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**CASE FILE
COPY**

**NUMERICAL ANALYSIS OF
STIFFENED SHELLS OF REVOLUTION**

Volume III of VII

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Prepared by

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for George C. Marshall Space Flight Center

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16. Abstract This report contains the information necessary for application of the STARS-2B, -2V (Shell Theory Automated for Rotational Structures-2 (Buckling, Vibrations)) programs. These new versions of the STARS programs retain the basic features contained in the STARS programs since 1963, i.e. <ol style="list-style-type: none"> 1. Arbitrary branching of the shell meridians. 2. Arbitrary boundary conditions. 3. Minimum input requirements to describe a complex, practical shell of revolution structure. 4. Accurate analysis capability using a minimum number of degrees of freedom. <p>The STARS-2B, -2V programs contain the following capabilities:</p> <ol style="list-style-type: none"> 1. Stability analysis of shells of revolution under axisymmetric loading. The "worst meridian technique" may be used in cases of unsymmetric loading. Both eigenvalue and determinant calculation options are available. 2. Vibration analysis of shells of revolution including axisymmetric prestress effects. 3. Critical speed analysis of rotating shells of revolution including axisymmetric prestress effects. <p>The fundamental structural theory for the programs is detailed in Volume I of this series, while the Users' Manual for the statics program is Volume II.</p>			
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- VOLUME I. Theory Manual for STARS-2S, 2B, 2V Digital Computer Programs**
- VOLUME II. Users' Manual for STARS-2S - Shell Theory Automated for Rotational Structures - 2 (Statics), Digital Computer Program**
- VOLUME III. Users' Manual for STARS-2B, 2V - Shell Theory Automated for Rotational Structures - 2 (Buckling, Vibrations), Digital Computer Programs**
- VOLUME IV. Engineer's Program Manual for STARS-2S - Shell Theory Automated for Rotational Structures - 2 (Statics), Digital Computer Program**
- VOLUME V. Engineer's Program Manual for STARS-2B - Shell Theory Automated for Rotational Structures -2 (Buckling), Digital Computer Program**
- VOLUME VI. Engineer's Program Manual for STARS-2V - Shell Theory Automated for Rotational Structures -2 (Vibration), Digital Computer Program**
- VOLUME VII. Satellite Programs for the STARS System**

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SYMBOLS

Lower Case Latin

a	semi-diameter perpendicular to Z-axis in ellipsoid
b	semi-diameter parallel to Z-axis in ellipsoid
f	distributed loads in local coordinates
h	shell thickness; face sheet thickness
i	index: beginning edge of shell segment; independent joint of kinematic link; subscript "inside"
j	index: ending edge of shell segment; dependent joint of kinematic link
n	index on harmonic
o	subscript "outside"
r	radius
s	index of segment; coordinate in cylinder or cone
t	core thickness in sandwich shell
w	normal deflection, positive inward

Upper Case Latin

C	stiffness eccentricity parameters; offset distance in ogive, ellipse
D	bending stiffness parameters
E	Young's modulus (lb/in ²)
F	lineal force (lb/in)
G	shear modulus (lb/in ²)
K	extensional stiffness parameters
M	bending moment on shell (in-lb/in)
N	membrane stress resultant (lb/in)
\bar{N}	assumed membrane stress resultant (lb/in)
Q	transverse shear stress resultant (lb/in)
R	radius; "global" coordinate, positive radially outward.

SYMBOLS (continued)

T temperature; "global" coordinate, tangential
X Cartesian coordinate, $\theta = 0$ at X-axis
Y Cartesian coordinate
Z Cartesian and "global" coordinate, coincides with axis of revolution

Greek

α angle between rotated coordinates
 β ratio of semi-diameter parallel to Z-axis in ellipsoid to semi-diameter perpendicular to Z-axis
 γ shear strain; non-linear parameter; angle of inclination of kinematic link
 ζ normal coordinate, positive inward
 θ circumferential angular coordinate (rad)
 λ shell parameter
 ν Poisson's ratio
 σ normal stress (lb/in²)
 τ shear stress (lb/in²)
 ϕ meridional angular coordinate (rad)
 ω rotational displacement (rad)
 Ω rotational displacement in "global" coordinates (rad)
 Δ displacements in fixed or "global" coordinates
 Λ segment length parameter

Miscellaneous

eq equivalent
 $s\phi$ $\sin \phi$
 $c\phi$ $\cos \phi$

Other symbols are defined in the text where used.

SECTION 1

PROGRAM CAPABILITY

The use of an accurate shell theory to analyze structural shell problems usually involves complex mathematics and numerical techniques, which are nearly impossible to treat without the aid of automated procedures. On this basis, digital computer programs based upon the Love-Reissner first order shell theory have been developed. These programs can perform a stability or vibration analysis of orthotropic thin shells of revolution, subjected to axisymmetric distributed loading or concentrated line loads, as well as thermal strains (Reference 1). Furthermore, a shell with arbitrary boundary conditions, under loads which vary arbitrarily with position and under a temperature variation through the thickness, is tractable with these programs. The shell can consist of any combination of the following geometric shapes:

- 1) Ellipsoidal - spherical (offset from the axis of revolution allowed)
- 2) Ogival - toroidal
- 3) Modified ellipse shape
- 4) Conical - circular plate
- 5) Cylindrical
- 6) General point input geometry
- 7) Dummy geometry slot to be filled by the user
- 8) Discrete ring

The shell wall crosssection can be a sheet, sandwich, or reinforced sheet or sandwich. The reinforcement can consist of rings and/or stringers, a waffle construction rotated at any angle to the principal coordinates, or an isogrid construction. General stiffness input options are also available. The reinforcement material properties can differ from those of the main shell, and a temperature variation can cause different properties in the two face sheets of a sandwich shell.

The basic approach to the problem (Reference 1) is to cut the structure into several shell regions. These regions need to be singly-connected shells, and can only have line loads applied at their end points. There are no restrictions on geometry, or uniform or thermal loads. The regions are further subdivided into several shell segments, each being free to have its own geometric shape, provided that the shape falls into one of the categories mentioned above.

Stiffness matrices obtained for each segment, are coupled by standard matrix methods to obtain region stiffnesses, which, after being reduced in size, are in turn coupled to form the total shell structure under analysis. Currently, the UNIVAC 1108 computer programs are sized to handle a structure composed of up to 29 segments in each of 29 regions arbitrarily connected to each other. There is a limitation on the size of a shell segment, which is a consequence of the demand that boundary disturbances be felt throughout the segment. This limitation is mathematically described in Section 2 (pages 2-31 to 2-33) as a length parameter. This parameter, however, is not reliable near the apex of any shell shape ($\phi = 0$), and the segments needed in this region are actually much smaller than predicted by the parameter. A mathematical singularity occurs at the apex where r_0 (the radius of revolution) becomes zero. It is this singularity which prevents the length parameter from being meaningful near the apex. Furthermore, the point ($\phi = 0$) is not an acceptable input point of the program (except for the torus-ogive and offset ellipsoid), although any point outside a circle of infinitesimal radius is satisfactory.

There is a considerable latitude in what can be done within each shell segment. The thickness of any segment can be symmetrically tapered and it can contain up to 14 points of discontinuity, provided that the segment center-line remains continuous and describable by a single shell geometry. A temperature distribution through the thickness can be specified at three points in a homogeneous shell, and 4 points in a shell of rigid core sandwich construction. The distribution is considered to be linear between these points. Thus, it is possible to approximate temperature distributions other than linear distributions. In the event of physically discontinuous shell center-lines, a kinematic link is available for use in the analysis. The link relates displacements across the discontinuity. This link may be used between

regions, and between segments within a region. Discrete offset rings are also available for use within or between regions.

SECTION 2

INPUT INFORMATION

2.1 GENERAL NOTES

The preceding section provides some insight into the capability of the programs, and the potential that they might have for future use. If the programs are applied judiciously they can be extremely powerful tools. The mechanics of applying them should be clearly understood. With this in mind, the remaining section should be studied carefully.

The required input data may be subdivided into three main parts, namely: geometric, topological (or coupling orientation) and joint data (degree of freedom description for each joint component). Each segment requires its own geometric configuration and numerical integration control.

The output consists of stiffness coefficients for each shell segment and the actual symmetry of the coefficients is presented in a convenient form for a check on the accuracy of the integration through the segment. Region stiffnesses and their symmetry checks are also provided. Eigenvalues and final eigenvectors are printed out for each shell segment at intervals along the segment as specified by the user of the program. The output will be further discussed in Section 3.

