	0.0	1.31000D-02	0.0
	-6.66134D-16	0.0	3.30000D 02	0.0	0.0	0.0
	-4.32288D 00	0.0	3.29972D 02	0.0	0.0	0.0
	-5.05646D 00	0.0	3.85967D 02	0.0	0.0	0.0
	-1.30996D-02	0.0	9.99914D-01	0.0	0.0	0.0
MASS 12	-1.84172D 01	-2.00000D 01	-8.00031D 00	0.0	1.31000D-02	0.0
	-6.66134D-16	0.0	3.30000D 02	0.0	0.0	0.0
	-4.32288D 00	0.0	3.29972D 02	0.0	0.0	0.0
	-5.05646D 00	0.0	3.85967D 02	0.0	0.0	0.0
	-1.30996D-02	0.0	9.99914D-01	0.0	0.0	0.0
MASS 13	-3.70409D 00	-1.30000D 01	-2.99949D 01	0.0	1.31000D-02	0.0
	-6.66134D-16	0.0	3.30000D 02	0.0	0.0	0.0
	-4.32288D 00	0.0	3.29972D 02	0.0	0.0	0.0
	-5.05646D 00	0.0	3.85967D 02	0.0	0.0	0.0
	-1.30996D-02	0.0	9.99914D-01	0.0	0.0	0.0
NODE 1	-3.70409D 00	-1.30000D 01	-2.99949D 01			
	-6.66134D-16	0.0	3.30000D 02			
	-4.32288D 00	0.0	3.29972D 02			
	-1.30996D-02	0.0	9.99914D-01	-1.30996D-02	0.0	9.99914D-01
MASS 14	-3.90176D 00	-1.30000D 01	-4.50836D 01	0.0	1.31000D-02	0.0
	-6.66134D-16	0.0	3.30000D 02	0.0	0.0	0.0
	-4.32288D 00	0.0	3.29972D 02	0.0	0.0	0.0
	-5.05646D 00	0.0	3.85967D 02	0.0	0.0	0.0
	-1.30996D-02	0.0	9.99914D-01	0.0	0.0	0.0
MASS 15	-3.90176D 00	-1.30000D 01	-4.50836D 01	0.0	1.31000D-02	0.0
	-6.66134D-16	0.0	3.30000D 02	0.0	0.0	0.0
	-4.32288D 00	0.0	3.29972D 02	0.0	0.0	0.0
	-5.05646D 00	0.0	3.85967D 02	0.0	0.0	0.0
	-1.30996D-02	0.0	9.99914D-01	0.0	0.0	0.0

SAMPLE CASE SUBSECTIN DROP TEST SIMULATION 16MASS/3CMEMBER MODEL
6-1-79 KRASH.F79.DATA 27.5 FT./SEC

TIME = 0.0 NUMBER OF INTEGRATION INTERVALS = 0

MASS DISPLACEMENTS,VELOCITIES,AND ACCELERATIONS

	X XDOT U UDOT XACCEL	Y YDOT V VDOT YACCEL	Z ZDOT W WDOT ZACCEL	PHI PHIDOT P PDOT XACFIL	THETA THETADOT Q QDOT YACFIL	PSI PSIDOT R RDOT ZACFIL
MASS 16	-3.60584D 00	-1.30000D 01	-2.24956D 01	0.0	1.31000D-02	0.0
	-6.66134D-16	0.0	3.30000D 02	0.0	0.0	0.0
	-4.32288D 00	0.0	3.29972D 02	0.0	0.0	0.0
	-5.05646D 00	0.0	3.85967D 02	0.0	0.0	0.0
	-1.30996D-02	0.0	9.99914D-01	0.0	0.0	0.0
NODE 1	1.13929D 01	-6.00000D 00	-2.26921D 01			
	-6.66134D-16	0.0	3.30000D 02			
	-4.32288D 00	0.0	3.29972D 02			
	-1.30996D-02	0.0	9.99914D-01	-1.30996D-02	0.0	9.99914D-01
NODE 2	-1.16052D 01	-6.00000D 00	-2.23908D 01			
	-6.66134D-16	0.0	3.30000D 02			
	-4.32288D 00	0.0	3.29972D 02			
	-1.30996D-02	0.0	9.99914D-01	-1.30996D-02	0.0	9.99914D-01
NODE 3	1.13929D 01	-2.00000D 01	-2.26921D 01			
	-6.66134D-16	0.0	3.30000D 02			
	-4.32288D 00	0.0	3.29972D 02			
	-1.30996D-02	0.0	9.99914D-01	-1.30996D-02	0.0	9.99914D-01
NODE 4	-1.16052D 01	-2.00000D 01	-2.23908D 01			
	-6.66134D-16	0.0	3.30000D 02			
	-4.32288D 00	0.0	3.29972D 02			
	-1.30996D-02	0.0	9.99914D-01	-1.30996D-02	0.0	9.99914D-01
NODE 5	-3.60584D 00	-1.30000D 01	-2.24956D 01			
	-6.66134D-16	0.0	3.30000D 02			
	-4.32288D 00	0.0	3.29972D 02			
	-1.30996D-02	0.0	9.99914D-01	-1.30996D-02	0.0	9.99914D-01
MASS 17	2.75788D 01	6.00000D 00	-8.60290D 00	0.0	1.31000D-02	0.0
	-6.66134D-16	0.0	3.30000D 02	0.0	0.0	0.0
	-4.32288D 00	0.0	3.29972D 02	0.0	0.0	0.0
	-5.05646D 00	0.0	3.85967D 02	0.0	0.0	0.0
	-1.30996D-02	0.0	9.99914D-01	0.0	0.0	0.0
MASS 18	2.25793D 01	6.00000D 00	-8.53740D 00	0.0	1.31000D-02	0.0
	-6.66134D-16	0.0	3.30000D 02	0.0	0.0	0.0
	-4.32288D 00	0.0	3.29972D 02	0.0	0.0	0.0
	-5.05646D 00	0.0	3.85967D 02	0.0	0.0	0.0
	-1.30996D-02	0.0	9.99914D-01	0.0	0.0	0.0
MASS 19	1.15802D 01	6.00000D 00	-8.39330D 00	0.0	1.31000D-02	0.0
	-6.66134D-16	0.0	3.30000D 02	0.0	0.0	0.0
	-4.32288D 00	0.0	3.29972D 02	0.0	0.0	0.0
	-5.05646D 00	0.0	3.85967D 02	0.0	0.0	0.0

```
                                                                    0.0
                                                          0.0
                                  9.999914D-01    0.0
-1.309996D-02    0.0
```

SAMPLE CASE SUBSECTIN DROP TEST SIMULATION 16MASS/32MEMBER MODEL
6-1-79 NRASH.F79.DATA 27.5 FT./SEC

TIME = 0.0 NUMBER OF INTEGRATION INTERVALS = 0

MASS DISPLACEMENTS,VELOCITIES,AND ACCELERATIONS

	X XDOT U UDOT XACCEL	Y YDOT V VDOT YACCEL	Z ZDOT W WDOT ZACCEL	PHI PHIDOT P PDOT XACFIL	THETA THETADOT Q QDOT YACFIL	PSI PSIDOT R RDOT ZACFIL
MASS 20	-4.18772D-01	6.00000D 00	-8.23611D 00	0.0	1.31000D-02	0.0
	-6.66134D-16	0.0	3.30000D 02	0.0	0.0	0.0
	-4.32288D 00	0.0	3.29972D 02	0.0	0.0	0.0
	-5.05646D 00	0.0	3.85967D 02	0.0	0.0	0.0
	-1.30996D-02	0.0	9.99914D-01	0.0	0.0	0.0
MASS 21	-1.14178D 01	6.00000D 00	-8.09201D 00	0.0	1.31000D-02	0.0
	-6.66134D-16	0.0	3.30000D 02	0.0	0.0	0.0
	-4.32288D 00	0.0	3.29972D 02	0.0	0.0	0.0
	-5.05646D 00	0.0	3.85967D 02	0.0	0.0	0.0
	-1.30996D-02	0.0	9.99914D-01	0.0	0.0	0.0
MASS 22	-1.84172D 01	6.00000D 00	-8.00031D 00	0.0	1.31000D-02	0.0
	-6.66134D-16	0.0	3.30000D 02	0.0	0.0	0.0
	-4.32288D 00	0.0	3.29972D 02	0.0	0.0	0.0
	-5.05646D 00	0.0	3.85967D 02	0.0	0.0	0.0
	-1.30996D-02	0.0	9.99914D-01	0.0	0.0	0.0
MASS 23	2.75788D 01	2.00000D 01	-8.60290D 00	0.0	1.31000D-02	0.0
	-6.66134D-16	0.0	3.30000D 02	0.0	0.0	0.0
	-4.32288D 00	0.0	3.29972D 02	0.0	0.0	0.0
	-5.05646D 00	0.0	3.85967D 02	0.0	0.0	0.0
	-1.30996D-02	0.0	9.99914D-01	0.0	0.0	0.0
MASS 24	2.25793D 01	2.00000D 01	-8.53740D 00	0.0	1.31000D-02	0.0
	-6.66134D-16	0.0	3.30000D 02	0.0	0.0	0.0
	-4.32288D 00	0.0	3.29972D 02	0.0	0.0	0.0
	-5.05646D 00	0.0	3.85967D 02	0.0	0.0	0.0
	-1.30996D-02	0.0	9.99914D-01	0.0	0.0	0.0
MASS 25	1.15800D 01	2.00000D 01	-8.39330D 00	0.0	1.31000D-02	0.0
	-6.66134D-16	0.0	3.30000D 02	0.0	0.0	0.0
	-4.32288D 00	0.0	3.29972D 02	0.0	0.0	0.0
	-5.05646D 00	0.0	3.85967D 02	0.0	0.0	0.0
	-1.30996D-02	0.0	9.99914D-01	0.0	0.0	0.0
MASS 26	-4.18772D-01	2.00000D 01	-8.23611D 00	0.0	1.31000D-02	0.0
	-6.66134D-16	0.0	3.30000D 02	0.0	0.0	0.0
	-4.32288D 00	0.0	3.29972D 02	0.0	0.0	0.0
	-5.05646D 00	0.0	3.85967D 02	0.0	0.0	0.0
	-1.30996D-02	0.0	9.99914D-01	0.0	0.0	0.0
MASS 27	-1.14178D 01	2.00000D 01	-8.09201D 00	0.0	1.31000D-02	0.0
	-6.66134D-16	0.0	3.30000D 02	0.0	0.0	0.0
	-4.32288D 00	0.0	3.29972D 02	0.0	0.0	0.0
	-5.05646D 00	0.0	3.85967D 02	0.0	0.0	0.0
	-1.30996D-02	0.0	9.99914D-01	0.0	0.0	0.0

SAMPLE CASE SUBSECTIN DROP TEST SIMULATION 16MASS/32MEMBER MODEL
6-1-79 KRASH.F79.DATA 27.5 FT./SEC

TIME = 0.0 NUMBER OF INTEGRATION INTERVALS = 0

MASS DISPLACEMENTS,VELOCITIES,AND ACCELERATIONS

	X XDOT U UDOT XACCEL	Y YDOT V VDOT YACCEL	Z ZDOT W WDOT ZACCEL	PHI PHIDOT P PDOT XACFIL	THETA THETADOT Q QDOT YACFIL	PSI PSIDOT R RDOT ZACFIL
MASS 28	-1.84172D 01	2.00000D 01	-8.00031D 00	0.0	1.31000D-02	0.0
	-6.66134D-16	0.0	3.30000D 02	0.0	0.0	0.0
	-4.32288D 00	0.0	3.29972D 02	0.0	0.0	0.0
	-5.05646D 00	0.0	3.85967D 02	0.0	0.0	0.0
	-1.30996D-02	0.0	9.99914D-01	0.0	0.0	0.0
MASS 29	-3.70409D 00	1.30000D 01	-2.99949D 01	0.0	1.31000D-02	0.0
	-6.66134D-16	0.0	3.30000D 02	0.0	0.0	0.0
	-4.32288D 00	0.0	3.29972D 02	0.0	0.0	0.0
	-5.05646D 00	0.0	3.85967D 02	0.0	0.0	0.0
	-1.30996D-02	0.0	9.99914D-01	0.0	0.0	0.0
NODE 1	-3.70409D 00	1.30000D 01	-2.99949D 01			
	-6.66134D-16	0.0	3.30000D 02			
	-4.32288D 00	0.0	3.29972D 02			
	-1.30996D-02	0.0	9.99914D-01	-1.30996D-02	0.0	9.99914D-01
MASS 30	-3.90176D 00	1.30000D 01	-4.50836D 01	0.0	1.31000D-02	0.0
	-6.66134D-16	0.0	3.30000D 02	0.0	0.0	0.0
	-4.32288D 00	0.0	3.29972D 02	0.0	0.0	0.0
	-5.05646D 00	0.0	3.85967D 02	0.0	0.0	0.0
	-1.30996D-02	0.0	9.99914D-01	0.0	0.0	0.0
MASS 31	-3.90176D 00	1.30000D 01	-4.50836D 01	0.0	1.31000D-02	0.0
	-6.66134D-16	0.0	3.30000D 02	0.0	0.0	0.0
	-4.32288D 00	0.0	3.29972D 02	0.0	0.0	0.0
	-5.05646D 00	0.0	3.85967D 02	0.0	0.0	0.0
	-1.30996D-02	0.0	9.99914D-01	0.0	0.0	0.0
MASS 32	-3.60584D 00	1.30000D 01	-2.24956D 01	0.0	1.31000D-02	0.0
	-6.66134D-16	0.0	3.30000D 02	0.0	0.0	0.0
	-4.32288D 00	0.0	3.29972D 02	0.0	0.0	0.0
	-5.05646D 00	0.0	3.85967D 02	0.0	0.0	0.0
	-1.30996D-02	0.0	9.99914D-01	0.0	0.0	0.0
NODE 1	1.13929D 01	6.00000D 00	-2.26921D 01			
	-6.66134D-16	0.0	3.30000D 02			
	-4.32288D 00	0.0	3.29972D 02			
	-1.30996D-02	0.0	9.99914D-01	-1.30996D-02	0.0	9.99914D-01
NODE 2	-1.16052D 01	6.00000D 00	-2.23900D 01			
	-6.66134D-16	0.0	3.30000D 02			
	-4.32288D 00	0.0	3.29972D 02			
	-1.30996D-02	0.0	9.99914D-01	-1.30996D-02	0.0	9.99914D-01
NODE 3	1.13929D 01	2.00000D 01	-2.26921D 01			
	-6.66134D-16	0.0	3.30000D 02			

	-4.32286D 00	0.0	3.29972D 02			
	-1.30996D-02	0.0	9.99914D-01	-1.30996D-02	0.0	9.99914D-01
NODE 4	-1.16052D 01	2.00000D 01	-2.23908D 01			
	-6.6613+D-16	0.0	3.30000D 02			
	-4.32286D 00	0.0	3.29972D 02			
	-1.30996D-02	0.0	9.99914D-01	-1.30996D-02	0.0	9.99914D-01
NODE 5	-3.60584D 00	1.30000D 01	-2.24956D 01			
	-6.6613+D-16	0.0	3.30000D 02			
	-4.32286D 00	0.0	3.29972D 02			
	-1.30996D-02	0.0	9.99914D-01	-1.30996D-02	0.0	9.99914D-01

MASS IMPULSES(G-SEC)-BASED ON FILTERED ACCELS

	XIMPULSE	YIMPULSE	ZIMPULSE
MASS 1	0.0	0.0	0.0
MASS 2	0.0	0.0	0.0
MASS 3	0.0	0.0	0.0
MASS 4	0.0	0.0	0.0
MASS 5	0.0	0.0	0.0
MASS 6	0.0	0.0	0.0
MASS 7	0.0	0.0	0.0
MASS 8	0.0	0.0	0.0
MASS 9	0.0	0.0	0.0
MASS 10	0.0	0.0	0.0
MASS 11	0.0	0.0	0.0
MASS 12	0.0	0.0	0.0
MASS 13	0.0	0.0	0.0
NODE 1	0.0	0.0	0.0
MASS 14	0.0	0.0	0.0
MASS 15	0.0	0.0	0.0
MASS 16	0.0	0.0	0.0
NODE 1	0.0	0.0	0.0
NODE 2	0.0	0.0	0.0
NODE 3	0.0	0.0	0.0
NODE 4	0.0	0.0	0.0
NODE 5	0.0	0.0	0.0
MASS 17	0.0	0.0	0.0
MASS 18	0.0	0.0	0.0
MASS 19	0.0	0.0	0.0
MASS 20	0.0	0.0	0.0
MASS 21	0.0	0.0	0.0
MASS 22	0.0	0.0	0.0
MASS 23	0.0	0.0	0.0
MASS 24	0.0	0.0	0.0
MASS 25	0.0	0.0	0.0
MASS 26	0.0	0.0	0.0
MASS 27	0.0	0.0	0.0
MASS 28	0.0	0.0	0.0
MASS 29	0.0	0.0	0.0
NODE 1	0.0	0.0	0.0
MASS 30	0.0	0.0	0.0
MASS 31	0.0	0.0	0.0
MASS 32	0.0	0.0	0.0
NODE 1	0.0	0.0	0.0
NODE 2	0.0	0.0	0.0
NODE 3	0.0	0.0	0.0
NODE 4	0.0	0.0	0.0