The present program size is described in the table below.

UNIVAC 1108 Table of Program Sizing

I. Segments per region:	29
II. Segment joints per region:	30
III. Regions:	29
IV. Region joints:	30

UNIVAC 1108 Table of Program Sizing (continued)

- V. Number of points available per segment for specifying geometric or load data: 30
- VI. Number of points available through the thickness for specifying temperature data: 4
- VII. Geometries: ellipsoid, sphere, offset ellipsoid, modified ellipsoid, ogive, toroid, cone, annular plate, cylinder, general geometry, ring, elastic support, dummy geometry.
- VIII. Wall cross-section options: single sheet, equal face sheet sandwich, unequal face sheet sandwich, eccentric reinforcement (rings, stringers or both), waffle reinforcement rotated at an arbitrary angle to coordinate axes, isogrid reinforcement, arbitrary stiffness input.
- IX. Number of material property tables per submission: 10
- X. Number of points per material property table: 10
- XI. A combined fixed and variable loading option is available.
- XII. Orthotropy options: isotropic or orthotropic sheet, isotropic or orthotropic sandwich, isotropic or orthotropic sandwich with different face sheet properties caused by thermal gradients, isotropic or orthotropic sheet or sandwich reinforced by different property rings or different property stringers or both, isotropic or orthotropic sheet or sandwich reinforced by a different property waffle system rotated by an angle β to coordinate axes, isotropic or orthotropic sheet or sandwich reinforced by a different property general isogrid reinforcing system, arbitrary stiffness input options used to describe other configurations.

UNIVAC 1108 Table of Program Sizing (continued)

XIII.	Number of rings per region:	28
XIV.	Total number of rings at region joints in structure:	28

Figure 2-1 shows the detailed option flow chart for the present programs.

GENERAL NOTES - Idealizations

Before discussing the specific card input order, it would be advantageous to introduce some general guidelines in the area of idealizations and topology. In many computer programs there is such an abundance of numerical computation, that minimizing numerical roundoff errors becomes as important as getting the final answers. In some cases the engineer can aid the program in this effort through the use of judicious idealizations. Such a possibility exists in the STARS-2 programs, since many internal operations are involved with building and inverting stiffness matrices. The object of the user therefore, should be to help the computer by avoiding the creation of ill-conditioned matrices at any step (see Reference 2).

Physically, the way to achieve this end is to have all the segment stiffness matrices of the same order of magnitude. This will in turn produce region stiffness matrices which are of similar orders of magnitude, and minimize possible ill-conditioning in the total structure matrices. The user can help to achieve this end by sizing his segments in such a way so that no short stiff segment is contained alone in a region with all other long flexible segments, or that no region comprised of all short stiff segments exists in a structure whose other regions contain only long flexible segments. No accurate measure can be given on the relative stiffness or flexibility of segments allowed, and thus the best check is

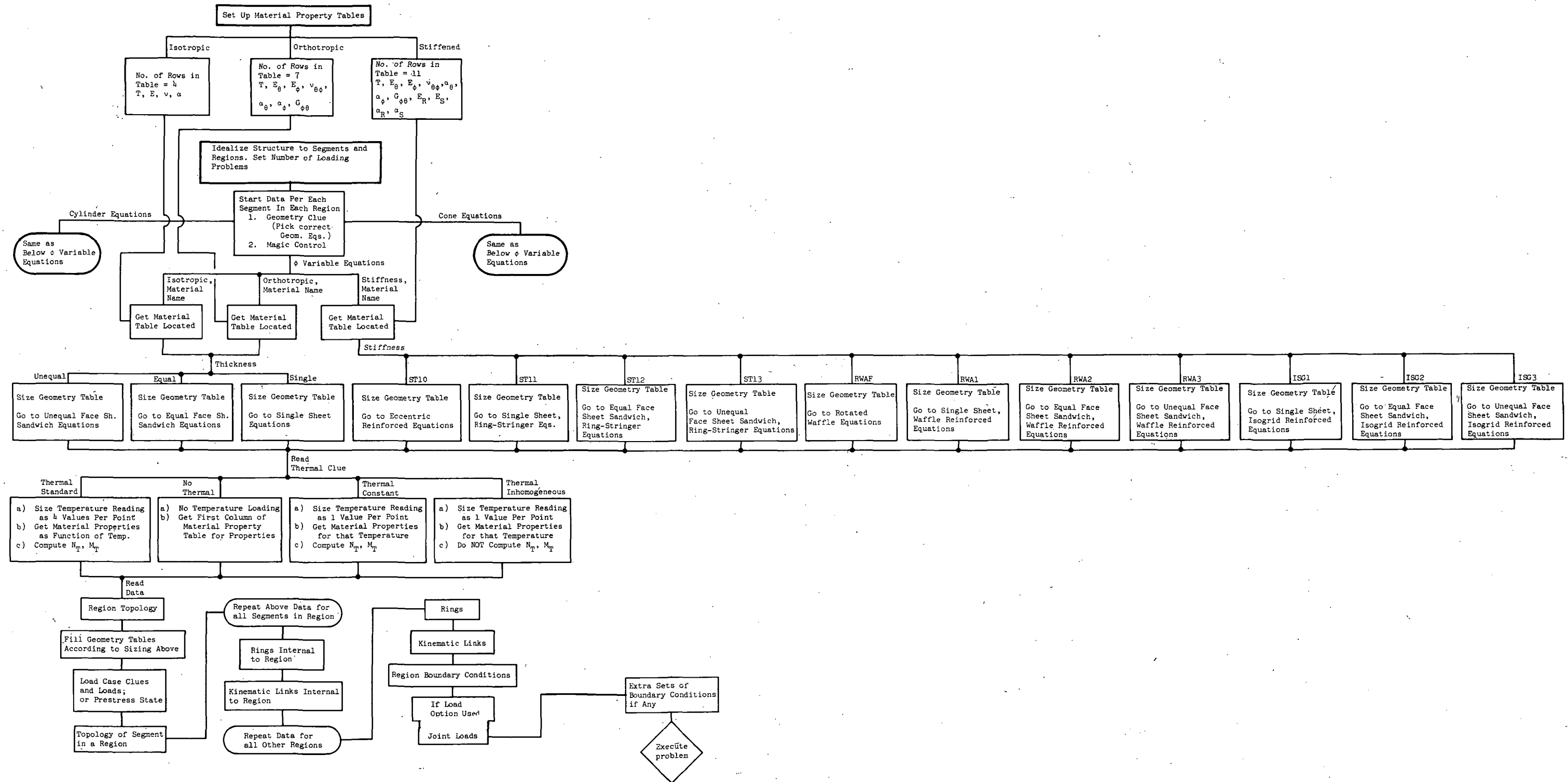


Figure 2-1 Program Option Flow Chart

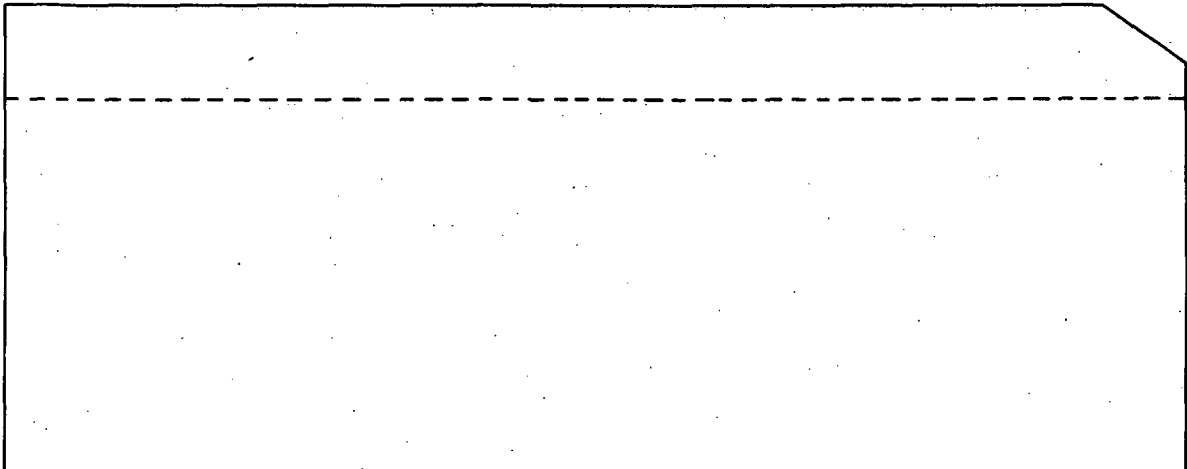
to see if a structure is in equilibrium under the applied loading. It also must be kept in mind, that if an idealization has provided useful results for axisymmetric (zeroth harmonic) loading, it need not necessarily be a good idealization for other harmonics, but if good results are obtained for the first harmonic, then other harmonics should also encounter no adverse behavior. The symmetry checks of segment and region stiffness matrices are useful for many reasons, but will not necessarily alert a user to ill-conditioning.

In the use of regions, one other type of accident must be avoided. This is the creation of a single region structure with both ends fixed, wherein no suitable boundary condition matrix can be formed. Thus, in the use of region idealizations, which are less physically meaningful to a user than pure segment idealizations, care should be taken so that all boundary conditions are not zeroed out. To avoid this problem, and to minimize program running time, it is best to maximize the number of regions in a structure, and minimize the number of segments per region. Thus, in small problems, for best numerical efficiency, there should only be one segment per region.

In the solution of the static axisymmetric problems, and the $n = 0$ eigenvalue search, all torsional degrees of freedom should be removed. A second boundary condition matrix should be input for searching for eigenvalues in other ($n \neq 0$) harmonics.

GENERAL NOTES - Data debugging

The STARS programs have been provided with special separate data debugging packages called SATELLITE programs. In order to be able to debug as much of a given data deck as possible in one computer submission, the data is grouped by inserting special cards, termed "dash-separator cards", appropriately. In order so that additional errors are not made by requiring insertion and removal of these cards, the STARS program has been coded to accept these dash-separator cards in the input. A dash-separator card is shown below:



As can be seen, a minus symbol is inserted straight across the computer card from column 1 through column 80.

Since the dash-separator cards subdivide the data deck, there exists the possibility that a separated data block may be completely omitted (for example no kinematic links in a structure). In this case one dash-separator card is also omitted. Under no circumstances can there exist two adjacent dash-separator cards in a data deck. The SATELLITE programs are described in Reference 3.

2.2 CARD FORMATS

The following different card formats are presently required by the STARS-2B, -2V programs. A full description and explanation of the information to be entered on the cards is presented in Section 2.3.

Title Card

01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78
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(1) Alphanumeric Title

16A4

Program Control Card

01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78
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- (1) Number of regions
- (2) Total number of segments
- (3) Number of material property tables
- (4) First harmonic in search
- (5) Last harmonic in search
- (6) Search increment
- (7) Number of loadings
- (8) Number of boundary conditions
- (9) Stress input clue (blank for vibrations)
- (10) Output clue
- (11) Problem solution procedure clue
- (12) Convergence tolerance
- (13) Upper cutoff
- (14) Largest load step
- (15) Smallest load step
- (16) Mass perturbation multiplier (blank for stability)
- (17) Frequency estimate (blank for stability)

I2
I3
I2
I2
I2
I2
I2
I2
I2
I2
I2
I2
I2
F7.0
F7.0
F7.0
F7.0
F7.0
E14.7

Dynamic Option Card (Do not exist for stability)

01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80
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- (1) Dynamic Problem Identification A4
- (2) Eigenvector Identification I6

Material Property Table ID Card

01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80
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- (1) Material Name A4
- (2) Blank -
- (3) Table Type A4

Materials Property Table, Geometry, Position, Crosssection, Loading, Prestress (not for vibrations), Ring-Thermal, and Ring Prestress or Dynamics Cards.

01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80
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- (1) Input table item (as many cards and fields as necessary) E14.7

Region Introductory Card

01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80
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- (1) Number of segments I2
- (2) Number of kinematic links I2
- (3) Number of rings I2
- (4) Title I6A4

Topology Cards, (Region Joint Control Card)

01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80
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- (1) Region or segment number, (number of joints) I5
- (2) Beginning joint, (number of rings) I5
- (3) End joint, (number of links) I5

Segment Identification Card

01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80
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- (1) Segment code F2.0,
- (2) Title 16A4

MAGIC Integration Card

01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80
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- (1) Print Interval E14.1
- (2) Accuracy control E14.1
- (3) Integration interval E14.1
- (4) Blank
- (5) Step control F2.0

Ring Geometry Card

01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80
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(1) Ring geometric properties

E12.5

Kinematic Link Cards

01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80
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- (1) Dependent joint
- (2) Independent joint
- (3) Angle of inclination

I2
I2
E14.7

Boundary Condition Card

01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80
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- (1) Joint Number
- (2) Boundary conditions
- (3) Axis rotation angle

I2
F2.0
E14.1

Joint Load Control Cards

01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80
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- (1) Number of joint loads
- (2) Title

I4
I6A4

Joint Load Cards

01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79
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0

2

3

- (1) Load condition number
- (2) Row Identification
- (3) Applied load

I5
I5
E14.7

.3 DETAILED ORDER OF INPUT (See Figures 2-1, 2-2)

GENERAL INTRODUCTORY CARDS

	<u>Column</u>	<u>Format</u>
1. Title Card		
A. Alphameric title (submission description)	1-64	16A4
2. Program Control Card		
A. Number of regions to be coupled (Max. = 29)	1-2	I2
B. <u>Total</u> number of segments (Max. = 29 x 29 = 841)	3-5	I3
C. Number of Material Property Tables (Max. = 10)	6-7	I2
D. First harmonic in the range to be searched for stability or vibration eigenvalues.	8-9	I2
E. Last harmonic in the range to be searched for stability or vibration eigenvalues.	10-11	I2
F. Search harmonic increment	12-13	I2
G. Number of loading conditions for this problem (See Dynamic Option Card for Vibration problems)	14-15	I2
<p>In a stability analysis two types of loadings may be applied simultaneously. The first loading will be considered as being of constant fixed magnitude, while the second will be considered as being the variable (eigenvalue) loading. In this case the number of loading conditions is set to 2. If there is no fixed load applied, then the number of loading conditions is 1.</p>		
H. Number of boundary conditions for this problem.	16-17	I2
<p>In some cases (such as shells containing an apex) boundary conditions must be changed for the first few harmonics. An option thus exists of using up to 3 different boundary condition sets in an eigenvalue analysis. For example, if the first eigenvalue sought is for the $n = 0$ harmonic, torsion degrees of freedom should be removed. For eigenvalue searches in other harmonics torsional freedom should be retained by using a second set of boundary conditions.</p>		

	<u>Column</u>	<u>Format</u>
I. Prestress input clue	18-19	I2
<p>If this clue is set to zero, the program will expect load input, and will calculate the prestress state by itself. In considering the prestress state it will include the effects of predeformation.</p> <p>If this clue is set to unity, the program will expect the prestress state to be input, and will assume there is no predeformation. If there are two loading conditions (item G above), the program will expect two sets of input prestress states.</p> <p>The prestress input clue set to unity may also be used to obtain estimates of buckling under unsymmetric loading by inputting the "worst meridian" stress distribution as an axisymmetric condition. This technique has been justified experimentally for cylinders under some loading conditions [4].</p>		
J. Intermediate print clue	20-21	I2
<p>If this clue is set to unity, base stiffness and prestress stiffness matrices for segments, regions, and structure will be printed for all estimates in all harmonics. To delete this intermediate print the clue should be set to zero.</p>		
K. Eigenvalue calculation clue	22-23	I2
<p>If this clue is set to zero an eigenvalue matrix procedure will be used for buckling load or vibration frequency calculations [1]. If this clue is set to unity a determinant evaluation procedure will be used [1]. Since the determinant evaluation procedure is much longer and can skip roots based on user input, it is not recommended for practical analysis.</p>		
L. Convergence Tolerance	24-30	F7.0
<p>If this is left blank and an eigenvalue procedure is used for calculations, the iterations will be carried on until successive estimates of the eigenvalue differ by less than 1.0%. Otherwise the user can input his own convergence tolerance (in decimal form, not %).</p>		