NODE 5 0.0 0.0 0.0

BEAM FORCES

STRAIN FORCES

I	J	M	N	FX	FY	FZ	MX	MYI	MYJ	MZI	MZJ
1	2	0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2	3	0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
3	4	0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
4	5	0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
5	6	0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
7	8	0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
8	9	0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
9	10	0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
10	11	0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
11	12	0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1	17	0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2	18	0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
3	19	0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
4	20	0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
5	21	0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
6	22	0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1	7	0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2	8	0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
3	9	0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
4	10	0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
5	11	0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
6	12	0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
3	16	0	1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
5	16	0	2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
9	16	0	3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
11	16	0	4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
13	14	0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
13	15	0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
5	13	0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
11	13	0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
13	16	0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
13	16	1	5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
17	18	0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
18	19	0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
19	20	0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
20	21	0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
21	22	0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
23	24	0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
24	25	0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
25	26	0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
26	27	0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
27	28	0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
17	23	0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
18	24	0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
19	25	0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
20	26	0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
21	27	0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
22	28	0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
19	32	0	1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
21	32	0	2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
25	32	0	3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
27	32	0	4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
29	30	0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
29	31	0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

21	29	0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
27	29	0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
29	32	0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
29	32	1	5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	

TOTAL FORCES (STRAIN+DAMPING)

I	J	M	N	FX	FY	FZ	MX	MYI	MYJ	MZI	MZJ
1	2	0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2	3	0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
3	4	0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
4	5	0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
5	6	0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
7	8	0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
8	9	0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
9	10	0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
10	11	0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
11	12	0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1	17	0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2	18	0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
3	19	0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
4	20	0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
5	21	0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
6	22	0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1	7	0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2	8	0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
3	9	0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
4	10	0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
5	11	0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
6	12	0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
3	15	0	1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
5	15	0	2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
9	16	0	3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
11	16	0	4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
13	14	0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
13	15	0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
5	13	0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
11	13	0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
13	16	0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
13	16	1	5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
17	18	0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
18	19	0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
19	20	0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
20	21	0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
21	22	0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
23	24	0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
24	25	0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
25	26	0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
26	27	0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
27	28	0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
17	23	0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
18	24	0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
19	25	0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
20	26	0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
21	27	0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
22	28	0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
19	32	0	1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
21	32	0	2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
25	32	0	3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
27	32	0	4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

29	30	0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
29	31	0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
21	29	0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
27	29	0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
29	32	0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
29	32	1	5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

BEAM RELATIVE DEFLECTIONS AND ROTATIONS AND BEAM EULER ANGLES (INCHES AND DEGREES)

BEAM				DEFLECTIONS (J-I)			ROTATIONS (J-I)			ROTATIONS (J+I)		EULER ANGLES	
I	J	M	N	X	Y	Z	PHI	THETA	PSI	THETA	PSI	THETA	PSI
1	2	0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-0.8	180.0
2	3	0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-0.8	180.0
3	4	0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-0.8	180.0
4	5	0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-0.8	180.0
5	6	0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-0.8	180.0
7	8	0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-0.8	180.0
8	9	0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-0.8	180.0
9	10	0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-0.8	180.0
10	11	0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-0.8	180.0
11	12	0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-0.8	180.0
1	17	0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	90.0
2	18	0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	90.0
3	19	0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	90.0
4	20	0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	90.0
5	21	0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	90.0
6	22	0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	90.0
1	7	0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-90.0
2	8	0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-90.0
3	9	0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-90.0
4	10	0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-90.0
5	11	0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-90.0
6	12	0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-90.0
3	16	0	1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	89.2	180.0
5	16	0	2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	89.2	180.0
9	16	0	3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	89.2	180.0
11	16	0	4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	89.2	180.0
13	14	0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	89.2	180.0
13	15	0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	89.2	180.0
5	13	0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	64.6	-42.2
11	13	0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	64.6	42.2
13	16	0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-89.2	0.0
13	16	1	5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-89.2	0.0
17	18	0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-0.8	180.0
18	19	0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-0.8	180.0
19	20	0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-0.8	180.0
20	21	0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-0.8	180.0
21	22	0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-0.8	180.0
23	24	0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-0.8	180.0
24	25	0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-0.8	180.0
25	26	0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-0.8	180.0
26	27	0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-0.8	180.0
27	28	0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-0.8	180.0
17	23	0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	90.0
18	24	0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	90.0
19	25	0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	90.0
20	26	0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	90.0
21	27	0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	90.0

22	28	0	3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	90.0
19	32	0	1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	89.2	180.0
21	32	0	2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	89.2	180.0
25	32	0	3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	89.2	180.0
27	32	0	4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	89.2	180.0
29	30	0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	89.2	180.0
29	31	0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	89.2	180.0
21	29	0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	64.6	42.2
27	29	0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	64.6	-42.2
29	32	0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-89.2	0.0
29	32	1	5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-89.2	0.0

EXTERNAL SPRINGS

MASS I	SPRING K	SPRING M	SPRING COMPRESSION	GROUND DEFLECTION	SPRING COMPRESSION LOAD	GROUND CONTACT POINT LOADS IN GROUND OR SLOPE AXES X(+ AFT OR DOWN SLOPE)	Y(+ LEFT)	Z(+ UP OR NORMAL TO SLOPE)	GROUND CONTACT POINT LOADS IN MASS AXES X (+ FORWARD)	Y (+ RIGHT)	Z (+ DOWN)
2	3	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
3	3	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
4	3	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
5	3	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
6	3	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
8	3	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
9	3	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
10	3	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
11	3	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
12	3	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
18	3	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
19	3	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
20	3	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
21	3	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
22	3	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
24	3	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
25	3	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
26	3	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
27	3	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
28	3	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

DRI RESULTS: MASS NO. AND DRI VALUE

MASS	DRI
15	0.0
31	0.0

VEHICLE C.G. TRANSLATIONAL VELOCITIES, GROUND AXES, BASED ON SYSTEM LINEAR MOMENTUM

XDOT (+FWD)	YDOT (+RIGHT)	ZDOT (+DOWN)
-6.661340-16	0.0	3.30000D 02

ENERGY DISTRIBUTION

TOTAL	KINETIC	POTENTIAL	STRAIN	DAMPING	CRUSHING	FRICTION

ENERGY	ENERGY	ENERGY	ENERGY	ENERGY	ENERGY	ENERGY
9.05850D 04	7.69498D 04	1.36350D 04	0.0	0.0	0.0	0.0
PERCENT OF TOTAL ENERGY	84.948	15.052	0.0	0.0	0.0	0.0

MASS	KINETIC ENERGY	PCT	POTENTIAL ENERGY	PCT	INTERNAL BEAM IJ I J M N	STRAIN ENERGY	PCT	DAMPING ENERGY	PCT	EXTERNAL SPRING I K M	CRUSHING ENERGY	PCT	FRICTION ENERGY	PCT
1	2.215D 02	0.3	1.351D 01	0.1										
2	7.095D 02	0.9	4.294D 01	0.3										
3	2.428D 03	3.2	1.444D 02	1.1										
4	1.017D 03	1.3	5.938D 01	0.4										
5	7.956D 02	1.0	4.564D 01	0.3										
6	3.103D 02	0.4	1.760D 01	0.1										
7	4.415D 02	0.6	2.693D 01	0.2										
8	1.415D 03	1.8	8.562D 01	0.6										
9	3.445D 03	4.5	2.050D 02	1.5										
10	2.034D 03	2.6	1.188D 02	0.9										
11	1.592D 03	2.1	9.130D 01	0.7										
12	6.193D 02	0.8	3.512D 01	0.3										
13	1.028D 04	13.4	2.185D 03	16.0										
14	1.028D 04	13.4	3.285D 03	24.1										
15	0.0	0.0	0.0	0.0										
16	2.892D 03	3.8	4.612D 02	3.4										
17	2.215D 02	0.3	1.351D 01	0.1										
18	7.095D 02	0.9	4.294D 01	0.3										
19	2.428D 03	3.2	1.444D 02	1.1										
20	1.017D 03	1.3	5.938D 01	0.4										
21	7.956D 02	1.0	4.564D 01	0.3										
22	3.103D 02	0.4	1.760D 01	0.1										
23	4.415D 02	0.6	2.693D 01	0.2										
24	1.415D 03	1.8	8.562D 01	0.6										
25	3.445D 03	4.5	2.050D 02	1.5										
26	2.034D 03	2.6	1.188D 02	0.9										
27	1.592D 03	2.1	9.130D 01	0.7										
28	6.193D 02	0.8	3.512D 01	0.3										
29	1.028D 04	13.4	2.185D 03	16.0										
30	1.028D 04	13.4	3.285D 03	24.1										
31	0.0	0.0	0.0	0.0										
32	2.892D 03	3.8	4.612D 02	3.4										

DEVIATION OF TOTAL ENERGY OF EACH MASS FROM 100 PERCENT

MASS	DEVIATION(PERCENT)
1	0.0
2	0.0
3	0.0
4	0.0
5	0.0
6	0.0
7	0.0
8	0.0

9	0.0
10	0.0
11	0.0
12	0.0
13	0.0
14	0.0
15	0.0
16	0.0
17	0.0
18	0.0
19	0.0
20	0.0
21	0.0
22	0.0
23	0.0
24	0.0
25	0.0
26	0.0
27	0.0
28	0.0
29	0.0
30	0.0
31	0.0
32	0.0