FIGURE 2-2
0 1 1 4

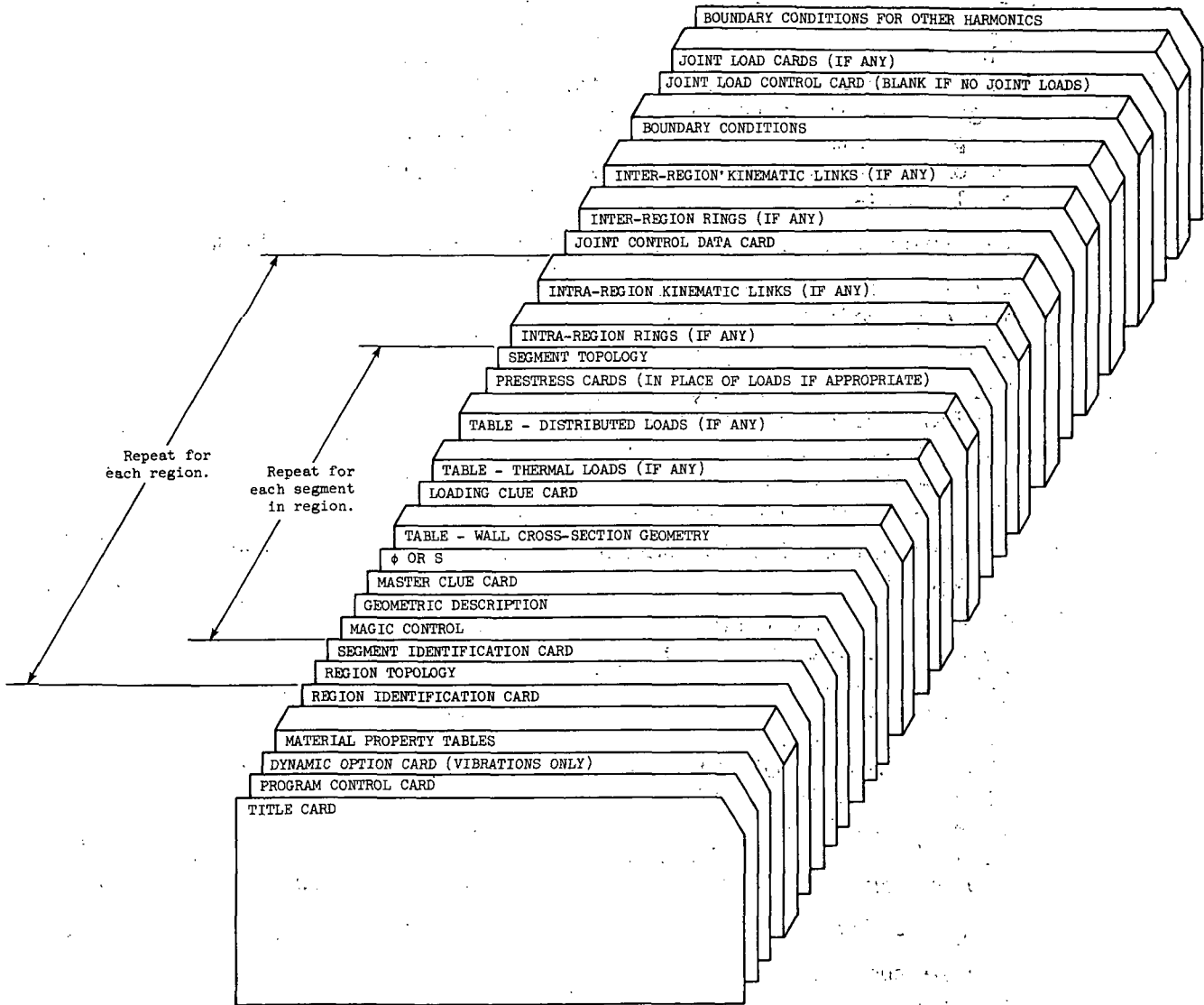


Figure 2-2 Data Sequence

	<u>Column</u>	<u>Format</u>
M. Upper cutoff value	31-37	F7.0
<p>This input is mainly relevant for stability calculations although it will be used for vibrations if input. If the user wishes to speed his computer search time by disregarding any eigenvalues higher than a specific ratio on his input prestress state, he may input this ratio here. Thus if 2.5 is input, all harmonic calculations where the minimum eigenvalue is found to be greater than 2.5x (input prestress state) will be aborted. The cutoff value will not be used if this field is left blank.</p>		
N. Determinant evaluation largest increment	38-44	F7.0
<p>Input here and item O will be disregarded if the eigenvalue calculation option is used (item K above).</p> <p>This is the initial load step (input as a decimal, used as a percent) used for the loading variation in the determinant calculation option. If this field is left blank the program will use 5%.</p>		
O. Determinant evaluation smallest increment multiplier	45-51	F7.0
<p>This is the multiplier for the initial load step which will determine the <u>smallest</u> load step. The multiplier can start at 1.0 and should decrease in a factor of 10 to (for example) .1, or .01, .001 etc. Thus for an input of .05 above (item N) and .01 here, the load will first be changed by 5%, then .5%, and finally .05% (=5%x.01) as convergence increases. If this field is left blank the program will use 1.0 making the smallest step= to the initial step.</p>		
P. Harmonic Mass Multiplier (for vibrations <u>only</u>)	52-58	F7.0
<p>To use the harmonic mass multiplier see Reference 1 and the Dynamic Option Card. This entry is <u>not</u> necessary for a free or prestressed vibration problem, or a free or prestressed critical speed problem.</p>		
Q. Frequency or Angular Velocity in rad./sec. (for vibrations <u>only</u>)	59-72	E14.7
<p>The assumed value of the frequency of interest (see Dynamic Option Card).</p>		

3. Dynamic Option Card (omitted for stability)

A. Dynamic Analysis Description Clue

1-4

A4

There are six possible dynamic analysis options, each defined by a code word. If the run is to be a free vibration analysis (unloaded shell), the code word is FREV and item G on card 2 should be zero.

If the run is to be a vibration analysis of a prestressed shell, the code word is to be VPRE and item G on card 2 should be unity. If the run is to be a critical rotation speed analysis, the code word is CRSP and item G on card 2 should be unity.

If the run is to be a critical rotation speed analysis of a prestressed shell, the code word is PCRS and item G on card 2 should be two.

If the run is to be a critical rotation speed analysis including mass perturbation (see Ref. 1), the code word is CRSR and item G on card 2 should be unity.

If the run is to be a critical rotation speed analysis of a prestressed shell including mass perturbation (see Ref. 1), the code word is PCSR and item G on card 2 should be two.

B. Eigenvector Clue

5-10

I6

If this clue is zero the lowest two eigenvectors will be sought and printed for each harmonic. If this clue is unity the two eigenvectors corresponding to the frequencies closest to the estimated frequency will be sought and printed for each harmonic.

C. Rigid Body Mode Clue

11-15

I5

The $n = 0, 1$ harmonics contain rigid body modes for a totally unsupported (free) shell. If an analysis for other modes in these harmonics is required for this type of shell, the clue is set to unity. In this case the total harmonic search can only encompass $n = 0, 1$. The first two eigenvalues in the output should then approximate zero, and the third will be the first to correspond to a nonrigid body mode. In all other cases (including a free shell investigated for harmonics $n \geq 2$), the clue is zero.

MATERIAL PROPERTY TABLES (Max. = 10 sets)

As many sets of these cards are used (10) as there are different material property segments in the structure to be analyzed. These tables will be used to obtain the thermal variation of material properties if thermal loadings exist. Thus the range of temperature

in this table should be greater than that of the thermal loads. If no thermal loads exist, the values given in the first column of this table will be used, and the rest of the table can be left blank. If there are thermal loads, the range of the table is to be considered as that between the second and tenth columns.

1. Identification Card

A. Material Title (Alphameric)

1-4

A4

Any name can be made up as long as it is consistently used on the segment cards to which it refers. The same name cannot appear on more than one (1) table.

B. Type of Table

11-14

A4

One of several possible alphameric clues is written here. These clues serve to size the number of cards in the property table, and define which properties belong on which card. The possible clues are:

ISOT
ORTH
STIF

Their definitions are provided in Item 2 below.

2. Material Property Cards

The material property cards below are given depending upon which table type clue is used. If the table type clue is "ISOT" (isotropic table):

A. Temperature values (5 values per card; 2 cards)

5E14.7

These are the temperatures at which the values of material properties will be given. The first value in the table must always be the room or stress-free temperature, since the material properties in only the first column of the table will be used in an analysis involving no thermal load. The values of temperature in table columns 2 through 10 must be in algebraically increasing order.

B. Values of Young's Modulus at the given temperatures. (5 values per card; 2 cards)

5E14.7

C. Values of Poisson's Ratio at the given temperatures. (5 values per card; 2 cards)

5E14.7

D. Values of the thermal coefficient of expansion at the given temperatures. (5 values per card; 2 cards)

5E14.7

MATERIAL PROPERTY TABLES (continued)

Column

Format

If the table type clue is "ORTH" (orthotropic table):

- A. Temperature values.
(5 values per card; 2 cards) 5E14.
These are the temperatures at which the values of material properties will be given.
- B. Values of Young's Modulus in the θ direction (E_{θ})
at the given temperatures. 5E14.
(5 values per card; 2 cards)
- C. Values of Young's Modulus in the ϕ direction (E_{ϕ})
at the given temperatures. 5E14.
(5 values per card; 2 cards)
- D. Values of the Poisson's Ratio $\nu_{\theta\phi}$ at the given
temperatures. 5E14.
(5 values per card; 2 cards)
- E. Values of the thermal coefficient of expansion in
the θ direction (α_{θ}) at the given temperatures. 5E14.
(5 values per card; 2 cards)
- F. Values of the thermal coefficient of expansion in
the ϕ direction (α_{ϕ}) at the given temperatures. 5E14.
(5 values per card; 2 cards)
- G. Values of the Shear Modulus $G_{\phi\theta}$ at the given
temperatures. 5E14.
(5 values per card; 2 cards)

If the table type is "STIF" (table to be used for reinforced shells):

- A.-G. The values in these locations are the same as
those above for the "ORTH" clue case, and refer
to the basic shell. 5E14
- H. Values of ring Young's Modulus (E_R) at the
given temperatures. 5E14
(5 values per card; 2 cards)
- I. Values of stringer Young's Modulus (E_S) at the
given temperatures. 5E14
(5 values per card; 2 cards)
- J. Values of ring thermal coefficient of expansion
(α_R) at the given temperatures. 5E14
(5 values per card; 2 cards)
- K. Values of stringer thermal coefficient of
expansion (α_S) at the given temperatures. 5E14
(5 values per card; 2 cards)

Note: In a rotated waffle or isogrid construction, items H and I, and J and K, refer to the grid directions and are respectively identical.

D-A-S-H S-E-P-A-R-A-T-O-R C-A-R-D
(See General Notes - Data Debugging)

minus in 1-80

REGION INTRODUCTORY CARDS

These two cards are placed at the beginning of each region data information. Each region contains the following data set (see Figure 2-2): a) Two region introductory cards; b) data cards for each segment within the region; c) ring cards describing the discrete rings within the region, if any; and d) kinematic link cards describing the kinematic links within the region, if any.

- | | | | |
|----|--|-------|------|
| 1. | Identification Card | | |
| | A. Number of segments within the region (<29) | 1-2 | I2 |
| | B. Number of kinematic links between segments <u>within</u> the region. | 3-4 | I2 |
| | C. Number of discrete rings between segments <u>within</u> the region. | 5-6 | I2 |
| | D. Any alphameric information (region description) | 7-70 | 16A4 |
| 2. | Topology Card (Coupling Orientation) | | |
| | A. Region Number
Number of the region under consideration. | 1-5 | I5 |
| | B. Joint (i)
Joint associated with i th (beginning) end of the region. | 6-10 | I5 |
| | C. Joint (j)
Joint associated with j th (ending) end of the region. | 11-15 | I5 |

There is no coordinate flow in regions (unless 1 region = 1 segment), such as that shown for segments in Figures 2-3 to 2-9. However, the start joint of a region must match with 1 in segment numbering, and the end joint must match with the highest segment joint number in the region (see Figure 2-12 and page 2-54). If 1 region = 1 segment the segment topology card will be a dummy card [1 1 2] (see page 2-54).