ELEMENT STRESSES

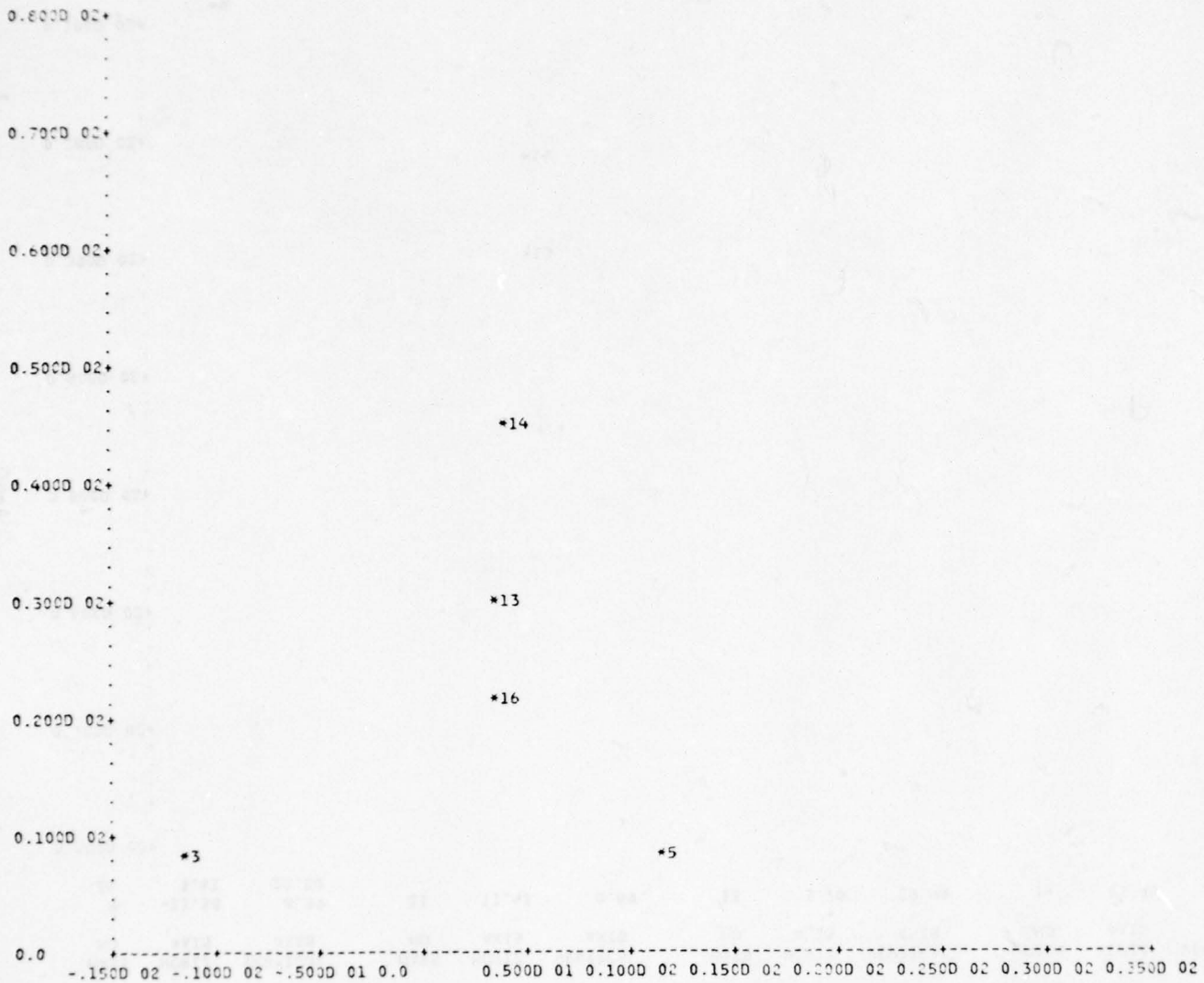
	BEAM				RATIO OF CURRENT STRESS / FAILURE STRESS								RATIO OF CURRENT		
					MAXIMUM SHEAR STRESS THEORY				THEORY OF CONSTANT ENERGY OF DISTORTION				AXIAL/FAILURE		BUCK. /
IJ	I	J	M	N	TOP	BOTTOM	LEFT	RIGHT	TOP	BOTTOM	LEFT	RIGHT	COMPR. STRESS	TENSILE STRESS	CR.BUCK. LOAD
1	1	2	0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0
2	2	3	0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0
3	3	4	0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0
4	4	5	0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0
5	5	6	0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0
6	7	8	0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0
7	8	9	0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0
8	9	10	0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0
9	10	11	0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0
10	11	12	0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0
11	1	17	0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0
12	2	18	0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0
13	3	19	0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0
14	4	20	0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0
15	5	21	0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0
16	6	22	0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0
17	1	7	0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0
18	2	8	0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0
19	3	9	0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0
20	4	10	0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0
21	5	11	0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0
22	6	12	0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0
23	3	16	0	1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0
24	5	16	0	2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0
25	9	16	0	3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0
26	11	16	0	4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0

```
27 13 14  0 0 0  0.0  0.0  0.
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MASS POSITION PLOT PLANE ** X(+AFT) - Z(+UP)

NOTE *** A MODIFIED RIGHT HAND GROUND COORDINATE SYSTEM HAS BEEN USED FOR THIS PLOT ***

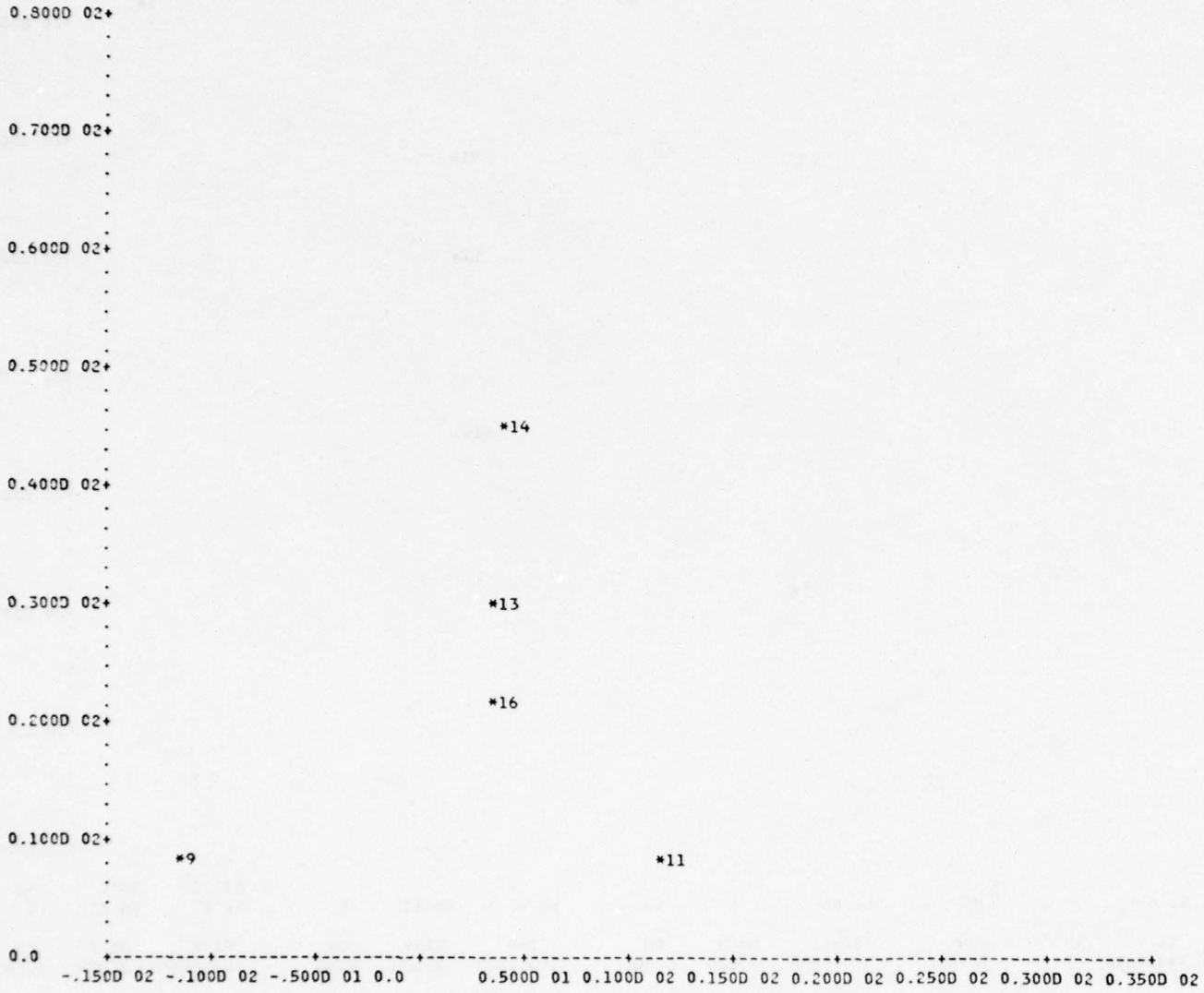
MASS NO	HORIZ AXIS	VERTICAL AXIS	MASS NO	HORIZ AXIS	VERTICAL AXIS	MASS NO	HORIZ AXIS	VERTICAL AXIS	MASS NO	HORIZ AXIS	VERTICAL AXIS
3	-11.58	8.39	5	11.42	8.09	13	3.70	29.99	14	3.90	45.08
16	3.61	22.50									



MASS POSITION PLOT PLANE ** X(+AFT) - Z(+UP)

NOTE *** A MODIFIED RIGHT HAND GROUND COORDINATE SYSTEM HAS BEEN USED FOR THIS PLOT ***

MASS NO	HORIZ AXIS	VERTICAL AXIS	MASS NO	HORIZ AXIS	VERTICAL AXIS	MASS NO	HORIZ AXIS	VERTICAL AXIS	MASS NO	HORIZ AXIS	VERTICAL AXIS
9	-11.58	8.39	11	11.42	8.09	13	3.70	29.99	14	3.90	45.08
16	3.61	20.50									



A40

SAMPLE CASE SUBSECTIN DROP TEST SIMULATION 16MASS/32MEMBER MODEL
6-1-79 KRASH.F79.DATA 27.5 FT./SEC

TIME = 0.002000 NUMBER OF INTEGRATION INTERVALS = 100

MASS DISPLACEMENTS,VELOCITIES,AND ACCELERATIONS

	X XDOT U UDOT XACCEL	Y YDOT V VDOT YACCEL	Z ZDOT W WDOT ZACCEL	PHI PHIDOT P PDOT XACFIL	THETA THETADOT Q QDOT YACFIL	PSI PSIDOT R RDOT ZACFIL
MASS 1	2.75772D 01	-5.99988D 00	-7.94164D 00	6.26744D-05	1.12912D-02	2.60324D-06
	-3.20361D 00	3.56141D-02	3.09411D 02	-3.13617D-01	-3.14325D 00	-8.41820D-03
	-6.69659D 00	5.51043D-02	3.09357D 02	-3.13502D-01	-3.14313D 00	-8.21969D-03
	-2.72694D 03	-1.37830D 02	-1.43539D 05	-4.72841D 03	1.55051D 04	-1.02939D 02
	-9.58372D 00	-1.05661D-01	-3.71916D 02	-3.28732D 00	1.56740D-02	-2.90254D 01
MASS 2	2.25776D 01	-5.99987D 00	-7.88495D 00	1.25823D-05	1.14631D-02	-3.72871D-06
	-3.33432D 00	3.83038D-02	2.95022D 02	2.83217D-02	-2.69330D 00	-1.68067D-02
	-6.71569D 00	4.20108D-02	2.94963D 02	2.85026D-02	-2.69337D 00	-1.67715D-02
	-2.84666D 03	-3.97541D 01	-7.87167D 04	-4.51564D 02	9.94025D 03	-3.43996D 01
	-9.43286D 00	-1.24487D-01	-2.03976D 02	-3.22027D 00	1.58672D-02	-4.31705D 01
MASS 3	1.15785D 01	-5.99944D 00	-7.75545D 00	-1.63094D-04	1.16347D-02	-1.44640D-05
	-3.67591D 00	7.79267D-01	2.71531D 02	-6.89341D-01	-3.05331D 00	-5.05092D-02
	-6.83481D 00	7.34971D-01	2.71471D 02	-6.88753D-01	-3.05329D 00	-5.10034D-02
	-2.80653D 03	-1.76353D 01	-7.09652D 04	-1.86072D 03	-1.63494D 03	-1.40183D 02
	-9.41808D 00	4.39610D-01	-1.83644D 02	-3.23884D 00	7.82699D-01	-6.58130D 01
MASS 4	-4.20774D-01	-5.99986D 00	-7.62875D 00	-1.66548D-03	1.03352D-02	-2.54439D-05
	-3.35680D 00	8.47188D-02	2.64224D 02	-2.13301D-01	1.24753D 00	-2.24650D-02
	-6.08760D 00	-3.55465D-01	2.64173D 02	-2.13093D-01	1.24792D 00	-2.03855D-02
	-4.95933D 03	1.54305D 02	-2.39466D 04	6.81374D 03	-1.41669D 04	4.69319D 01
	-1.19942D 01	5.45899D-01	-6.20180D 01	-2.78632D 00	1.17651D-01	-6.11318D 01
MASS 5	-1.14203D 01	-5.99861D 00	-7.51921D 00	-1.72817D-03	9.46388D-03	-6.77062D-06
	-3.10087D 00	1.23920D 00	2.68892D 02	6.41095D-01	-5.75047D-01	1.99658D-02
	-5.64533D 00	7.74524D-01	2.68853D 02	6.40895D-01	-5.75302D-01	1.89707D-02
	-3.66601D 03	4.63449D 02	-9.76923D 04	1.29210D 03	7.94435D 03	-2.62751D 01
	-9.89801D 00	7.53972D-01	-2.53097D 02	-2.38138D 00	9.99485D-01	-4.02364D 01
MASS 6	-1.84199D 01	-5.99975D 00	-7.45538D 00	-2.10339D-03	8.95193D-03	1.99839D-04
	-3.08974D 00	1.78398D-01	2.61524D 02	3.61269D-01	-1.43623D 00	4.64279D-01
	-5.43036D 00	-3.71030D-01	2.61486D 02	3.57106D-01	-1.43762D 00	4.61238D-01
	-4.45540D 03	5.16101D 01	-7.29932D 03	2.17339D 03	1.70656D 04	1.73501D 02
	-1.25156D 01	-1.14702D-01	-1.89307D 01	-2.24958D 00	1.44671D-01	-3.92336D 01
MASS 7	2.75783D 01	-1.99996D 01	-7.94145D 00	1.73870D-05	1.30965D-02	1.06090D-05
	-4.86516D-01	1.34323D-01	3.32052D 02	6.53999D-02	-6.08923D-02	4.04172D-03
	-4.83520D 00	1.40104D-01	3.32027D 02	6.53418D-02	-6.08997D-02	4.04176D-03
	-7.97249D 02	-9.96861D 00	-4.75839D 03	-1.33897D 02	-2.45835D 02	-4.14704D 01
	-2.11779D 00	-8.25159D-02	-1.23282D 01	-5.40812D-01	8.16177D-02	2.04878D 00
MASS 8	2.25783D 01	-1.99996D 01	-7.87595D 00	7.81048D-08	1.31128D-02	1.22571D-06
	-5.04416D-01	1.22053D-01	3.32793D 02	-1.00433D-05	2.35402D-02	-5.49571D-03
	-4.86810D 00	1.22060D-01	3.32752D 02	6.19931D-05	2.35406D-02	-5.49523D-03
	-9.10165D 02	-1.21385D 02	4.07854D 03	-6.30464D-01	9.86836D 00	-2.23163D 01
	-2.33765D 00	-3.14452D-01	1.05667D 01	-5.87153D-01	4.59835D-02	3.07041D 00

SAMPLE CASE SUBSECTIN DROP TEST SIMULATION 16MASS/32MEMBER MODEL
6-1-79 KRASH.F79.DATA 27.5 FT./SEC

TIME = 0.002000 NUMBER OF INTEGRATION INTERVALS = 100

MASS DISPLACEMENTS,VELOCITIES,AND ACCELERATIONS

	X XDOT U UDOT XACCEL	Y YDOT V VDOT YACCEL	Z ZDOT W WDOT ZACCEL	PHI PHIDOT P PDOT XACFIL	THETA THETADOT Q QDOT YACFIL	PSI PSIDOT R RDOT ZACFIL
MASS 9	1.15797D 01	-1.99989D 01	-7.72915D 00	-2.14147D-05	1.30923D-02	-6.73776D-06
	-7.00665D-01	1.74184D 00	3.33972D 02	-1.58973D-01	-4.55555D-02	-2.41391D-02
	-5.07296D 00	1.73470D 00	3.33935D 02	-1.58657D-01	-4.55552D-02	-2.41380D-02
	-5.87779D 02	1.78847D 03	-1.38017D 04	-6.13889D 02	-1.69091D 02	-7.10259D 01
	-1.56205D 00	4.77091D 00	-3.57570D 01	-7.97202D-01	1.87852D 00	3.10520D 00
MASS 10	-4.18936D-01	-1.99995D 01	-7.58623D 00	-2.50593D-04	1.29004D-02	-2.33412D-05
	-7.00561D-01	3.77271D-01	3.06661D 02	-5.65740D-01	-5.04791D-01	-5.53905D-02
	-4.65548D 00	3.00433D-01	3.06626D 02	-5.65025D-01	-5.04778D-01	-5.55103D-02
	-1.43241D 03	1.36132D 02	-3.29387D 04	-8.05195D 02	-9.44652D 02	-8.54514D 01
	-4.11183D 00	8.02182D-01	-8.53399D 01	-5.19305D-01	3.64345D-01	-2.58973D 01
MASS 11	-1.14184D 01	-1.99970D 01	-7.47112D 00	-8.28826D-04	1.27348D-02	-6.14531D-05
	-1.69061D 00	4.44087D 00	2.68985D 02	-1.32089D 00	-6.10625D-01	-8.26826D-02
	-5.11614D 00	4.21787D 00	2.68945D 02	-1.31979D 00	-6.10556D-01	-8.31820D-02
	-1.37427D 03	3.42251D 02	-3.99105D 04	-1.00618D 03	-7.08121D 02	-1.19610D 01
	-3.98479D 00	1.80732D 00	-1.03418D 02	-1.08334D 00	4.45876D 00	-6.12751D 01
MASS 12	-1.84176D 01	-1.99990D 01	-7.38270D 00	-1.90031D-03	1.23620D-02	-1.49645D-04
	-1.66620D 00	7.66472D-01	2.62996D 02	-2.34734D 00	-8.37988D-01	-1.14619D-02
	-4.91727D 00	2.66548D-01	2.62957D 02	-2.34720D 00	-8.37966D-01	-1.30535D-02
	-1.98324D 03	-9.44235D 02	-7.65972D 04	-1.42328D 03	-1.36718D 02	4.64416D 02
	-5.70877D 00	-8.47046D-01	-1.98451D 02	-1.09176D 00	6.79607D-01	-6.83626D 01
MASS 13	-3.70405D 00	-1.29999D 01	-2.93339D 01	3.54827D-11	1.30999D-02	-1.51515D-18
	-8.83005D-04	1.44773D-05	3.30707D 02	3.22802D-08	-6.27061D-08	-1.57308D-15
	-4.33299D 00	1.44777D-05	3.30679D 02	3.22819D-08	-6.27063D-08	-1.57291D-15
	-5.14309D 00	1.13587D-01	2.65053D 02	-3.13817D-05	-7.47599D-05	3.23149D-12
	-1.33241D-02	2.94497D-04	6.86665D-01	-8.63237D-03	2.61105D-05	5.86675D-01
NODE 1	-3.70405D 00	-1.29999D 01	-2.93339D 01			
	-8.83005D-04	1.44777D-05	3.30707D 02			
	-4.33299D 00	1.44777D-05	3.30679D 02			
	-1.33241D-02	2.94497D-04	6.86665D-01	-1.31340D-02	2.61105D-05	9.30289D-01
MASS 14	-3.90172D 00	-1.29999D 01	-4.44224D 01	4.36940D-11	1.30999D-02	-3.86704D-18
	2.79105D-05	-3.01385D-07	3.30774D 02	3.97000D-08	-8.55304D-08	-3.98057D-15
	-4.33295D 00	-3.01382D-07	3.30746D 02	3.96996D-08	-8.55307D-08	-3.98013D-15
	-5.05715D 00	3.20983D-04	3.84267D 02	-3.88135D-05	-1.01942D-04	8.40504D-12
	-1.31015D-02	7.97546D-07	9.95509D-01	-8.59853D-03	-2.46716D-07	6.60902D-01
MASS 15	-3.90172D 00	-1.29999D 01	-4.44224D 01	8.16226D-12	1.30999D-02	-7.22057D-19
	-4.52303D-05	-5.58190D-08	3.30769D 02	7.40149D-09	-1.59867D-08	-7.40329D-16
	-4.33295D 00	-5.58185D-08	3.30740D 02	7.40142D-09	-1.59868D-08	-7.40747D-16
	-5.05654D 00	6.06470D-05	3.84926D 02	-7.29497D-06	-1.90628D-05	1.58030D-12
	-1.30999D-02	1.50775D-07	9.97224D-01	-8.59802D-03	-4.55581D-08	6.56009D-01

SAMPLE CASE SUBSECTIN DROP TEST SIMULATION 16MASS/32MEMBER MODEL
6-1-79 KRASH.F79.DATA 27.5 FT./SEC

TIME = 0.000000 NUMBER OF INTEGRATION INTERVALS = 100

MASS DISPLACEMENTS,VELOCITIES,AND ACCELERATIONS

	X XDOT U UDOT XACCEL	Y YDOT V VDOT YACCEL	Z ZDOT W WDOT ZACCEL	PHI PHIDOT P PDOT XACFIL	THETA THETADOT Q QDOT YACFIL	PSI PSIDOT R RDOT ZACFIL
MASS 16	-3.60106D 00	-1.30068D 01	-2.18786D 01	-2.19720D-03	1.06316D-02	-7.27051D-05
	9.44574D 00	-1.51339D 01	2.69721D 02	-2.75550D 00	-2.17955D 00	-1.04211D-01
	6.57883D 00	-1.57260D 01	2.69772D 02	-2.75440D 00	-2.17933D 00	-1.08993D-01