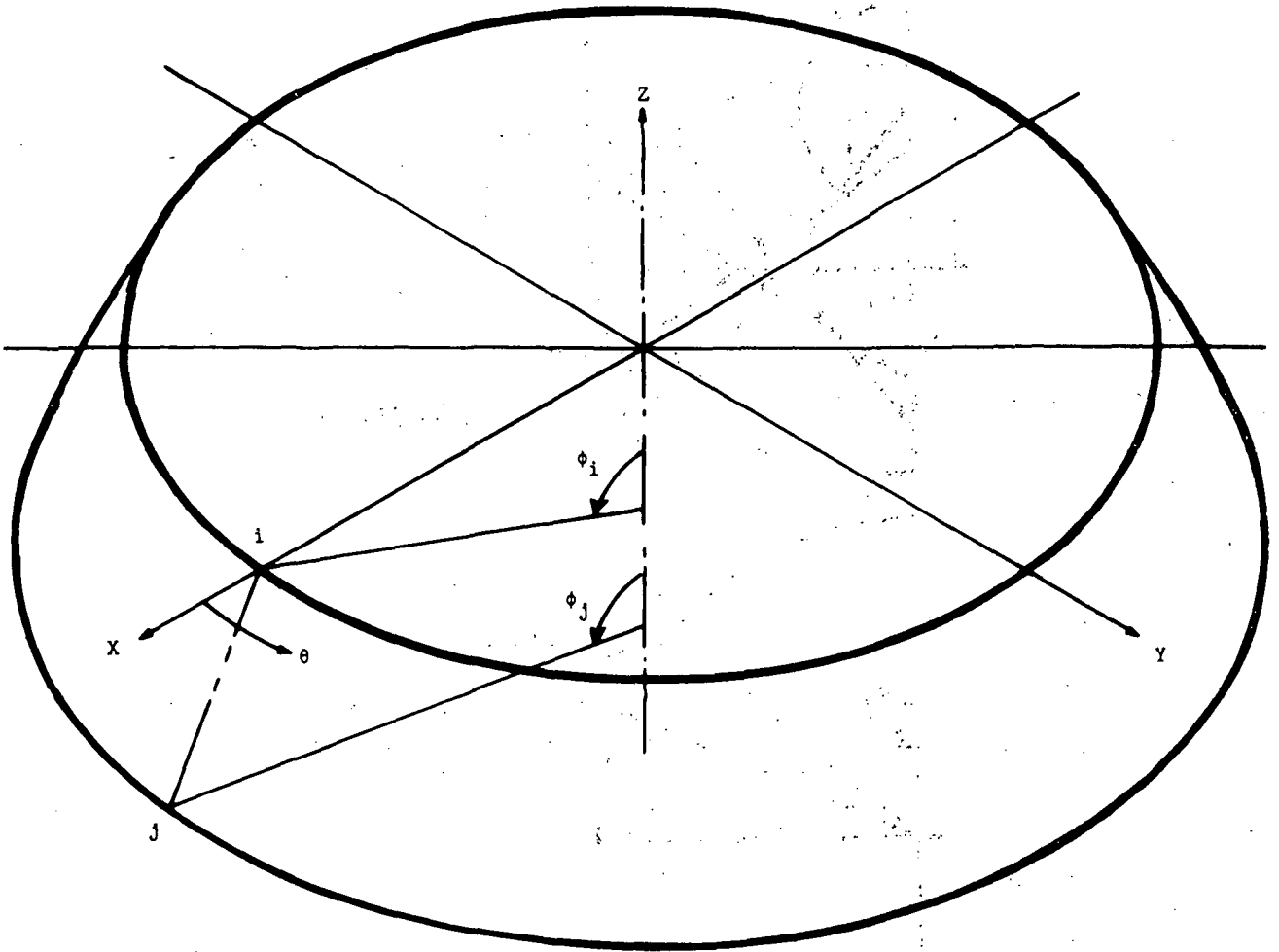


Figure 2-3. Typical Shell Segment

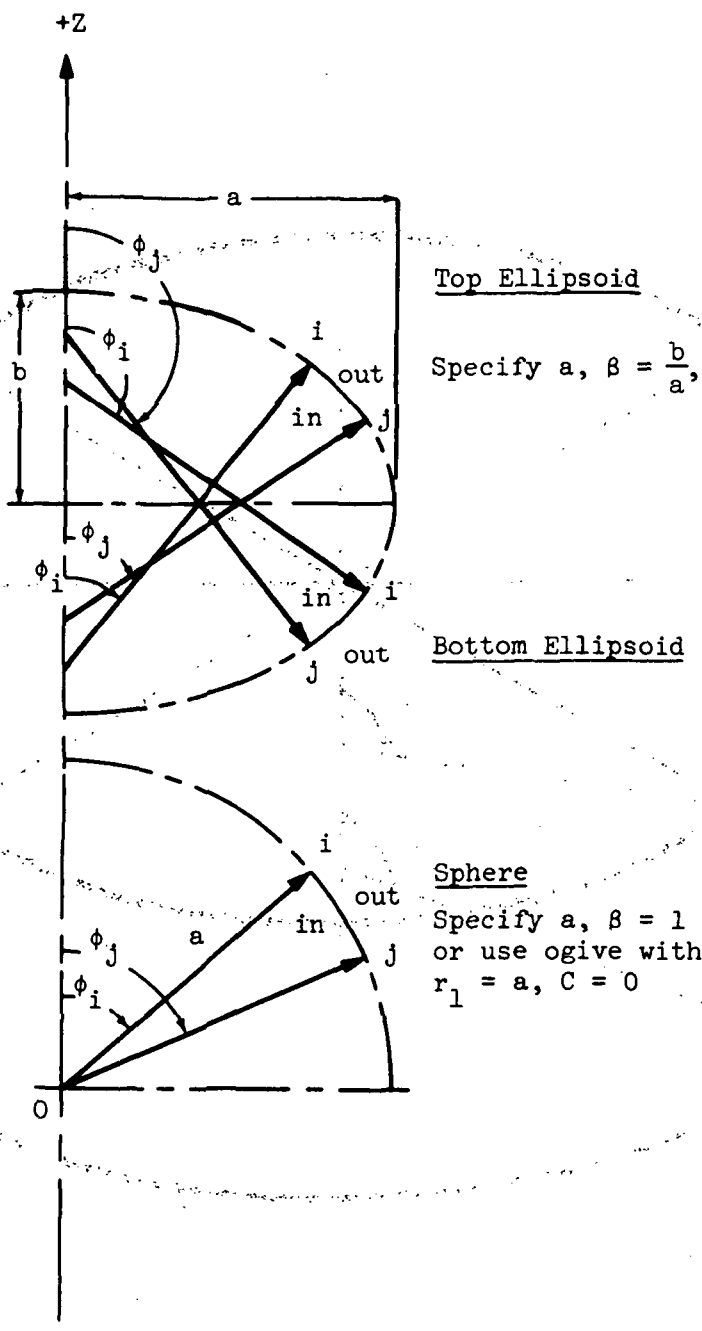


Figure 2-4a. Ellipsoid

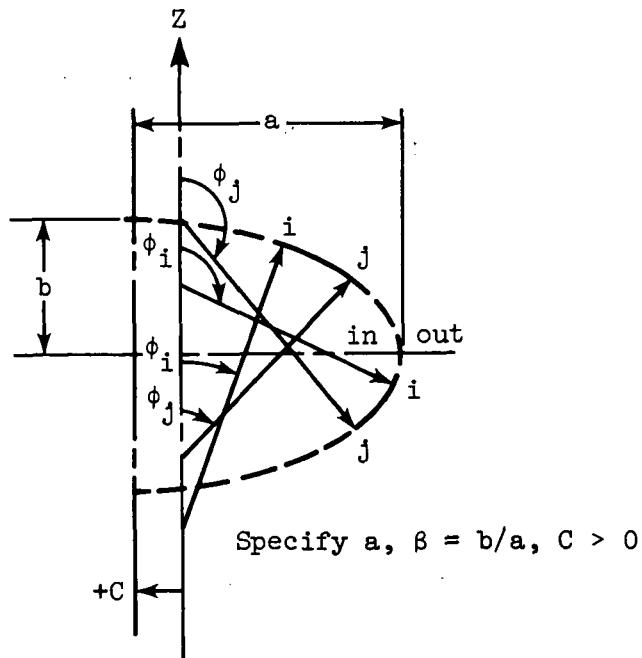
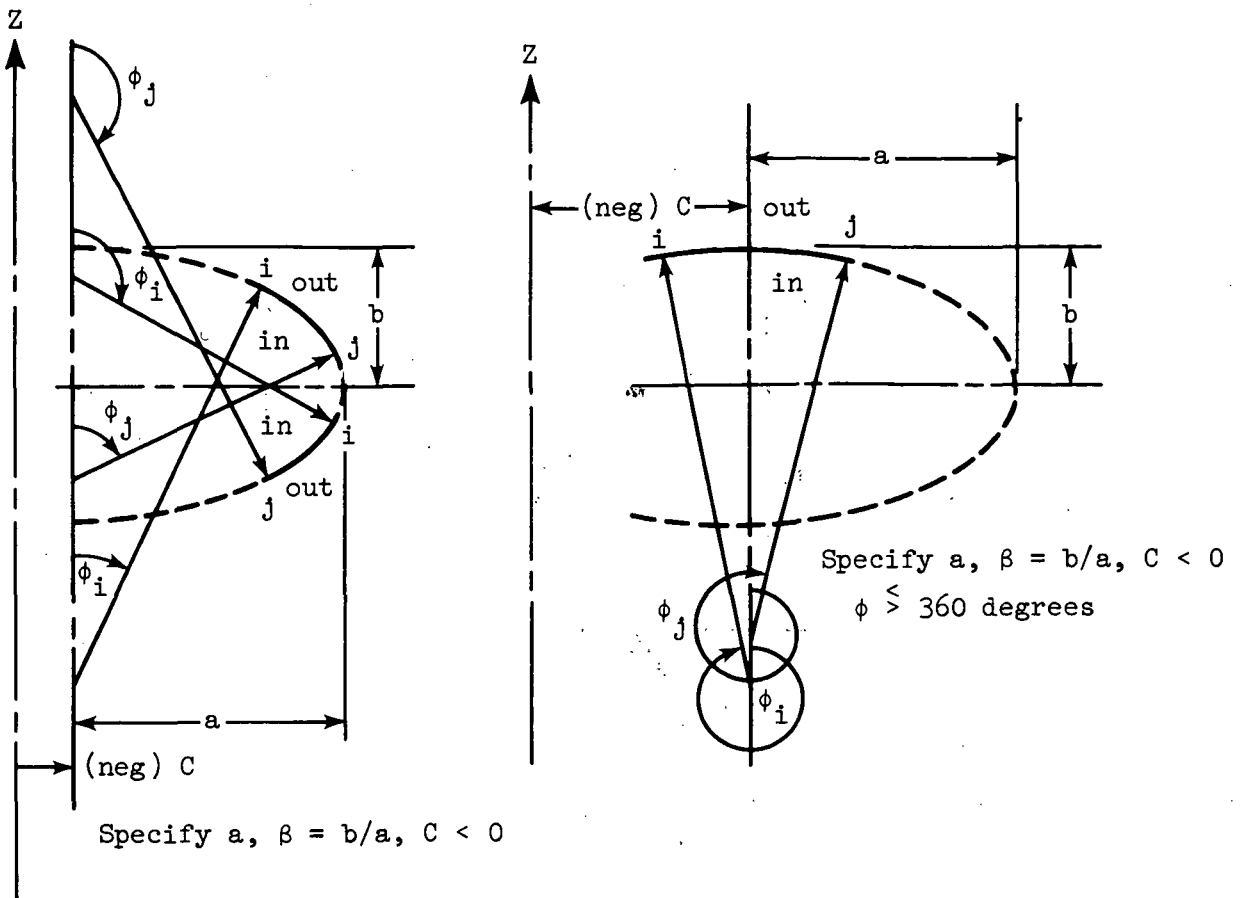