	1.42792D 04	-2.15792D 04	-1.60695D 04	-3.24146D 02	3.06913D 03	-3.43595D 02
	3.54653D 01	-5.39814D 01	-4.14814D 01	1.09184D 01	-1.66148D 01	-5.80126D 01
NODE 1	1.13984D 01	-6.00791D 00	-2.20534D 01			
	1.03511D 01	-1.67394D 01	2.83125D 02			
	7.34178D 00	-1.73609D 01	2.83181D 02			
	4.16255D 01	-6.72497D 01	-1.66610D 02	1.16434D 01	-1.82428D 01	-5.12908D 01
NODE 2	-1.16003D 01	-6.00624D 00	-2.18089D 01			
	9.81834D 00	-1.43427D 01	2.32997D 02			
	7.34178D 00	-1.48541D 01	2.33057D 02			
	4.19092D 01	-4.71163D 01	1.62473D 01	1.17812D 01	-1.58006D 01	-8.83781D 01
NODE 3	1.13977D 01	-2.00079D 01	-2.20226D 01			
	9.23526D 00	-1.66546D 01	3.21700D 02			
	5.81588D 00	-1.73609D 01	3.21743D 02			
	2.89349D 01	-6.69741D 01	-1.54862D 02	1.00047D 01	-1.81723D 01	-1.56725D 01
NODE 4	-1.16010D 01	-2.00062D 01	-2.17781D 01			
	8.70249D 00	-1.42579D 01	2.71573D 02			
	5.81588D 00	-1.48541D 01	2.71618D 02			
	2.92187D 01	-4.68407D 01	2.79953D 01	1.01425D 01	-1.57301D 01	-5.27597D 01
NODE 5	-3.60106D 00	-1.30068D 01	-2.18786D 01			
	9.44573D 00	-1.51339D 01	2.69721D 02			
	6.57883D 00	-1.57260D 01	2.69772D 02			
	3.54653D 01	-5.39814D 01	-4.14814D 01	1.09139D 01	-1.66148D 01	-5.76690D 01
MASS 17	2.75772D 01	5.99993D 00	-7.94164D 00	-6.26744D-05	1.12912D-02	-2.60324D-06
	-3.20351D 00	-3.56141D-02	3.09411D 02	3.13617D-01	-3.14325D 00	8.41820D-03
	-6.69668D 00	-5.51043D-02	3.09357D 02	3.13502D-01	-3.14313D 00	8.21968D-03
	-2.72694D 03	1.37835D 02	-1.43539D 05	4.72841D 03	1.55051D 04	1.02939D 02
	-9.58372D 00	1.05661D-01	-3.71916D 02	-3.28732D 00	-1.56740D-02	-2.90254D 01
MASS 18	2.25776D 01	5.99987D 00	-7.88495D 00	-1.25823D-05	1.14631D-02	3.72371D-06
	-3.33432D 00	-3.83035D-02	2.95022D 02	-2.83217D-02	-2.69339D 00	1.68067D-02
	-6.71569D 00	-4.20103D-02	2.94663D 02	-2.85026D-02	-2.69337D 00	1.67715D-02
	-2.84668D 03	3.97534D 01	-7.87167D 04	4.51564D 02	9.94025D 03	3.43993D 01
	-9.43286D 00	1.24437D-01	-2.03976D 02	-3.22027D 00	-1.58672D-02	-4.31705D 01
MASS 19	1.15785D 01	5.99944D 00	-7.75645D 00	1.63094D-04	1.16347D-02	1.44640D-05
	-3.67591D 00	-7.79257D-01	2.71531D 02	6.89341D-01	-3.05331D 00	5.05992D-02
	-6.83421D 00	-7.34971D-01	2.71471D 02	6.88753D-01	-3.05329D 00	5.10034D-02
	-2.00857D 03	1.76353D 01	-7.03655D 04	1.86072D 03	-1.63494D 03	1.40183D 02

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-9.41808D 00 -4.39610D-01 -1.83644D 02 -3.23884D 00 -7.82699D-01 -6.58130D 01

SAMPLE CASE SUBSECTIN DROP TEST SIMULATION 16MASS/32MEMBER MODEL
6-1-79 KRASH.F79.DATA 27.5 FT./SEC

TIME = 0.002000 NUMBER OF INTEGRATION INTERVALS = 100

MASS DISPLACEMENTS,VELOCITIES,AND ACCELERATIONS

	X XDOT U UDOT XACCEL	Y YDOT V VDOT YACCEL	Z ZDOT W WDOT ZACCEL	PHI PHIDOT P PDOT XACFIL	THETA THETADOT Q QDOT YACFIL	PSI PSIDOT R RDOT ZACFIL
MASS 20	-4.20774D-01	5.99936D 00	-7.62875D 00	1.66549D-03	1.03352D-02	2.54438D-05
	-3.35680D 00	-8.47188D-02	2.64224D 02	2.13301D-01	1.24753D 00	2.24650D-02
	-6.08760D 00	3.55465D-01	2.64173D 02	2.13093D-01	1.24792D 00	2.03855D-02
	-4.65933D 03	-1.54305D 02	-2.39466D 04	-6.81374D 03	-1.41669D 04	-4.69319D 01
	-1.19942D 01	-5.45899D-01	-6.20180D 01	-2.78632D 00	-1.17651D-01	-6.11316D 01
MASS 21	-1.14203D 01	5.99861D 00	-7.51921D 00	1.72817D-03	9.46388D-03	6.77062D-06
	-3.10087D 00	-1.23920D 00	2.68890D 02	-6.41095D-01	-5.75047D-01	-1.99658D-02
	-5.64533D 00	-7.74524D-01	2.68853D 02	-6.40895D-01	-5.75302D-01	-1.89707D-02
	-3.66601D 03	-4.63449D 02	-9.76928D 04	-1.29210D 03	7.94435D 03	2.62751D 01
	-9.89801D 00	-7.53972D-01	-2.53097D 02	-2.38138D 00	-9.99485D-01	-4.02364D 01
MASS 22	-1.84199D 01	5.99975D 00	-7.45539D 00	2.10339D-03	8.95199D-03	-1.99339D-04
	-3.08974D 00	-1.78398D-01	2.61524D 02	-3.61268D-01	-1.43623D 00	-4.64279D-01
	-5.43036D 00	3.71030D-01	2.61486D 02	-3.57106D-01	-1.43762D 00	-4.61238D-01
	-4.45540D 03	-5.16101D 01	-7.29930D 03	-2.17339D 03	1.70656D 04	-1.73501D 02
	-1.25156D 01	1.14702D-01	-1.89307D 01	-2.24958D 00	-1.44671D-01	-3.92336D 01
MASS 23	2.75783D 01	1.99996D 01	-7.94145D 00	-1.73870D-05	1.30965D-02	-1.06090D-05
	-4.86516D-01	-1.34323D-01	3.32062D 02	-6.58999D-02	-6.08923D-02	-4.04172D-03
	-4.83520D 00	-1.40104D-01	3.32027D 02	-6.58418D-02	-6.08897D-02	-4.04176D-03
	-7.97249D 02	9.96861D 00	-4.75939D 03	1.33897D 02	-2.45885D 02	4.14704D 01
	-2.11779D 00	8.25159D-02	-1.23292D 01	-5.40812D-01	-8.16177D-02	2.04878D 00
MASS 24	2.25788D 01	1.99996D 01	-7.87596D 00	-7.81048D-08	1.31128D-02	-1.22571D-06
	-5.04416D-01	-1.22053D-01	3.32793D 02	1.00483D-05	2.35402D-02	5.49571D-03
	-4.86810D 00	-1.22090D-01	3.32758D 02	-6.19931D-05	2.35406D-02	5.49523D-03
	-9.10165D 02	1.21385D 02	4.07864D 03	6.30464D-01	9.86836D 00	2.23167D 01
	-2.33765D 00	3.14452D-01	1.05667D 01	-5.87153D-01	-4.59835D-02	3.07041D 00
MASS 25	1.15797D 01	1.99989D 01	-7.72915D 00	2.14147D-05	1.30923D-02	6.73776D-06
	-7.00665D-01	-1.74184D 00	3.33972D 02	1.58973D-01	-4.55555D-02	2.41391D-02
	-5.07296D 00	-1.73470D 00	3.33935D 02	1.58657D-01	-4.55552D-02	2.41380D-02
	-5.87779D 02	-1.78847D 03	-1.38017D 04	6.13889D 02	-1.69891D 02	7.10259D 01
	-1.56205D 00	-4.77091D 00	-3.57570D 01	-7.97202D-01	-1.87852D 00	3.10520D 00
MASS 26	-4.18936D-01	1.99995D 01	-7.58523D 00	2.50593D-04	1.29004D-02	2.33410D-05
	-7.00561D-01	-3.77271D-01	3.06661D 02	5.65740D-01	-5.04791D-01	5.53905D-02
	-4.65648D 00	-3.00433D-01	3.06626D 02	5.65025D-01	-5.04778D-01	5.55123D-02
	-1.43241D 03	-1.35132D 02	-3.29337D 04	8.05195D 02	-9.44652D 02	8.54514D 01
	-4.11183D 00	-8.02182D-01	-8.53399D 01	-5.19305D-01	-3.64345D-01	-2.58973D 01
MASS 27	-1.14184D 01	1.99970D 01	-7.47110D 00	8.29826D-04	1.27348D-02	6.14531D-05
	-1.69061D 00	-4.44087D 00	2.68915D 02	1.32034D 00	-6.10625D-01	8.26826D-02
	-5.11614D 00	-4.21787D 00	2.68945D 02	1.31979D 00	-6.10556D-01	8.31020D-02
	-1.37427D 03	-3.42251D 02	-3.99105D 04	1.00618D 03	-7.09121D 02	1.19610D 01
	-3.93479D 00	-1.80732D 00	-1.03418D 02	-1.08334D 00	-4.45876D 00	-6.12751D 01

SAMPLE CASE SUBSECTIN DROP TEST SIMULATION 16MASS/32MEMBER MODEL
6-1-79 KRASH.F79.DATA 27.5 FT./SEC

TIME = 0.002000 NUMBER OF INTEGRATION INTERVALS = 100

MASS DISPLACEMENTS,VELOCITIES,AND ACCELERATIONS

	X XDOT U UDOT XACCEL	Y YDOT V VDOT YACCEL	Z ZDOT W WDOT ZACCEL	PHI PHIDOT P PDOT XACFIL	THETA THETADOT Q QDOT YACFIL	PSI PSIDOT R RDOT ZACFIL
MASS 28	-1.84176D 01	1.99990D 01	-7.38270D 00	1.90031D-03	1.23620D-02	1.49645D-04
	-1.66620D 00	-7.66472D-01	2.62996D 02	2.34734D 00	-8.37988D-01	1.14619D-02
	-4.91727D 00	-2.66548D-01	2.62957D 02	2.34720D 00	-8.37966D-01	1.30535D-02
	-1.98324D 03	9.44235D 02	-7.65972D 04	1.42328D 03	-1.36718D 02	-4.64416D 02
	-5.70877D 00	8.47046D-01	-1.98451D 02	-1.09176D 00	-6.79607D-01	-6.83626D 01
MASS 29	-3.70405D 00	1.29999D 01	-2.93339D 01	-3.54827D-11	1.30999D-02	1.51515D-18
	-8.83005D-04	-1.44773D-05	3.30707D 02	-3.22822D-08	-6.27061D-08	1.57308D-15
	-4.33298D 00	-1.44777D-05	3.30679D 02	-3.22819D-08	-6.27063D-08	1.57291D-15
	-5.14309D 00	-1.13687D-01	2.65053D 02	3.13817D-05	-7.47598D-05	-3.23149D-12
	-1.33241D-02	-2.94497D-04	6.86665D-01	-8.63237D-03	-2.61105D-05	5.86675D-01
NODE 1	-3.70405D 00	1.29999D 01	-2.93339D 01			
	-8.83005D-04	-1.44777D-05	3.30707D 02			
	-4.33298D 00	-1.44777D-05	3.30679D 02			
	-1.33241D-02	-2.94497D-04	6.86665D-01	-1.31340D-02	-2.61105D-05	9.30288D-01
MASS 30	-3.90172D 00	1.29999D 01	-4.44224D 01	-4.36940D-11	1.30999D-02	3.86704D-18
	2.79105D-05	3.01385D-07	3.30774D 02	-3.97000D-08	-8.55304D-08	3.93057D-15
	-4.33295D 00	3.01382D-07	3.30746D 02	-3.96996D-08	-8.55307D-08	3.93013D-15
	-5.05715D 00	-3.20983D-04	3.84267D 02	3.88135D-05	-1.01942D-04	-8.40504D-12
	-1.31015D-02	-7.97546D-07	9.95509D-01	-8.59853D-03	2.46716D-07	6.60902D-01
MASS 31	-3.90172D 00	1.29999D 01	-4.44224D 01	-8.16226D-12	1.30999D-02	7.22057D-19
	-4.52303D-05	5.58190D-08	3.30769D 02	-7.40149D-09	-1.59867D-08	7.40829D-16
	-4.33295D 00	5.58185D-08	3.30740D 02	-7.40142D-09	-1.59868D-08	7.40747D-16
	-5.05554D 00	-6.06470D-05	3.84928D 02	7.29497D-06	-1.90628D-05	-1.58030D-12
	-1.30999D-02	-1.50775D-07	9.97224D-01	-8.59802D-03	4.55581D-08	6.56009D-01
MASS 32	-3.60106D 00	1.30068D 01	-2.18786D 01	2.19720D-03	1.06316D-02	7.27051D-05
	9.44574D 00	1.51339D 01	2.69721D 02	2.75550D 00	-2.17955D 00	1.04211D-01
	6.57883D 00	1.57260D 01	2.69772D 02	2.75440D 00	-2.17933D 00	1.08993D-01
	1.42792D 04	2.15792D 04	-1.60695D 04	3.24146D 02	3.06913D 03	3.43895D 02
	3.54653D 01	5.39814D 01	-4.14814D 01	1.09184D 01	1.66148D 01	-5.80126D 01
NODE 1	1.13984D 01	6.00791D 00	-2.20534D 01			
	1.03511D 01	1.67394D 01	2.83125D 02			
	7.34178D 00	1.73609D 01	2.83181D 02			
	4.16255D 01	6.72497D 01	-1.66610D 02	1.16434D 01	1.82428D 01	-5.12908D 01
NODE 2	-1.16003D 01	6.00624D 00	-2.18089D 01			
	9.81834D 00	1.43427D 01	2.32997D 02			
	7.34178D 00	1.48541D 01	2.33057D 02			
	4.19092D 01	4.71163D 01	1.62473D 01	1.17812D 01	1.58006D 01	-8.83781D 01
NODE 3	1.13977D 01	2.00079D 01	-2.20226D 01			
	9.23526D 00	1.66546D 01	3.21700D 02			

	5.81538D 00	1.73609D 01	3.21743D 02			
	2.89349D 01	6.69741D 01	-1.54986D 02	1.00047D 01	1.81723D 01	-1.56725D 01
NODE 4	-1.16010D 01	2.00062D 01	-2.17781D 01			
	8.70249D 00	1.42579D 01	2.71573D 02			
	5.81588D 00	1.48541D 01	2.71619D 02			
	2.92187D 01	4.68407D 01	2.79953D 01	1.01425D 01	1.57301D 01	-5.27597D 01
NODE 5	-3.60106D 00	1.30068D 01	-2.18786D 01			
	9.44573D 00	1.51339D 01	2.69721D 02			
	6.57883D 00	1.57260D 01	2.69772D 02			
	3.54653D 01	5.39814D 01	-4.14814D 01	1.09139D 01	1.66148D 01	-5.76690D 01

MASS IMPULSES(G-SEC)-BASED ON FILTERED ACCELS

	XIMPULSE	YIMPULSE	ZIMPULSE
MASS 1	-1.55593D-03	5.75553D-05	7.26879D-04
MASS 2	-1.51413D-03	6.93273D-05	-1.01684D-02
MASS 3	-1.56153D-03	5.61290D-04	-2.87819D-02
MASS 4	-1.56313D-03	9.16112D-05	-5.64270D-02
MASS 5	-1.69217D-03	1.36235D-03	-8.33046D-02
MASS 6	-1.49205D-03	1.81941D-04	-1.04259D-01
MASS 7	-3.21128D-04	1.95904D-04	1.51149D-03
MASS 8	-3.06105D-04	2.30407D-04	1.49883D-03
MASS 9	-4.62389D-04	1.00738D-03	4.48107D-03
MASS 10	-5.69983D-05	3.01850D-04	-1.21572D-02
MASS 11	-3.06040D-04	3.22758D-03	-4.37792D-02
MASS 12	-6.10886D-05	8.63626D-04	-4.60687D-02
MASS 13	-1.01864D-05	-1.12373D-08	7.46140D-04
NODE 1	-2.62280D-05	-1.12373D-08	1.97062D-03
MASS 14	-1.01579D-05	-3.57760D-10	7.80310D-04
MASS 15	-1.01575D-05	-6.65743D-11	7.75370D-04
MASS 16	6.01765D-03	-8.10250D-03	-4.76635D-02
NODE 1	6.49487D-03	-9.19311D-03	-2.35943D-02
NODE 2	6.55910D-03	-7.54197D-03	-8.42611D-02
NODE 3	5.42455D-03	-9.16555D-03	9.84631D-03
NODE 4	5.48879D-03	-7.51441D-03	-5.08200D-02
NODE 5	6.00161D-03	-8.10250D-03	-4.64391D-02
MASS 17	-1.55593D-03	-5.75553D-05	7.26879D-04
MASS 18	-1.51413D-03	-6.93273D-05	-1.01684D-02
MASS 19	-1.56153D-03	-5.61290D-04	-2.87819D-02
MASS 20	-1.56313D-03	-9.16112D-05	-5.64270D-02
MASS 21	-1.69217D-03	-1.36235D-03	-8.33046D-02
MASS 22	-1.49205D-03	-1.81941D-04	-1.04259D-01
MASS 23	-3.21128D-04	-1.95904D-04	1.51149D-03
MASS 24	-3.06105D-04	-2.30407D-04	1.49883D-03
MASS 25	-4.62389D-04	-1.00738D-03	4.48107D-03
MASS 26	-5.69983D-05	-3.01850D-04	-1.21572D-02
MASS 27	-3.06040D-04	-3.22758D-03	-4.37792D-02
MASS 28	-6.10886D-05	-8.63626D-04	-4.60687D-02
MASS 29	-1.01864D-05	1.12373D-08	7.46140D-04
NODE 1	-2.62280D-05	1.12373D-08	1.97062D-03
MASS 30	-1.01579D-05	3.57760D-10	7.80310D-04
MASS 31	-1.01575D-05	6.65743D-11	7.75370D-04
MASS 32	6.01765D-03	8.10250D-03	-4.76635D-02
NODE 1	6.49487D-03	9.19311D-03	-2.35943D-02
NODE 2	6.55910D-03	7.54197D-03	-8.42611D-02
NODE 3	5.42455D-03	9.16555D-03	9.84631D-03
NODE 4	5.48879D-03	7.51441D-03	-5.08200D-02

NODE 5 6.00161D-03 8.10250D-03 -4.64391D-02

BEAM FORCES

STRAIN FORCES

I	J	M	N	FX	FY	FZ	MX	MYI	MYJ	MZI	MZJ
1	2	0	0	1.5009D 01	-3.0043D-01	-6.2398D 02	1.7419D 02	-6.2504D 01	-3.0573D 03	1.5532D 00	-5.1059D-02
2	3	0	0	8.8593D 01	-1.8339D 00	6.0275D 02	2.6703D 02	4.0067D 03	2.6235D 03	1.0699D 01	9.4735D 00
3	4	0	0	8.0775D 01	2.8948D 00	-1.2534D 03	2.1273D 03	-1.2326D 04	-2.7141D 03	-1.6745D 01	-1.7994D 01
4	5	0	0	1.8568D 02	-6.0690D 00	2.4552D 02	1.0108D 02	-2.1072D 03	4.8079D 03	3.2393D 01	3.4367D 01
5	6	0	0	-3.4097D 01	1.0292D 01	-9.0914D 02	9.1203D 02	-6.3800D 03	1.6060D 01	-5.4555D 01	-1.7488D 01
7	8	0	0	6.7195D 00	-2.2099D 00	-1.4167D 01	5.2191D 00	-2.3924D 01	-4.6909D 01	6.3625D 00	4.6870D 00
8	9	0	0	2.8875D 01	-2.3977D 00	8.6803D 01	2.9125D 00	4.7080D 02	4.8402D 02	1.3509D 01	1.2866D 01
9	10	0	0	-2.6529D 01	2.3598D 00	-3.2042D 02	2.9167D 01	-1.9793D 03	-1.8656D 03	1.3546D 01	-1.4771D 01
10	11	0	0	4.0463D 01	-8.4145D 00	-8.3011D 02	8.0415D 01	-4.6195D 03	-4.5117D 03	4.7803D 01	4.4756D 01
11	12	0	0	-3.6344D 01	4.3107D 01	7.6076D 01	2.3440D 02	7.5565D 01	4.5688D 02	-1.4519D 02	-1.5655D 02
1	17	0	0	-2.6883D 00	-5.3309D-12	-2.9674D-11	-4.2985D-12	-2.0954D 02	2.0954D 02	1.3392D-02	-1.3392D-02
2	18	0	0	-6.5012D 00	1.7573D-14	5.4278D-11	4.1815D-11	-4.0980D 01	4.0980D 01	-2.8532D-02	2.8532D-02
3	19	0	0	-2.1858D 02	-1.1401D-12	3.1283D-10	1.0208D-11	5.2712D 02	-5.2712D 02	-9.0688D-02	9.0688D-02
4	20	0	0	-1.0178D 01	-1.2129D-12	1.3105D-10	8.5492D-11	5.4603D 03	-5.4603D 03	-2.6707D-02	2.6707D-02
5	21	0	0	-6.3795D 02	3.2265D-13	3.4081D-10	2.4573D-11	5.6744D 03	-5.6744D 03	1.1755D-01	-1.1755D-01
6	22	0	0	-6.3583D 01	1.5765D-13	1.7040D-10	5.5412D-11	6.8991D 03	-6.8991D 03	1.6801D 00	-1.6801D 00
1	7	0	0	-2.2735D 00	1.7695D-01	2.1587D 01	-4.0117D 02	1.7832D 02	1.2389D 02	-1.2643D 00	-1.2129D 00
2	8	0	0	-4.1371D 00	2.1510D-01	0.0	-3.6665D 02	0.0	0.0	-1.5224D 00	-1.4891D 00
3	9	0	0	-3.3716D 01	2.6517D-01	9.1484D 02	-3.2342D 02	6.3220D 03	6.4855D 03	-1.8784D 00	-1.8339D 00
4	10	0	0	3.4696D-01	3.8710D-01	6.9454D 02	-5.7434D 02	3.2523D 03	6.4712D 03	-2.6701D 00	-2.7493D 00
5	11	0	0	-2.0839D 02	4.1538D-01	1.0791D 03	-7.3099D 02	7.0252D 03	8.0822D 03	-2.7253D 00	-3.0898D 00
6	12	0	0	-4.7115D 01	3.2929D-01	8.0393D 02	-7.6203D 02	7.3529D 03	3.9021D 03	-1.2608D 00	-3.3492D 00
3	16	0	1	-2.1566D 02	-1.9316D 02	1.5475D 02	1.1554D 01	9.8473D 02	1.2284D 03	6.1450D 02	2.1481D 03
5	16	0	2	-1.1755D 03	-4.5604D 02	2.6683D 02	1.2198D 01	2.0558D 03	1.7559D 03	3.0696D 03	3.4424D 03
9	16	0	3	-7.2402D 02	-1.6170D 02	9.3763D 01	1.3167D 01	3.6326D 02	9.7080D 02	3.2017D 02	1.9914D 03
11	16	0	4	1.1172D 03	-2.8339D 02	1.1062D 02	2.7116D 00	5.3049D 02	1.0518D 03	1.4994D 03	2.5544D 03
13	14	0	0	1.6654D 00	-3.7817D-06	-7.8971D-06	6.3591D-15	-5.9675D-05	-5.9498D-05	2.8576D-05	2.8490D-05
13	15	0	0	5.9521D-02	-2.3958D-07	-4.9494D-07	3.1879D-16	-3.7228D-06	-3.7458D-06	1.7989D-06	1.8163D-06
5	13	0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
11	13	0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
13	16	0	0	-2.3144D 01	0.0	0.0	0.0	0.0	0.0	0.0	0.0
13	16	1	5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
17	18	0	0	1.5009D 01	3.0043D-01	-6.2398D 02	-1.7419D 02	-6.2504D 01	-3.0573D 03	-1.5532D 00	5.1059D-02
18	19	0	0	8.8593D 01	1.8339D 00	6.0275D 02	-2.6703D 02	4.0067D 03	2.6235D 03	-1.0699D 01	-9.4735D 00
19	20	0	0	8.0775D 01	-2.8948D 00	-1.2534D 03	-2.1273D 03	-1.2326D 04	-2.7141D 03	1.6745D 01	1.7994D 01
20	21	0	0	1.8560D 02	6.0690D 00	2.4552D 02	-1.0108D 02	-2.1072D 03	4.8079D 03	-3.2393D 01	-3.4367D 01
21	22	0	0	-3.4097D 01	-1.0292D 01	-9.0914D 02	-9.1203D 02	-6.3800D 03	1.6060D 01	5.4555D 01	1.7488D 01
23	24	0	0	6.7195D 00	2.2099D 00	-1.4167D 01	-5.2191D 00	-2.3924D 01	-4.6909D 01	-6.3625D 00	-4.6870D 00
24	25	0	0	2.8875D 01	2.3977D 00	8.6803D 01	-2.9125D 00	4.7080D 02	4.8402D 02	-1.3509D 01	-1.2866D 01
25	26	0	0	-2.6529D 01	-2.3598D 00	-3.2042D 02	-2.9167D 01	-1.9793D 03	-1.8656D 03	1.3546D 01	1.4771D 01
26	27	0	0	4.0463D 01	8.4145D 00	-8.3011D 02	-8.0415D 01	-4.6195D 03	-4.5117D 03	-4.7803D 01	-4.4756D 01
27	28	0	0	-3.6344D 01	-4.3107D 01	7.6076D 01	-2.3440D 02	7.5565D 01	4.5688D 02	1.4519D 02	1.5655D 02
17	23	0	0	-2.2735D 00	-1.7695D-01	2.1587D 01	4.0117D 02	1.7832D 02	1.2389D 02	1.2643D 00	1.2129D 00
18	24	0	0	-4.1371D 00	-2.1510D-01	0.0	3.6665D 02	0.0	0.0	1.5224D 00	1.4891D 00
19	25	0	0	-3.3716D 01	-2.6517D-01	9.1484D 02	3.2342D 02	6.3220D 03	6.4855D 03	1.8784D 00	1.8339D 00
20	26	0	0	3.4696D-01	-3.8710D-01	6.9454D 02	5.7434D 02	3.2523D 03	6.4712D 03	2.6701D 00	2.7493D 00
21	27	0	0	-2.0839D 02	-4.1538D-01	1.0791D 03	7.3099D 02	7.0252D 03	8.0822D 03	2.7253D 00	3.0898D 00
22	28	0	0	-4.7115D 01	-3.2929D-01	8.0393D 02	7.6203D 02	7.3529D 03	3.9021D 03	1.2608D 00	3.3492D 00
19	32	0	1	-2.1566D 02	1.9316D 02	1.5475D 02	-1.1554D 01	9.8473D 02	1.2284D 03	-6.1450D 02	-2.1481D 03
21	32	0	2	-1.1755D 03	4.5604D 02	2.6683D 02	-1.2198D 01	2.0558D 03	1.7559D 03	-3.0696D 03	-3.4424D 03
25	32	0	3	-7.2402D 02	1.6170D 02	9.3763D 01	-1.3167D 01	3.6326D 02	9.7080D 02	-3.2017D 02	-1.9914D 03
27	32	0	4	1.1172D 03	2.8339D 02	1.1062D 02	-2.7116D 00	5.3049D 02	1.0518D 03	-1.4994D 03	-2.5544D 03
29	30	0	0	1.6654D 00	3.7817D-06	-7.8971D-06	-6.3591D-15	-5.9675D-05	-5.9498D-05	-2.8576D-05	-2.8490D-05
29	31	0	0	5.9521D-02	2.3958D-07	-4.9494D-07	-3.1879D-16	-3.7228D-06	-3.7458D-06	-1.7989D-06	-1.8163D-06

21	29	0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
27	29	0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
29	32	0	0	-2.3144D 01	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
29	32	1	5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	

TOTAL FORCES (STRAIN+DAMPING)

I	J	M	N	FX	FY	FZ	MX	MYI	MYJ	MZI	MZJ
1	2	0	0	1.4845D 01	-2.2432D-01	-6.2223D 02	1.5802D 02	-4.9986D 01	-3.0611D 03	1.3850D 00	-2.6338D-01
2	3	0	0	8.9007D 01	-2.0210D 00	6.3642D 02	3.1183D 02	4.1768D 03	2.8237D 03	1.1906D 01	1.0334D 01
3	4	0	0	7.8101D 01	3.4544D 00	-1.2385D 03	2.0939D 03	-1.2019D 04	-2.8427D 03	-2.0287D 01	-2.1166D 01
4	5	0	0	1.8452D 02	-6.6109D 00	2.4902D 02	-5.6775D 01	-2.1547D 03	4.8945D 03	3.5184D 01	3.7537D 01
5	6	0	0	-3.4482D 01	9.8026D 00	-9.1100D 02	9.2500D 02	-6.4066D 03	2.9603D 01	-5.4238D 01	-1.4379D 01
7	8	0	0	6.8091D 00	-2.1816D 00	-4.9670D 00	8.6523D 00	1.0334D 00	-2.5873D 01	6.3273D 00	4.5814D 00
8	9	0	0	2.9679D 01	-3.3416D 00	9.0975D 01	1.2326D 01	4.9151D 02	5.0921D 02	1.8823D 01	1.7935D 01
9	10	0	0	-2.7864D 01	3.5048D 00	-3.9257D 02	5.5064D 01	-2.4287D 03	-2.2819D 03	-2.0183D 01	-2.1873D 01
10	11	0	0	4.2600D 01	-1.0577D 01	-9.2957D 02	1.2365D 02	-5.1699D 03	-5.0554D 03	5.9862D 01	5.6479D 01
11	12	0	0	-3.6658D 01	4.7190D 01	7.0537D 01	2.8851D 02	5.0644D 01	4.4302D 02	-1.5977D 02	-1.7055D 02
1	17	0	0	-2.8176D 00	1.4347D-11	-2.9515D-11	-4.7281D-12	-2.0035D 02	2.0035D 02	8.4121D-03	-8.4121D-03
2	18	0	0	-6.7501D 00	-1.2384D-11	6.3033D-11	5.8133D-11	-4.2465D 01	4.2465D 01	-6.7519D-02	6.7519D-02
3	19	0	0	-2.2794D 02	8.2938D-13	3.1294D-10	1.4753D-11	6.1543D 02	-6.1543D 02	-2.4835D-01	2.4835D-01
4	20	0	0	-1.0837D 01	-1.7655D-12	1.4253D-10	6.6467D-11	5.4737D 03	-5.4737D 03	-8.1365D-02	8.1365D-02
5	21	0	0	-6.4648D 02	-9.7638D-13	3.2987D-10	1.3244D-11	5.6387D 03	-5.6387D 03	1.4513D-01	-1.4513D-01
6	22	0	0	-6.4348D 01	-5.5295D-12	1.6098D-10	7.0215D-11	6.8265D 03	-6.8265D 03	2.3344D 00	-2.3344D 00
1	7	0	0	-2.4390D 00	2.9259D-01	3.6750D 01	-4.1903D 02	2.7995D 02	2.3453D 02	-2.0791D 00	-2.0171D 00
2	8	0	0	-4.3159D 00	4.6424D-01	0.0	-4.0890D 02	0.0	0.0	-3.2842D 00	-3.2150D 00
3	9	0	0	-3.8117D 01	7.2837D-01	1.0781D 03	-5.2794D 02	7.4396D 03	7.6534D 03	-5.1765D 00	-5.0204D 00
4	10	0	0	-2.4313D-01	7.0694D-01	7.0795D 02	-5.3367D 02	3.2523D 03	6.6589D 03	-4.8544D 00	-5.0412D 00
5	11	0	0	-2.1862D 02	5.7142D-01	1.0727D 03	-7.3040D 02	7.0244D 03	7.9933D 03	-3.7095D 00	-4.2901D 00
6	12	0	0	-4.8273D 01	2.3297D-01	8.0534D 02	-7.6723D 02	7.3725D 03	3.9021D 03	-2.2246D-01	-3.0392D 00
3	16	0	1	-2.6988D 02	-2.1000D 02	1.8033D 02	1.2937D 01	1.2055D 03	1.4092D 03	6.6424D 02	2.3403D 03
5	16	0	2	-1.0643D 03	-4.5584D 02	2.7032D 02	1.4607D 01	2.0570D 03	1.7945D 03	3.0020D 03	3.5070D 03
9	16	0	3	-6.6398D 02	-1.6838D 02	1.0159D 02	1.6312D 01	3.7324D 02	1.0790D 03	2.5512D 02	2.1519D 03
11	16	0	4	1.1063D 03	-3.0618D 02	1.2187D 02	3.6187D 00	5.7936D 02	1.1640D 03	1.6087D 03	2.7712D 03
13	14	0	0	-3.2094D-01	5.8109D-05	-1.4615D-04	1.6820D-13	-1.1045D-03	-1.1009D-03	-4.3781D-04	-4.3904D-04
13	15	0	0	-1.9603D-01	1.0985D-05	-2.7194D-05	4.4565D-14	-2.0449D-04	-2.0586D-04	-8.3248D-05	-8.2518D-05
5	13	0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
11	13	0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
13	16	0	0	-2.3144D 01	0.0	0.0	0.0	0.0	0.0	0.0	0.0
13	16	1	5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
17	18	0	0	1.4845D 01	2.2432D-01	-6.2223D 02	-1.5802D 02	-4.9986D 01	-3.0611D 03	-1.3850D 00	2.6338D-01
18	19	0	0	8.9007D 01	2.0218D 00	6.3642D 02	-3.1183D 02	4.1768D 03	2.8237D 03	-1.1906D 01	-1.0334D 01