Figure 2-4b: Translated Ellipsoid

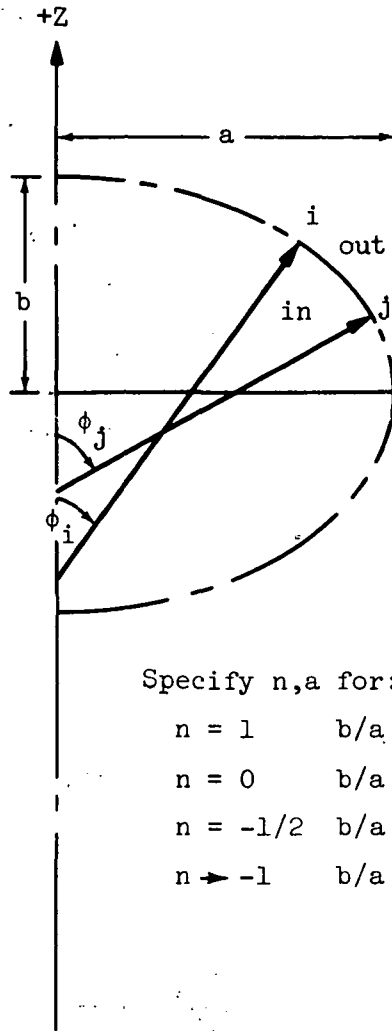


Figure 2-5. Modified Ellipsoid

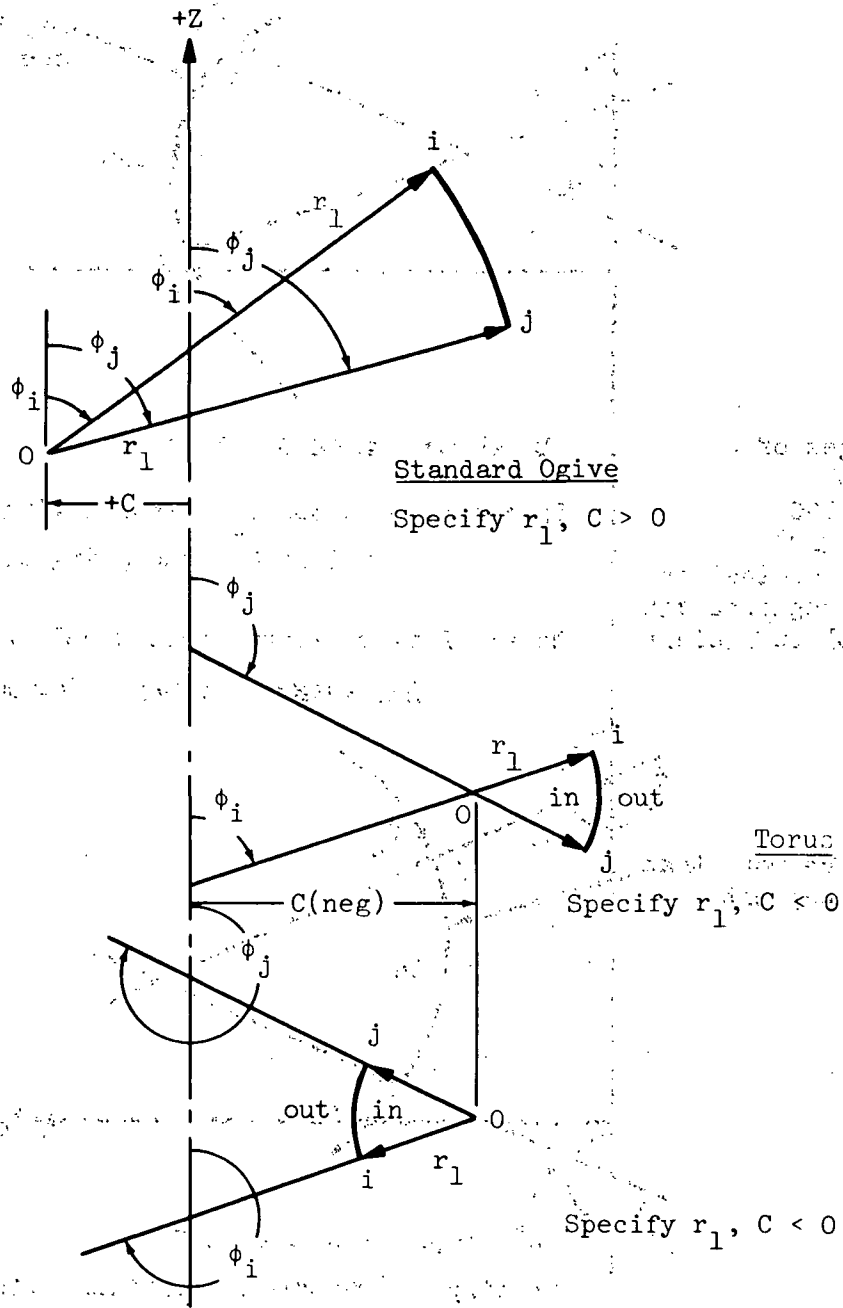
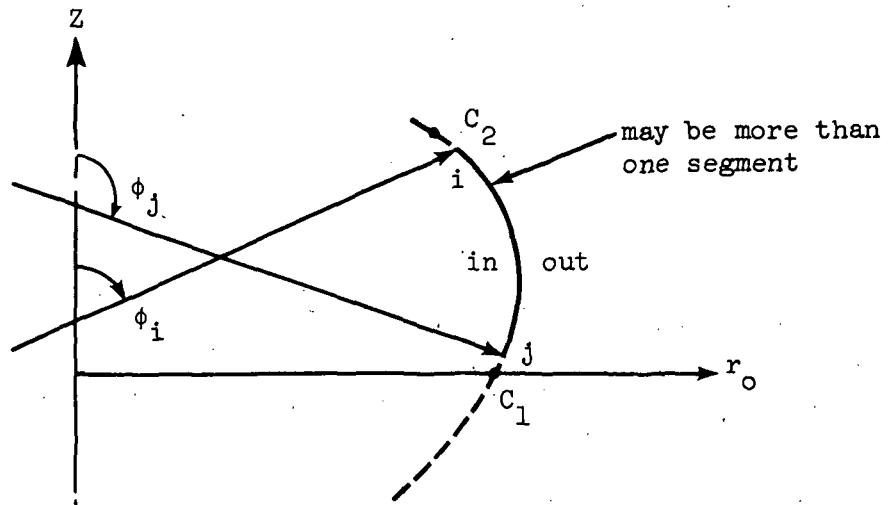


Figure 2-6. Ogive

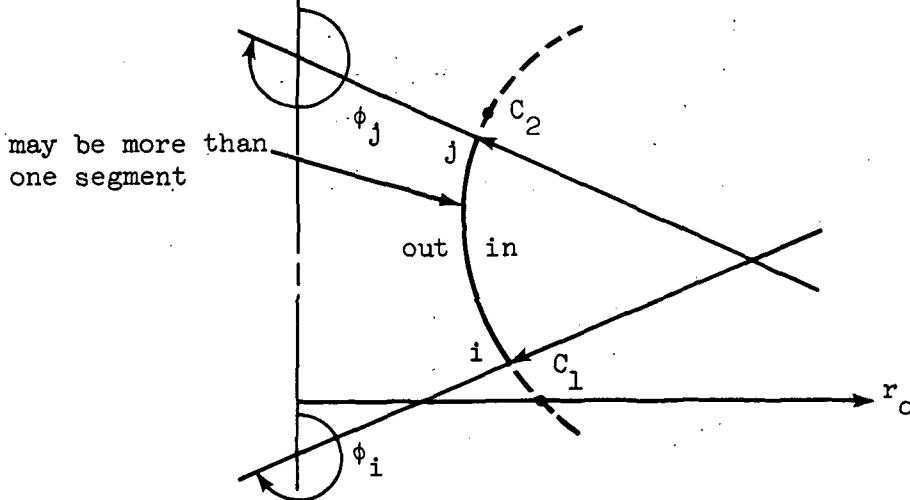


In the ranges of ϕ
 $0^\circ \leq \phi < 10^\circ$
 $170^\circ < \phi < 190^\circ$
 $350^\circ < \phi \leq 360^\circ$
 spherical, toroidal or
 elliptical segments can
 be used with sufficient
 accuracy.

"B" shape $10^\circ \leq \phi \leq 170^\circ$

Specify: Z versus r_o starting with
 $Z = 0$ at C_1 , and going to C_2 .

Note: Z vs r_o input table should overlap
total range of ϕ input for all segments.