19	20	0	0	7.8101D 01	-3.4544D 00	-1.2385D 03	-2.0939D 03	-1.2019D 04	-2.8427D 03	2.0287D 01	2.1166D 01
20	21	0	0	1.8452D 02	6.6109D 00	2.4902D 02	-5.6775D 01	-2.1547D 03	4.8945D 03	-3.5184D 01	-3.7537D 01
21	22	0	0	-3.4482D 01	-9.8026D 00	-9.1100D 02	-9.2500D 02	-6.4066D 03	2.9603D 01	5.4238D 01	1.4379D 01
23	24	0	0	6.8091D 00	2.1816D 00	-4.9670D 00	-8.6523D 00	1.0334D 00	-2.5873D 01	-6.3273D 00	-4.5814D 00
24	25	0	0	2.9679D 01	3.3416D 00	9.0975D 01	-1.2326D 01	4.9151D 02	5.0921D 02	-1.8823D 01	-1.7935D 01
25	26	0	0	-2.7864D 01	-3.5048D 00	-3.9257D 02	-5.5064D 01	-2.4287D 03	-2.2819D 03	2.0183D 01	2.1873D 01
26	27	0	0	4.2600D 01	1.0577D 01	-9.2957D 02	-1.2365D 02	-5.1699D 03	-5.0554D 03	-5.9862D 01	-5.6479D 01
27	28	0	0	-3.6658D 01	-4.7190D 01	7.0537D 01	-2.8851D 02	5.0644D 01	4.4302D 02	1.5977D 02	1.7055D 02
17	23	0	0	-2.4390D 00	-2.9259D-01	3.6750D 01	4.1903D 02	2.7995D 02	2.3453D 02	2.0791D 00	2.0171D 00
18	24	0	0	-4.3159D 00	-4.6424D-01	0.0	4.0890D 02	0.0	0.0	3.2842D 00	3.2150D 00
19	25	0	0	-3.8117D 01	-7.2837D-01	1.0781D 03	5.2794D 02	7.4396D 03	7.6534D 03	5.1765D 00	5.0204D 00
20	26	0	0	-2.4313D-01	-7.0694D-01	7.0795D 02	5.3367D 02	3.2523D 03	6.6589D 03	4.8544D 00	5.0412D 00
21	27	0	0	-2.1862D 02	-5.7142D-01	1.0727D 03	7.3040D 02	7.0244D 03	7.9933D 03	3.7095D 00	4.2901D 00
22	28	0	0	-4.8273D 01	-2.3297D-01	8.0534D 02	7.6723D 02	7.3725D 03	3.9021D 03	2.2246D-01	3.0392D 00
19	32	0	1	-2.6988D 02	2.1000D 02	1.8033D 02	-1.2937D 01	1.2055D 03	1.4092D 03	-6.6424D 02	-2.3403D 03
21	32	0	2	-1.0643D 03	4.5584D 02	2.7032D 02	-1.4607D 01	2.0570D 03	1.7945D 03	-3.0020D 03	-3.5070D 03
25	32	0	3	-6.6398D 02	1.6838D 02	1.0159D 02	-1.6312D 01	3.7324D 02	1.0790D 03	-2.5512D 02	-2.1519D 03
27	32	0	4	1.1063D 03	3.0618D 02	1.2187D 02	-3.6187D 00	5.7936D 02	1.1640D 03	-1.6087D 03	-2.7712D 03

29	30	0	0	-3.2094D-01	-5.8109D-05	-1.4615D-04	-1.6800D-13	-1.1045D-03	-1.1009D-03	4.3781D-04	4.3904D-04	
29	31	0	0	-1.9603D-01	-1.0985D-05	-2.7194D-05	-4.4565D-14	-2.0449D-04	-2.0586D-04	8.3248D-05	8.2518D-05	
21	29	0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
27	29	0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
29	32	0	0	-2.3144D 01	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
29	32	1	5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	

BEAM RELATIVE DEFLECTIONS AND ROTATIONS AND BEAM EULER ANGLES (INCHES AND DEGREES)

BEAM				DEFLECTIONS (J-I)			ROTATIONS (J-I)			ROTATIONS (J+I)		EULER ANGLES	
I	J	M	N	X	Y	Z	PHI	THETA	PSI	THETA	PSI	THETA	PSI
1	2	0	0	1.1609D-05	-4.9248D-06	-1.4814D-04	2.9404D-03	-9.7684D-03	-3.6161D-04	1.9635D-01	-5.4724D-05	-0.6	180.0
2	3	0	0	1.5975D-04	-3.2009D-04	1.5223D-03	9.9185D-03	-9.9264D-03	-6.0772D-04	1.7685D-01	-1.0327D-03	-0.7	180.0
3	4	0	0	1.4994D-04	6.5599D-04	-4.1100D-03	8.6181D-02	7.5249D-02	-6.7545D-04	2.4197D-01	-2.3989D-03	-0.6	-180.0
4	5	0	0	3.1595D-04	-1.0593D-03	6.2024D-04	3.7536D-03	4.9623D-02	9.7923D-04	3.6686D-01	-2.0322D-03	-0.6	180.0
5	6	0	0	-3.6921D-05	4.6295D-04	-5.9207D-04	2.1554D-02	2.9208D-02	1.1697D-02	4.4567D-01	1.0721D-02	-0.5	-180.0
7	8	0	0	2.4938D-05	-5.1384D-05	-4.1123D-05	9.7234D-04	-9.1746D-04	-5.3578D-04	-5.5365D-04	6.7842D-04	-0.8	180.0
8	9	0	0	2.3633D-04	-5.9363D-04	2.6830D-03	1.1937D-03	1.1605D-03	-4.5291D-04	-3.1060D-04	-3.1027D-04	-0.8	180.0
9	10	0	0	-2.3686D-04	7.5851D-04	-1.2858D-02	1.3041D-02	1.0903D-02	-9.3957D-04	1.1752D-02	-1.6993D-03	-0.7	-180.0
10	11	0	0	3.3117D-04	-2.0833D-03	-2.5658D-02	3.2960D-02	9.4699D-03	-2.1438D-03	3.2129D-02	-4.7583D-03	-0.6	180.0
11	12	0	0	-1.8929D-04	2.7503D-03	6.0584D-04	6.1136D-02	2.1304D-02	-5.0833D-03	6.2877D-02	-1.2099D-02	-0.7	-180.0
1	17	0	0	-1.0521D-05	-1.7195D-14	-2.1716D-16	-3.9340D-16	7.3216D-03	-2.0625D-04	2.0604D-15	1.9813D-13	-0.0	90.0
2	18	0	0	-2.5684D-05	5.6749D-17	3.9720D-16	3.8267D-15	1.4319D-03	4.3943D-04	7.9692D-15	5.3386D-14	0.0	90.0
3	19	0	0	-8.6353D-04	-3.6775D-15	2.2893D-15	9.3416D-16	-1.8419D-02	1.3967D-03	1.3390D-14	1.3901D-14	0.0	90.0
4	20	0	0	-4.0210D-05	-3.9122D-15	9.5906D-16	7.8238D-15	-1.9079D-01	4.1132D-04	2.8496D-15	2.0510D-14	-0.0	90.0
5	21	0	0	-2.5204D-03	1.0413D-15	2.4940D-15	2.2498D-15	-1.9827D-01	-1.8104D-03	2.5691D-15	2.7134D-15	0.0	90.0
6	22	0	0	-2.5120D-04	5.0877D-16	1.2470D-15	5.0710D-15	-2.4107D-01	-2.5975D-02	-7.1665D-15	-4.9261D-15	0.0	90.0
1	7	0	0	-1.3878D-05	9.4147D-04	6.0434D-04	-1.0288D-01	-2.6729D-03	4.8012D-04	4.6404D-03	7.0722D-04	-0.0	-90.0
2	8	0	0	-2.5254D-05	1.1445D-03	8.8227D-03	-9.4024D-02	-7.0766D-04	3.1123D-04	7.1660D-04	-1.6842D-04	-0.0	-90.0
3	9	0	0	-2.0591D-04	1.4109D-03	2.5611D-02	-8.2936D-02	8.0176D-03	4.1616D-04	-1.0408D-02	-1.1471D-03	-0.1	-90.0
4	10	0	0	2.1179D-06	2.0596D-03	2.8839D-02	-1.4728D-01	8.1147D-02	-7.3925D-04	-1.0965D-01	-1.5501D-03	-0.2	-90.0
5	11	0	0	-1.2720D-03	2.2100D-03	3.0210D-02	-1.8745D-01	5.1906D-02	-3.4006D-03	-1.4638D-01	-2.3548D-03	-0.2	-90.0
6	12	0	0	-2.8760D-04	1.7521D-03	4.4889D-02	-1.9541D-01	1.2122D-02	-1.9489D-02	-2.2901D-01	5.1557D-03	-0.3	-90.0
3	16	0	1	-1.6335D-03	-8.7187D-03	2.0953D-02	3.4600D-03	5.5535D-02	1.1637D-01	2.2156D-01	1.3921D-01	89.3	-177.3
5	16	0	2	-8.9031D-03	-2.0539D-02	3.6076D-02	3.6522D-03	-6.9160D-02	2.7581D-02	3.4695D-01	2.2730D-01	89.3	-177.6
9	16	0	3	-5.4838D-03	-7.2914D-03	1.2634D-02	3.9430D-03	1.3804D-01	1.2673D-01	1.3877D-01	1.2915D-01	89.3	-177.2
11	16	0	4	8.4615D-03	-1.2797D-02	1.4982D-02	8.1202D-04	1.1878D-01	8.0134D-02	1.5831D-01	1.7539D-01	89.3	-177.1
13	14	0	0	1.1967D-04	-1.3751D-08	-2.8715D-08	9.1634D-17	1.0111D-09	-4.6907D-10	6.5502D-09	-4.5229D-09	89.2	180.0
13	15	0	0	1.2430D-04	-1.4292D-08	-2.9526D-08	9.5702D-17	-2.0626D-09	1.5607D-09	3.4765D-09	-2.4933D-09	89.2	180.0
5	13	0	0	-7.7644D-02	-1.2005D-02	-6.4716D-03	-2.7997D-02	2.2080D-01	-6.0389D-02	-2.2080D-01	6.0389D-02	64.5	-42.2
11	13	0	0	-3.6028D-02	7.0391D-03	1.9217D-02	1.8405D-02	-1.6338D-02	4.5444D-02	1.6338D-02	-4.5444D-02	64.5	42.2
13	16	0	0	-4.3390D-02	-1.4631D-02	-1.4913D-02	-4.3018D-03	-1.4423D-01	1.2187D-01	-1.4423D-01	1.2187D-01	-89.2	-3.9
13	16	1	5	-4.3390D-02	-1.4631D-02	-1.4913D-02	-4.3018D-03	-1.4423D-01	1.2187D-01	-1.4423D-01	1.2187D-01	-89.2	-3.9
17	18	0	0	1.1609D-05	4.9248D-06	-1.4814D-04	-2.9404D-03	-9.7684D-03	3.6161D-04	1.9635D-01	5.4724D-05	-0.6	-180.0
18	19	0	0	1.5975D-04	3.2009D-04	1.5223D-03	-9.9185D-03	-9.9264D-03	6.0772D-04	1.7685D-01	1.0327D-03	-0.7	-180.0
19	20	0	0	1.4994D-04	-6.5599D-04	-4.1100D-03	-8.6181D-02	7.5249D-02	6.7545D-04	2.4197D-01	2.3989D-03	-0.6	180.0
20	21	0	0	3.1595D-04	1.0593D-03	6.2024D-04	-3.7536D-03	4.9623D-02	-9.7923D-04	3.6686D-01	2.0322D-03	-0.6	-180.0
21	22	0	0	-3.6921D-05	-4.6295D-04	-5.9207D-04	-2.1554D-02	2.9208D-02	-1.1697D-02	4.4567D-01	-1.0721D-02	-0.5	180.0
23	24	0	0	2.4993D-05	5.1384D-05	-4.1123D-05	-9.7234D-04	-9.1746D-04	5.3578D-04	-5.5365D-04	-6.7842D-04	-0.8	-180.0
24	25	0	0	2.3633D-04	5.9363D-04	2.6830D-03	-1.1937D-03	1.1605D-03	4.5291D-04	-3.1060D-04	3.1027D-04	-0.8	-180.0
25	26	0	0	-2.3686D-04	-7.5851D-04	-1.2858D-02	-1.3041D-02	1.0903D-02	9.3957D-04	1.1752D-02	1.6993D-03	-0.7	180.0
26	27	0	0	3.3117D-04	2.0833D-03	-2.5658D-02	-3.2960D-02	9.4699D-03	2.1438D-03	3.2129D-02	4.7583D-03	-0.6	-180.0
27	28	0	0	-1.8929D-04	-2.7503D-03	6.0584D-04	-6.1136D-02	2.1304D-02	5.0833D-03	6.2877D-02	1.2099D-02	-0.7	180.0
17	23	0	0	-1.3878D-05	-9.4147D-04	6.0434D-04	1.0288D-01	-2.6729D-03	-4.8012D-04	4.6404D-03	-7.0722D-04	-0.0	90.0
18	24	0	0	-2.5254D-05	-1.1445D-03	8.8227D-03	9.4024D-02	-7.0766D-04	-3.1123D-04	7.1660D-04	1.6842D-04	-0.0	90.0
19	25	0	0	-2.0591D-04	-1.4109D-03	2.5611D-02	8.2936D-02	8.0176D-03	-4.1616D-04	-1.0408D-02	1.1471D-03	-0.1	90.0
20	26	0	0	2.1179D-06	-2.0596D-03	2.8839D-02	1.4728D-01	8.1147D-02	7.3925D-04	-1.0965D-01	1.5501D-03	-0.2	90.0
21	27	0	0	-1.2720D-03	-2.2100D-03	3.0210D-02	1.8745D-01	5.1906D-02	3.4006D-03	-1.4638D-01	2.3548D-03	-0.2	90.0

22	28	0	0	-2.8760D-04	-1.7521D-03	4.4689D-02	1.9541D-01	1.2102D-02	1.9489D-02	-2.2901D-01	-5.1557D-03	-0.3	90.0
19	32	0	1	-1.6335D-03	8.7187D-03	2.0953D-02	-3.4600D-03	5.5535D-02	-1.1637D-01	2.2158D-01	-1.3921D-01	89.3	177.3
21	32	0	2	-8.9031D-03	2.0539D-02	3.6076D-02	-3.6522D-03	-6.9160D-02	-2.7561D-02	3.4695D-01	-2.2730D-01	89.3	177.6
25	32	0	3	-5.4838D-03	7.2914D-03	1.2634D-02	-3.9430D-03	1.3004D-01	-1.2673D-01	1.3977D-01	-1.2915D-01	89.3	177.2
27	32	0	4	8.4615D-03	1.2797D-02	1.4982D-02	-8.1205D-04	1.1870D-01	-8.0134D-02	1.5831D-01	-1.7539D-01	89.3	177.1
29	30	0	0	1.1967D-04	1.3751D-06	-2.8715D-03	-9.1634D-17	1.0111D-09	4.6807D-10	6.5502D-09	4.5009D-09	89.2	-180.0
29	31	0	0	1.2480D-04	1.4290D-06	-2.9526D-03	-9.5700D-17	-2.0626D-09	-1.5807D-09	3.4765D-09	2.4930D-09	89.2	-180.0
21	29	0	0	-7.7644D-02	1.2005D-02	-6.4716D-03	2.7897D-02	2.2032D-01	6.0389D-02	-2.2032D-01	-6.0389D-02	64.5	42.2
27	29	0	0	-3.6028D-02	-7.0391D-03	1.9217D-02	-1.8425D-02	-1.6333D-02	-4.5444D-02	1.6333D-02	4.5444D-02	64.5	-42.2
29	32	0	0	-4.3390D-02	1.4631D-02	-1.4913D-02	4.3018D-03	-1.4423D-01	-1.2187D-01	-1.4423D-01	-1.2187D-01	-89.2	3.9
29	32	1	5	-4.3390D-02	1.4631D-02	-1.4913D-02	4.3018D-03	-1.4423D-01	-1.2187D-01	-1.4423D-01	-1.2187D-01	-89.2	3.9

EXTERNAL SPRINGS

MASS I	SPRING K	SPRING M	SPRING COMPRESSION	GROUND DEFLECTION	SPRING COMPRESSION LOAD	GROUND CONTACT POINT LOADS IN GROUND OR SLOPE AXES X(+ AFT OR DOWN SLOPE)	Y(+ LEFT)	Z(+ UP OR NORMAL TO SLOPE)	GROUND CONTACT POINT LOADS IN MASS AXES X (+ FORWARD)	Y (+ RIGHT)	Z (+ DOWN)
2	3	0	1.14536D-01	0.0	2.29000D 03	0.0	0.0	2.28985D 03	2.62466D 01	-2.88756D-02	-2.28970D 03
3	3	0	2.43033D-01	0.0	2.65000D 03	0.0	0.0	2.64982D 03	3.08294D 01	4.31814D-01	-2.64964D 03
4	3	0	3.70836D-01	0.0	2.65000D 03	0.0	0.0	2.64985D 03	2.73888D 01	4.41424D 00	-2.64971D 03
5	3	0	4.80444D-01	0.0	2.41000D 03	0.0	0.0	2.40989D 03	2.28053D 01	4.16471D 00	-2.40978D 03
6	3	0	5.44306D-01	0.0	1.76000D 03	0.0	0.0	1.75993D 03	1.57526D 01	3.70192D 00	-1.75985D 03
8	3	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
9	3	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
10	3	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
11	3	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
12	3	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
18	3	0	1.14536D-01	0.0	2.29000D 03	0.0	0.0	2.28985D 03	2.62466D 01	2.88756D-02	-2.28970D 03
19	3	0	2.43033D-01	0.0	2.65000D 03	0.0	0.0	2.64982D 03	3.08294D 01	-4.31814D-01	-2.64964D 03
20	3	0	3.70836D-01	0.0	2.65000D 03	0.0	0.0	2.64985D 03	2.73888D 01	-4.41424D 00	-2.64971D 03
21	3	0	4.80444D-01	0.0	2.41000D 03	0.0	0.0	2.40989D 03	2.28053D 01	-4.16471D 00	-2.40978D 03
22	3	0	5.44306D-01	0.0	1.76000D 03	0.0	0.0	1.75993D 03	1.57526D 01	-3.70192D 00	-1.75985D 03
24	3	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
25	3	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
26	3	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
27	3	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
28	3	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

DRI RESULTS: MASS NO. AND DRI VALUE

MASS	DRI
15	-8.17468D-04
31	-8.17468D-04

VEHICLE C.G. TRANSLATIONAL VELOCITIES, GROUND AXES, BASED ON SYSTEM LINEAR MOMENTUM

XDOT (+FWD)	YDOT (+RIGHT)	ZDOT (+DOWN)
-4.71167D-04	2.46703D-16	3.17143D 02

ENERGY DISTRIBUTION

TOTAL	KINETIC	POTENTIAL	STRAIN	DAMPING	CRUSHING	FRICTION

ENERGY	ENERGY	ENERGY	ENERGY	ENERGY	ENERGY	ENERGY
9.06241D 04	7.01393D 04	1.32810D 04	2.92191D 02	4.42938D 01	6.86727D 03	0.0
PERCENT OF TOTAL ENERGY	77.396	14.655	0.322	0.049	7.578	0.0

MASS	KINETIC ENERGY	PCT	POTENTIAL ENERGY	PCT	INTERNAL BEAM IJ	I	J	M	N	STRAIN ENERGY	PCT	DAMPING ENERGY	PCT	EXTERNAL SPRING I K M	CRUSHING ENERGY	PCT	FRICTION ENERGY	PCT
1	1.940D 02	0.3	1.247D 01	0.1	1	1	2	0	0	1.876D-01	0.1	4.373D-03	0.0	2 3 0	1.513D 02	2.2	0.0	0.0
2	5.670D 02	0.8	3.966D 01	0.3	2	2	3	0	0	5.914D-01	0.2	9.456D-02	0.2	3 3 0	5.154D 02	7.5	0.0	0.0
3	1.665D 03	2.4	1.335D 02	1.0	3	3	4	0	0	8.129D 00	2.8	2.324D 00	5.2	4 3 0	8.539D 02	12.4	0.0	0.0
4	6.524D 02	0.9	5.500D 01	0.4	4	4	5	0	0	2.021D 00	0.7	8.621D-01	1.9	5 3 0	1.041D 03	15.2	0.0	0.0
5	5.284D 02	0.8	4.241D 01	0.3	5	5	6	0	0	1.481D 00	0.5	2.035D-01	0.5	6 3 0	8.724D 02	12.7	0.0	0.0
6	1.950D 02	0.3	1.640D 01	0.1	6	7	8	0	0	6.617D-04	0.0	6.488D-04	0.0	8 3 0	0.0	0.0	0.0	0.0
7	4.471D 02	0.6	2.486D 01	0.2	7	8	9	0	0	1.220D-01	0.0	2.596D-02	0.1	9 3 0	0.0	0.0	0.0	0.0
8	1.439D 03	2.1	7.899D 01	0.6	8	9	10	0	0	2.099D 00	0.7	6.470D-01	1.5	10 3 0	0.0	0.0	0.0	0.0
9	3.503D 03	5.0	1.887D 02	1.4	9	10	11	0	0	1.079D 01	3.7	1.921D 00	4.3	11 3 0	0.0	0.0	0.0	0.0
10	1.759D 03	2.5	1.094D 02	0.8	10	11	12	0	0	2.714D-01	0.1	2.726D-01	0.6	12 3 0	0.0	0.0	0.0	0.0
11	1.065D 03	1.5	8.429D 01	0.6	11	1	17	0	0	1.396D-02	0.0	1.004D-03	0.0	18 3 0	1.513D 02	2.2	0.0	0.0
12	4.012D 02	0.6	3.241D 01	0.2	12	2	18	0	0	6.169D-04	0.0	7.056D-05	0.0	19 3 0	5.154D 02	7.5	0.0	0.0
13	1.032D 04	14.7	2.137D 03	16.1	13	3	19	0	0	1.826D-01	0.1	2.417D-02	0.1	20 3 0	8.539D 02	12.4	0.0	0.0
14	1.033D 04	14.7	3.237D 03	24.4	14	4	20	0	0	9.189D 00	3.1	3.720D-01	0.8	21 3 0	1.041D 03	15.2	0.0	0.0
15	0.0	0.0	0.0	0.0	15	5	21	0	0	1.074D 01	3.7	3.920D-01	0.9	22 3 0	8.724D 02	12.7	0.0	0.0
16	1.979D 03	2.8	4.485D 02	3.4	16	6	22	0	0	1.465D 01	5.0	2.634D-01	0.6	24 3 0	0.0	0.0	0.0	0.0
17	1.940D 02	0.3	1.247D 01	0.1	17	1	7	0	0	3.804D-01	0.1	6.276D-02	0.1	25 3 0	0.0	0.0	0.0	0.0
18	5.670D 02	0.8	3.966D 01	0.3	18	2	8	0	0	3.068D-01	0.1	8.051D-02	0.2	26 3 0	0.0	0.0	0.0	0.0
19	1.665D 03	2.4	1.335D 02	1.0	19	3	9	0	0	1.216D 01	4.2	3.394D 00	7.7	27 3 0	0.0	0.0	0.0	0.0
20	6.524D 02	0.9	5.500D 01	0.4	20	4	10	0	0	1.419D 01	4.9	1.131D 00	2.6	28 3 0	0.0	0.0	0.0	0.0
21	5.284D 02	0.8	4.241D 01	0.3	21	5	11	0	0	1.804D 01	6.2	1.413D 00	3.2					
22	1.950D 02	0.3	1.640D 01	0.1	22	6	12	0	0	2.542D 01	8.7	7.901D-01	1.8					
23	4.471D 02	0.6	2.486D 01	0.2	23	3	16	0	1	3.574D 00	1.2	1.096D 00	2.9					
24	1.439D 03	2.1	7.899D 01	0.6	24	5	16	0	2	1.584D 01	5.4	5.245D 00	11.8					
25	3.528D 03	5.0	1.887D 02	1.4	25	9	16	0	3	4.519D 00	1.5	9.287D-01	2.1					
26	1.759D 03	2.5	1.094D 02	0.8	26	11	16	0	4	8.079D 00	2.8	9.237D-01	2.1					
27	1.065D 03	1.5	8.429D 01	0.6	27	13	14	0	0	1.002D-04	0.0	-3.459D-05	-0.0					
28	4.012D 02	0.6	3.241D 01	0.2	28	13	15	0	0	0.0	0.0	0.0	0.0					
29	1.032D 04	14.7	2.137D 03	16.1	29	5	13	0	0	1.052D-08	0.0	0.0	0.0					
30	1.033D 04	14.7	3.237D 03	24.4	30	11	13	0	0	5.373D-08	0.0	0.0	0.0					
31	0.0	0.0	0.0	0.0	31	13	16	0	0	5.070D-01	0.2	0.0	0.0					
32	1.979D 03	2.8	4.485D 02	3.4	32	13	16	1	5	0.0	0.0	0.0	0.0					
					33	17	18	0	0	1.876D-01	0.1	4.373D-03	0.0					
					34	18	19	0	0	5.914D-01	0.2	9.456D-02	0.2					
					35	19	20	0	0	8.129D 00	2.8	2.324D 00	5.2					
					36	20	21	0	0	2.021D 00	0.7	8.621D-01	1.9					
					37	21	22	0	0	1.481D 00	0.5	2.035D-01	0.5					
					38	23	24	0	0	6.617D-04	0.0	6.488D-04	0.0					
					39	24	25	0	0	1.220D-01	0.0	2.596D-02	0.1					
					40	25	26	0	0	2.099D 00	0.7	6.470D-01	1.5					
					41	26	27	0	0	1.079D 01	3.7	1.921D 00	4.3					
					42	27	28	0	0	2.714D-01	0.1	2.726D-01	0.6					
					43	17	23	0	0	3.804D-01	0.1	6.276D-02	0.1					
					44	18	24	0	0	3.068D-01	0.1	8.051D-02	0.2					
					45	19	25	0	0	1.216D 01	4.2	3.394D 00	7.7					
					46	20	26	0	0	1.419D 01	4.9	1.131D 00	2.6					
					47	21	27	0	0	1.804D 01	6.2	1.413D 00	3.2					

48	22	28	0	0	2.542D 01	8.7	7.901D-01	1.8
49	19	32	0	1	3.574D 00	1.2	1.296D 00	2.9
50	21	32	0	2	1.583D 01	5.4	5.045D 00	11.8
51	25	32	0	3	4.519D 00	1.5	9.287D-01	2.1
52	27	32	0	4	8.079D 00	2.8	9.237D-01	2.1
53	29	30	0	0	1.002D-04	0.0	-3.439D-05	-0.0
54	29	31	0	0	0.0	0.0	0.0	0.0
55	21	29	0	0	1.052D-03	0.0	0.0	0.0
56	27	29	0	0	5.373D-05	0.0	0.0	0.0
57	29	32	0	0	5.070D-01	0.2	0.0	0.0
58	29	32	1	5	0.0	0.0	0.0	0.0

DEVIATION OF TOTAL ENERGY OF EACH MASS FROM 100 PERCENT

MASS	DEVIATION(PERCENT)
1	0.432690
2	0.195729
3	0.192711
4	0.097636
5	0.269269
6	0.011402
7	0.013419
8	-0.012181
9	0.040589
10	0.092927
11	0.108386
12	0.218868
13	-0.001528
14	-0.001745
15	0.0
16	0.066041
17	0.432690
18	0.195729
19	0.192711
20	0.097636
21	0.269269
22	0.011402
23	0.013419
24	-0.012181
25	0.040589
26	0.092927
27	0.108386
28	0.218868
29	-0.001528
30	-0.001745
31	0.0
32	0.066041

ELEMENT STRESSES

BEAM					RATIO OF CURRENT STRESS / FAILURE STRESS								RATIO OF CURRENT		
					MAXIMUM SHEAR STRESS THEORY				THEORY OF CONSTANT ENERGY OF DISTORTION				AXIAL/FAILURE		BUCK. /
IJ	I	J	M	N	TOP	BOTTOM	LEFT	RIGHT	TOP	BOTTOM	LEFT	RIGHT	COMPR. STRESS	TENSILE STRESS	CR.BUCK. LOAD

1	1	2	0	0	9.670D-02	9.560D-02	6.891D-02	6.891D-02	9.052D-02	1.079D-01	5.587D-02	5.587D-02		5.130D-04		
2	2	3	0	0	1.345D-01	1.279D-01	7.048D-02	7.076D-02	1.259D-01	1.443D-01	5.714D-02	5.744D-02		3.076D-03		
3	3	4	0	0	3.746D-01	3.804D-01	1.372D-01	1.374D-01	4.227D-01	3.561D-01	1.340D-01	1.115D-01		2.699D-03		
4	4	5	0	0	1.469D-01	1.605D-01	3.200D-02	2.771D-02	1.658D-01	1.503D-01	2.703D-02	2.711D-02		6.377D-03		
5	5	6	0	0	2.025D-01	2.000D-01	1.016D-01	1.020D-01	2.285D-01	1.872D-01	8.260D-02	9.999D-02	1.436D-03		6.735D-05	
6	7	8	0	0	4.211D-03	2.002D-03	3.416D-03	5.289D-03	3.905D-03	2.161D-03	3.554D-03	4.794D-03		1.132D-03		
7	8	9	0	0	5.064D-02	6.117D-02	4.869D-02	5.082D-02	5.712D-02	5.726D-02	4.765D-02	4.182D-02		4.933D-03		
8	9	10	0	0	2.714D-01	2.615D-01	2.098D-01	2.092D-01	3.062D-01	2.449D-01	2.052D-01	1.696D-01	5.582D-03		2.269D-04	
9	10	11	0	0	5.593D-01	5.749D-01	4.958D-01	4.967D-01	6.315D-01	5.382D-01	4.846D-01	4.031D-01		7.081D-03		
10	11	12	0	0	6.058D-02	4.904D-02	1.044D-01	9.233D-02	6.686D-02	4.437D-02	1.158D-01	8.463D-02	7.343D-03		1.016D-04	
11	1	17	0	0	9.770D-03	9.327D-03	2.467D-04	1.980D-04	1.102D-02	8.732D-03	2.784D-04	2.211D-04	2.497D-04		2.302D-04	
12	2	18	0	0	2.554D-03	1.494D-03	3.268D-04	7.339D-04	2.882D-03	1.398D-03	3.687D-04	8.280D-04	5.983D-04		5.515D-04	
13	3	19	0	0	1.142D-02	4.724D-02	1.716D-02	1.866D-02	1.069D-02	5.330D-02	1.936D-02	2.105D-02	2.020D-02		1.862D-02	
14	4	20	0	0	2.600D-01	2.617D-01	6.061D-04	1.097D-03	2.434D-01	2.953D-01	6.838D-04	1.237D-03	9.606D-04		8.854D-04	
15	5	21	0	0	2.180D-01	3.195D-01	5.123D-02	5.035D-02	2.040D-01	3.605D-01	5.780D-02	5.681D-02	5.730D-02		5.282D-02	
16	6	22	0	0	3.232D-01	3.333D-01	1.209D-02	1.983D-03	3.025D-01	3.760D-01	1.364D-02	1.856D-03	5.704D-03		5.258D-03	
17	1	7	0	0	2.281D-02	2.332D-02	1.299D-02	1.324D-02	2.136D-02	2.631D-02	1.091D-02	1.346D-02	2.863D-04		2.818D-04	
18	2	8	0	0	4.719D-04	4.719D-04	9.581D-03	1.048D-02	5.261D-04	5.261D-04	8.969D-03	1.182D-02	5.066D-04		4.986D-04	
19	3	9	0	0	6.345D-01	6.266D-01	3.367D-01	3.371D-01	7.159D-01	5.866D-01	2.731D-01	3.296D-01	4.474D-03		1.761D-02	
20	4	10	0	0	5.486D-01	5.486D-01	2.215D-01	2.215D-01	6.190D-01	5.136D-01	2.166D-01	1.797D-01	2.854D-05		2.809D-05	
21	5	11	0	0	6.813D-01	6.358D-01	3.367D-01	3.350D-01	7.687D-01	5.952D-01	3.296D-01	3.273D-01	2.566D-02		1.010D-01	
22	6	12	0	0	6.024D-01	6.124D-01	2.518D-01	2.514D-01	5.639D-01	6.909D-01	2.461D-01	2.038D-01	5.667D-03		5.576D-03	
23	3	16	0	1	1.129D-01	1.021D-01	9.205D-02	9.877D-02	2.160D-01	1.903D-01	1.733D-01	1.892D-01	8.901D-02		7.737D-04	
24	5	16	0	2	2.580D-01	2.829D-01	1.994D-01	2.177D-01	4.993D-01	5.568D-01	4.020D-01	4.426D-01	3.523D-01		3.063D-03	
25	9	16	0	3	1.385D-01	1.217D-01	1.075D-01	1.202D-01	2.823D-01	2.440D-01	2.227D-01	2.505D-01	2.198D-01		1.911D-03	
26	11	16	0	4	2.154D-01	2.329D-01	1.901D-01	1.729D-01	4.316D-01	4.710D-01	3.995D-01	3.625D-01		3.662D-01		
27	13	14	0	0	3.647D-04	3.647D-04	3.647D-04	3.647D-04	4.115D-04	4.115D-04	4.115D-04	4.115D-04	4.115D-04		2.351D-05	
28	13	15	0	0	8.012D-04	8.012D-04	8.012D-04	8.012D-04	1.702D-03	1.702D-03	1.702D-03	1.702D-03	1.702D-03		2.356D-04	
29	5	13	0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	
30	11	13	0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	
31	13	16	0	0	1.381D 00	1.381D 00	1.381D 00	1.381D 00	1.558D 00	1.558D 00	1.558D 00	1.558D 00	0.0		0.0	
32	13	16	1	5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	
33	17	18	0	0	9.670D-02	9.560D-02	6.891D-02	6.891D-02	9.052D-02	1.079D-01	5.587D-02	5.587D-02		5.130D-04		
34	18	19	0	0	1.345D-01	1.279D-01	7.076D-02	7.048D-02	1.259D-01	1.443D-01	5.744D-02	5.714D-02		3.076D-03		
35	19	20	0	0	3.746D-01	3.804D-01	1.374D-01	1.372D-01	4.227D-01	3.561D-01	1.115D-01	1.340D-01		2.699D-03		
36	20	21	0	0	1.469D-01	1.605D-01	2.771D-02	3.200D-02	1.658D-01	1.503D-01	2.711D-02	2.703D-02		6.377D-03		
37	21	22	0	0	2.025D-01	2.000D-01	1.020D-01	1.016D-01	2.285D-01	1.872D-01	9.999D-02	8.260D-02	1.436D-03		6.735D-05	
38	23	24	0	0	4.211D-03	2.002D-03	5.289D-03	3.416D-03	3.905D-03	2.161D-03	4.794D-03	3.554D-03		1.132D-03		
39	24	25	0	0	5.064D-02	6.117D-02	5.082D-02	4.869D-02	5.712D-02	5.726D-02	4.182D-02	4.765D-02		4.933D-03		
40	25	26	0	0	2.714D-01	2.615D-01	2.092D-01	2.098D-01	3.062D-01	2.449D-01	1.696D-01	2.052D-01	5.582D-03		2.269D-04	
41	26	27	0	0	5.593D-01	5.749D-01	4.967D-01	4.958D-01	6.315D-01	5.382D-01	4.031D-01	4.846D-01		7.081D-03		
42	27	28	0	0	6.058D-02	4.904D-02	9.233D-02	1.044D-01	6.686D-02	4.437D-02	8.463D-02	1.158D-01	7.343D-03		1.016D-04	
43	17	23	0	0	2.281D-02	2.332D-02	1.324D-02	1.299D-02	2.136D-02	2.631D-02	1.346D-02	1.091D-02	2.863D-04		2.818D-04	
44	18	24	0	0	4.719D-04	4.719D-04	1.048D-02	9.581D-03	5.261D-04	5.261D-04	1.182D-02	8.969D-03	5.066D-04		4.986D-04	
45	19	25	0	0	6.345D-01	6.266D-01	3.371D-01	3.367D-01	7.159D-01	5.866D-01	3.296D-01	2.731D-01	4.474D-03		1.761D-02	
46	20	26	0	0	5.486D-01	5.486D-01	2.215D-01	2.215D-01	6.190D-01	5.136D-01	1.797D-01	2.166D-01	2.854D-05		2.809D-05	
47	21	27	0	0	6.813D-01	6.358D-01	3.350D-01	3.367D-01	7.687D-01	5.952D-01	3.273D-01	3.296D-01	2.566D-02		1.010D-01	
48	22	28	0	0	6.024D-01	6.124D-01	2.514D-01	2.518D-01	5.639D-01	6.909D-01	2.038D-01	2.461D-01	5.667D-03		5.576D-03	
49	19	32	0	1	1.129D-01	1.021D-01	9.877D-02	9.205D-02	2.160D-01	1.903D-01	1.892D-01	1.733D-01	8.901D-02		7.737D-04	
50	21	32	0	2	2.580D-01	2.829D-01	2.177D-01	1.994D-01	4.993D-01	5.568D-01	4.426D-01	4.020D-01	3.523D-01		3.063D-03	
51	25	32	0	3	1.385D-01	1.217D-01	1.202D-01	1.075D-01	2.823D-01	2.440D-01	2.505D-01	2.227D-01	2.198D-01		1.911D-03	
52	27	32	0	4	2.154D-01	2.329D-01	1.729D-01	1.901D-01	4.316D-01	4.710D-01	3.625D-01	3.995D-01		3.662D-01		
53	29	30	0	0	3.647D-04	3.647D-04	3.647D-04	3.647D-04	4.115D-04	4.115D-04	4.115D-04	4.115D-04	4.115D-04		2.351D-05	
54	29	31	0	0	8.012D-04	8.012D-04	8.012D-04	8.012D-04	1.702D-03	1.702D-03	1.702D-03	1.702D-03	1.702D-03		2.356D-04	
55	21	29	0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	
56	27	29	0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	
57	29	32	0	0	1.381D 00	1.381D 00	1.381D 00	1.381D 00	1.558D 00	1.558D 00	1.558D 00	1.558D 00	0.0		0.0	
58	29	32	1	5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	

SUMMARY OF EXTERNAL SPRING LOADING AND UNLOADING

TYPES;1=INITIAL LOADING 2=MAX.LOADING 3=UNLOAD TO ZERO FORCE 4=INITIATION OF RELOAD

NOTE:SPRING RELOADS AT ZERO FORCE(SEQ.1,2,3,4) OR AT FINITE FORCE VALUE(SEQ.1,2,4)

NOTE:INITIAL DEFLECTION IS FIRST IMPACT IF NYPE=1, OTHERWISE IT IS POINT AT WHICH RELOADING OCCUR FOR NTYPE=4

TIME(SEC)	MASS NO.	NODE NO.	DIRECTION L=1,2,3	TYPE NO.	INITIAL DEFLECTION	MAXIMUM FORCE &/OR DEFLECT		UNLOADED DEFLECT	UNLOADED & FORCE
0.000010	6	0	3	1	0.0023	0.0	0.0	0.0	0.0
0.000010	22	0	3	1	0.0023	0.0	0.0	0.0	0.0
0.000290	5	0	3	1	0.0025	0.0	0.0	0.0	0.0
0.000290	21	0	3	1	0.0025	0.0	0.0	0.0	0.0
0.000720	4	0	3	1	0.0010	0.0	0.0	0.0	0.0
0.000720	20	0	3	1	0.0010	0.0	0.0	0.0	0.0
0.001190	3	0	3	1	0.0003	0.0	0.0	0.0	0.0
0.001190	19	0	3	1	0.0003	0.0	0.0	0.0	0.0
0.001640	2	0	3	1	0.0029	0.0	0.0	0.0	0.0
0.001640	18	0	3	1	0.0029	0.0	0.0	0.0	0.0

SUMMARY OF PLASTIC HINGE FORMATIONS

TIME	BEAM IJ	I	J	M	N	BEAM END MASS NO.	DIRECTION
0.000660	22	6	12	0	0	12	5
0.000660	48	22	28	0	0	28	5
0.001310	20	4	10	0	0	4	5
0.001310	46	20	26	0	0	20	5
0.000010	19	3	9	0	0	9	5
0.000010	45	19	25	0	0	25	5

SUMMARY OF ENERGY DISTRIBUTION

TIME	PERCENT MAXIMUM ENERGY DEVIATION	PERCENT TOTAL SYSTEM ENERGY	KINETIC ENERGY	PERCENT OF CURRENT TOTAL	POTENTIAL ENERGY	PERCENT OF CURRENT TOTAL	STRAIN ENERGY	PERCENT OF CURRENT TOTAL	DAMPING ENERGY	PERCENT OF CURRENT TOTAL	CRUSHING ENERGY	PERCENT OF CURRENT TOTAL	FRICTION ENERGY	PERCENT OF CURRENT TOTAL
.0	0.0	100.00	7.695E 04	84.95	1.364E 04	15.05	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
.00100	0.290289	100.02	7.519E 04	82.99	1.346E 04	14.85	1.309E 02	0.14	1.073E 01	0.01	1.813E 03	2.00	0.0	0.0
.00200	0.430690	100.04	7.014E 04	77.40	1.328E 04	14.66	2.922E 02	0.32	4.429E 01	0.05	6.867E 03	7.58	0.0	0.0

5 MASS PLOT FLAG SUMMARY

1	0	0	0	0	0	1	1	0	1
3	0	0	0	0	0	1	1	0	0
13	0	0	0	0	0	1	1	0	0
14	0	0	0	0	0	1	1	0	0
16	0	0	0	0	0	1	1	0	1

MASS 1 UNFILTERED ACCELERATION(G'S)

TIME(SEC)	XACC *	YACC =	ZACC +	SCALE FACTOR = 4.439E 01
0.0	-1.310E-02	0.0	9.999E-01	
0.001	-7.889E-01	-4.274E-02	-1.524E 00	
0.002	-9.584E 00	-1.057E-01	-3.719E 02	

MASS 1 FILTERED ACCELERATION(G'S)

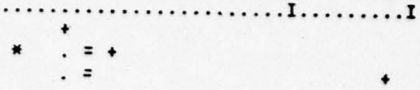
TIME(SEC)	XACCF *	YACCF =	ZACCF +
0.0	0.0	0.0	0.0
0.001	-1.020E-01	4.117E-02	-2.369E-01
0.002	-3.287E 00	1.567E-02	-2.903E 01

SCALE FACTOR = 3.460E 00

MASS 1 MASS IMPULSES

TIME(SEC)	XIMP *	YIMP =	ZIMP +
0.0	0.0	0.0	0.0
0.001	-1.222E-04	3.457E-05	1.123E-04
0.002	-1.556E-03	5.756E-05	7.269E-04

SCALE FACTOR = 2.718E-04



1 NODE PLOT FLAG SUMMARY

1	13	1	1	1	1	1	0

MASS 13 NODE 1 DISPLACEMENTS(IN)

TIME(SEC)	X	Y	Z	SCALE FACTOR = 3.571E 00
	*	=	+	
0.0	-3.704E 00	-1.300E 01	-2.999E 01	
0.001	-3.704E 00	-1.300E 01	-2.966E 01	
0.002	-3.704E 00	-1.300E 01	-2.933E 01	

MASS 13 NODE 1 VELOCITY(IN/SEC) - GROUND AXES

TIME(SEC)	XDOT *	YDOT =	ZDOT +	
				SCALE FACTOR = 3.937E 01
				.....I.....I
0.0	-8.661E-16	0.0	3.300E 02	= +
0.001	-8.737E-05	-1.149E-05	3.304E 02	= +
0.002	-8.830E-04	1.448E-05	3.307E 02	= +

MASS 13 NODE 1 VELOCITY(IN/SEC) - MASS AXES

TIME(SEC)	U	V	W	
	*	=	+	SCALE FACTOR = 3.988E 01
				I.....I
0.0	-4.333E 00	0.0	3.300E 02	*= +
0.001	-4.333E 00	-1.149E-05	3.304E 02	*= +
0.002	-4.333E 00	1.448E-05	3.307E 02	*= +

MASS 13 NODE 1 UNFILTERED ACCELERATION(G'S)

TIME(SEC)	XACC *	YACC =	ZACC +	SCALE FACTOR = 1.206E-01
				.....I.....I
0.0	-1.310E-02	0.0	9.999E-01	*= +
0.001	-1.310E-02	1.190E-06	9.641E-01	*= +
0.002	-1.332E-02	2.945E-04	6.867E-01	*= +

MASS 13 NODE 1 FILTERED ACCELERATION(G'S)

TIME(SEC)	XACCF *	YACCF =	ZACCF +	SCALE FACTOR = 1.206E-01
0.0	-1.310E-02	0.0	9.999E-01	*=
0.001	-1.311E-02	-1.084E-05	9.951E-01	*=
0.002	-1.313E-02	2.611E-05	9.303E-01	*=

2 BEAM FORCE PLOT FLAG SUMMARY

19	1	1	1
20	1	1	1

BEAM 19 I,M = 3, 0 J,N = 9, 0 AXIAL AND SHEAR FORCES(LB)

TIME(SEC)	FX *	FY =	FZ +	SCALE FACTOR = 1.330E 02
0.0	0.0	0.0	0.0	+
0.001	8.116E 00	8.940E-03	-3.900E 01	+ =*
0.002	-3.812E 01	7.284E-01	1.078E 03	* = +

BEAM 19 I,M = 3, 0 J,N = 9, 0 MOMENTS AT I,M(IN-LB)

TIME(SEC)	MX *	MY =	MZ +
0.0	0.0	0.0	0.0
0.001	1.977E 01	-2.722E 02	-6.498E-02
0.002	-5.279E 02	7.440E 03	-5.176E 00

SCALE FACTOR = 9.485E 02

I.....I

BEAM 19 I,M = 3, 0 J,N = 9, 0 MOMENTS AT J,N(IN-LB)

TIME(SEC)	MX *	MY =	MZ +	
				SCALE FACTOR = 9.740E 02
0.0	0.0	0.0	0.0	+
0.001	1.977E 01	-2.738E 02	-6.018E-02	= +*
0.002	-5.279E 02	7.653E 03	-5.020E 00	* +

2 BEAM DEFLECTION PLOT FLAG SUMMARY

19	1	1	1
20	1	1	1

BEAM 19 I,M = 3, 0 J,N = 9, 0 RELATIVE DEFLECTIONS*J-I*(IN)

TIME(SEC)	X *	Y =	Z +	SCALE FACTOR = 3.152E-03 I.....I
0.0	0.0	0.0	0.0	.
0.001	5.120E-05	1.013E-05	-8.637E-04	+ =
0.002	-2.058E-04	1.411E-03	2.581E-02	*. = +

BEAM 19 I,M = 3, 0 J,N = 9, 0 RELATIVE ROTATIONS*J-I*(DEGREE)

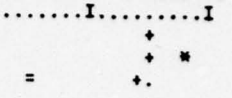
TIME(SEC)	PHI *	THETA =	PSI +
0.0	0.0	0.0	0.0
0.001	2.749E-03	-5.190E-05	1.100E-05
0.002	-8.294E-02	8.018E-03	4.162E-04

SCALE FACTOR = 1.083E-02

BEAM 19 I,M = 3, 0 J,N = 9, 0 RELATIVE ROTATIONS*J+I*(DEGREE)

TIME(SEC)	PHI *	THETA =	PSI +
0.0	0.0	0.0	0.0
0.001	2.749E-03	1.507E-04	-2.665E-05
0.002	-8.294E-02	-1.041E-02	-1.147E-03

SCALE FACTOR = 1.020E-02



1 BEAM STRESS PLOT FLAG SUMMARY

8	1	1	1	0	0

BEAM 8 I,M = 9, 0 J,N = 10, 0 STRESS RATIO (MAXIMUM SHEAR STRESS THEORY) AT TOP AND BOTTOM OF BEAM

TIME(SEC)	TOP *	BOTTOM =	SCALE FACTOR = 2.888E-02
			I.....I
0.0	0.0	0.0	=
0.001	5.666E-03	7.271E-03	. *=
0.002	2.714E-01	2.615E-01	. = *

BEAM 8 I,M = 9, 0 J,N = 10, 0 STRESS RATIO (MAXIMUM SHEAR STRESS THEORY) AT LEFT AND RIGHT EDGE OF BEAM

TIME(SEC)	LEFT *	RIGHT =
0.0	0.0	0.0
0.001	5.085E-03	5.123E-03
0.002	2.098E-01	2.092E-01

SCALE FACTOR = 2.232E-02

I.....I

BEAM 8 I,M = 9, 0 J,N = 10, 0 STRESS RATIO (THEORY OF CONST. ENERGY OF DIST.) AT TOP AND BOTTOM OF BEAM

TIME(SEC)	TOP *	BOTTOM =
0.0	0.0	0.0
0.001	6.392E-03	6.807E-03
0.002	3.062E-01	2.449E-01

SCALE FACTOR = 3.258E-02

.....I.....I

EXTERNAL SPRING PLOT FLAG SUMMARY

3	0	1	1
4	0	1	1
5	0	1	1
6	0	1	1

EXTERNAL SPRING I,M = 6, 0 COMPRESSION(IN)

TIME(SEC)	X *	Y =	Z +	SCALE FACTOR = 6.480E-02 I.....I
0.0	0.0	0.0	0.0	+
0.001	0.0	0.0	2.809E-01	=
0.002	0.0	0.0	5.443E-01	=

EXTERNAL SPRING I,M = 6, 0 AXIAL LOAD(LB)

TIME(SEC)	X *	Y =	Z +	SCALE FACTOR = 2.095E 02 .....I.....I
0.0	0.0	0.0	0.0 +	
0.001	0.0	0.0	1.760E 03 =	+
0.002	0.0	0.0	1.760E 03 =	+

2 STRAIN AND DAMPING PLOT FLAG SUMMARY

2	1	1
4	1	1

BEAM 2 I,M= 2, 0 J,N= 3, 0 STRAIN ENERGY AND PERCENT

TIME(SEC)	SE *	% =	SCALE FACTOR = 6.291E-02
			.....I.....I
0.0	0.0	0.0	=
0.001	4.760E-03	3.636E-03	.=
0.002	5.914E-01	2.024E-01	. = *

BEAM 2 I,M= 2, 0 J,N= 3, 0 DAMPING ENERGY AND PERCENT

```
TIME(SEC)   DE          %
             *          =
.....................................................................................................................SCALE.FACTOR = 2.271E-02
                                                                                                                    .....I.....I
 0.0        0.0        0.0          =
 0.001      4.287E-04  3.996E-03    * =
 0.002      9.456E-02  2.135E-01    .                    *                                                          =
```

1 DRI PLOT FLAG SUMMARY
15

DRI MASS 15

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TIME(SEC)    DRI
               *
.....                                                                                                    SCALE FACTOR = 7.860E-05
 0.0          0.0                                                                                        .....I.....I
 0.001       -4.802E-04
 0.002       -8.175E-04        *                    *                                                    *
                                                                                                         .
                                                                                                         .
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VEHICLE C.G. VELOCITY(IN/SEC)

TIME(SEC)	X	Y	Z	
	*	=	+	
0.0	-6.661E-16	0.0	3.300E 02	=
0.001	-2.379E-04	-3.084E-17	3.268E 02	=
0.002	-4.712E-04	2.467E-16	3.171E 02	=

SCALE FACTOR = 3.929E 01

.....I.....I