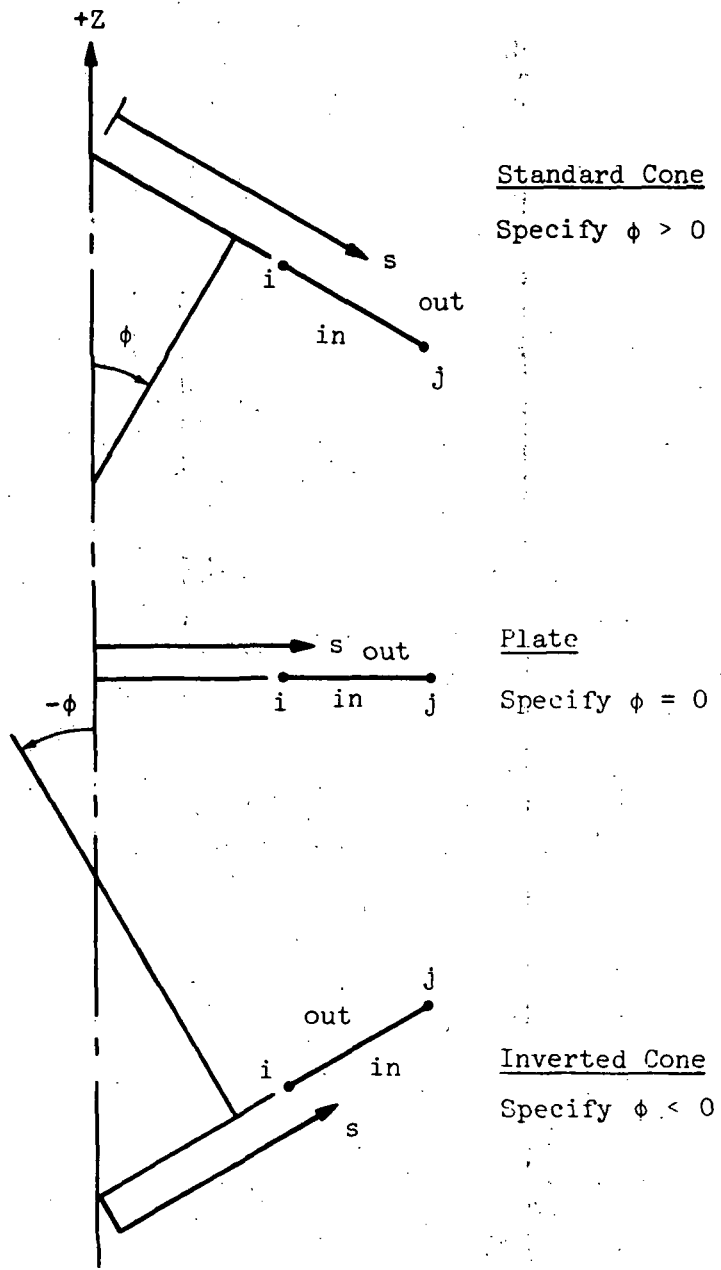


"A" shape $190^\circ \leq \phi \leq 350^\circ$

Specify: Z versus r_o starting with
 $Z = 0$ at C_1 , and going to C_2 .

Note: Z vs r_o input table should overlap
total range of ϕ input for all segments.

Figure 2-7. General Geometry



Standard Cone

Specify $\phi > 0$

Plate

Specify $\phi = 0$

Inverted Cone

Specify $\phi < 0$

Figure 2-8. Cone

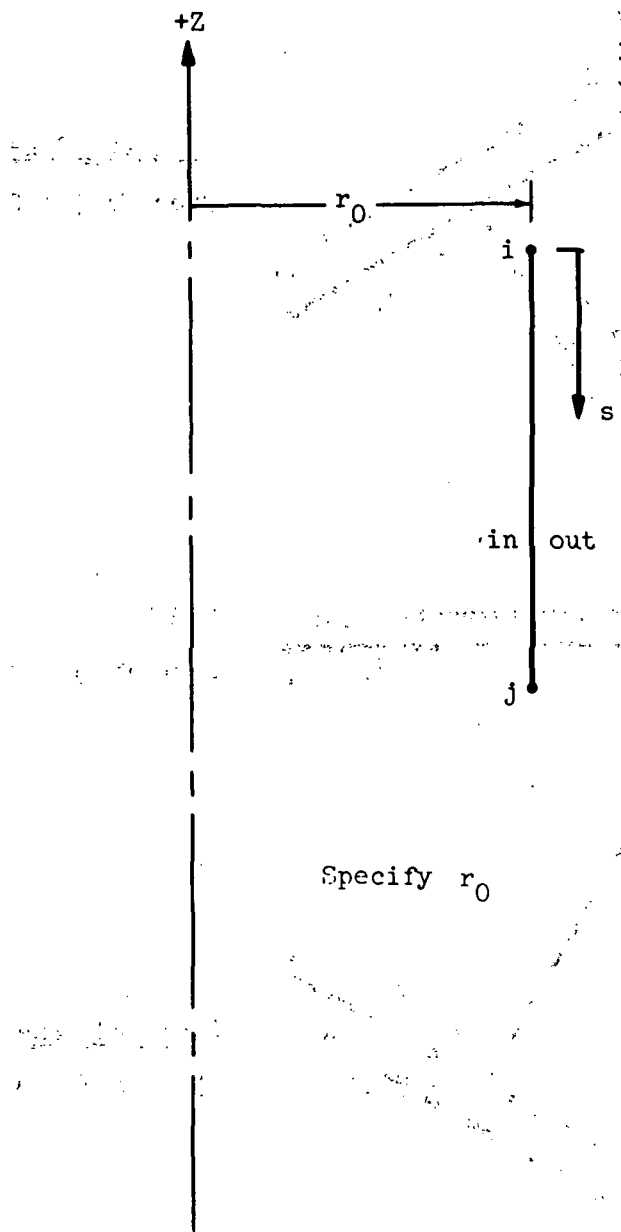


Figure 2-9. Cylinder

SEGMENT CARDS

Column Format

This sequence of cards is repeated for each segment within the region.

1. Identification Card

A. Segment identification code (see Figures 2-4 to 2-9)

1. Ellipsoidal or spherical shell	Code = 11	1-2	F2.0
2. Modified ellipse shape	Code = 12	1-2	F2.0
3. Ogival - Toroidal	Code = 13	1-2	F2.0
4. General Geometry (see Figure 2-7)	Code = 14A or 14B	1-3	F2.0A1
5. Dummy geometry slot (ϕ coordinate)	Code = 15	1-2	F2.0
6. Conical - Circular Plate	Code = 21	1-2	F2.0

The plate is treated as a cone with zero angle.

7. Cylindrical shell	Code = 31	1-2	F2.0
----------------------	-----------	-----	------

B. Any alphanumeric information (segment description)	4-67	16A4
---	------	------

2. "MAGIC" Control Card

A. Interval at which final answers are to be printed (in radians or inches).	1-14	E14.1
---	------	-------

The ϕ -coordinate is defined for all geometric shapes except the cylinder, cone and plate, for which the s coordinate is used. Figures 2-4 through 2-9 describe these coordinates for each shape.

B. Difference	15-28	E14.1
---------------	-------	-------

The value recommended depends upon the computer used. For eight figure accuracy computers it is 1.0 E-6; for the IBM 360 it is 1.0 E-4.

C. Integration interval	29-42	E14.1
-------------------------	-------	-------

The Runge Kutta numerical integration procedure is substantially more accurate than finite differencing. An interval of (.01 to .03) x segment size (in radians or inches) is recommended in eigenvalue analysis so as to be able to represent eigenvectors with high wrinkling in the segment interior. (In using a 30 point segment table (see p. 2-37) there should be at least 30 integration steps.)

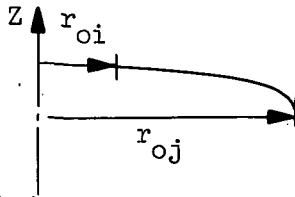
D. Delta	71-72	F2.0
----------	-------	------

For a fixed-step integration, Delta = 0.

This card controls the Runge-Kutta numerical integration scheme. The suggested values above yield accurate results for a fixed-step integration method.

Calculation of Segment Length

There is a restriction on the length of the shell segments. Physically, the restriction demands that boundary disturbances at one edge be distinctly felt at the other edge. This is a consequence of using a numerical integration procedure. Since the segment stiffness matrices must be symmetric, the calculations involved in obtaining each matrix element must be such that a computer round off error never becomes prominent. Limiting the segment length insures satisfaction of this criterion. This length is a function of both geometric shape and segment location within a specific geometry. One of the limiting factors is that the ratio of the radii of revolution at the initial and final points of a segment be greater than one hundredth and less than one hundred. Thus $\frac{1}{100} < \left(\frac{r_{oi}}{r_{oj}} \right) < 100$ where:



This requires smaller segments than will normally be predicted by formula in the area of an apex. In addition, note that $(\phi = 0)$ is not an acceptable input point (except for the torus-ogive or offset ellipsoid).

For a cylinder, the segment length parameter,

$$\Lambda = (1 + \gamma)^{\frac{1}{2}} \beta \Delta s$$

should be held to about 4.0. In this expression, "γ" is a non-linear parameter. For homogeneous shells:

$$\gamma = \left[3(1 - \nu^2) \right]^{\frac{1}{2}} \left(\frac{\bar{N}_\phi r_o}{EH^2} \right)$$

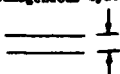


It is zero for a linear problem.

"β" is a measure of the rate of decay of a disturbance in the shell.

"Δs" is the meridional length.

$$r_o = r_2 \sin \phi$$

The values of β^4 and Δs for various shell geometries are given below:

<p>Homogeneous Cylinder</p>  <p>Sandwich Cylinder - Equal Face Sheets</p>  <p>Sandwich Cylinder - Unequal Face Sheets</p> 	$\beta^4 = \frac{3(1-\nu^2)}{r_0^2 h^2}$ $\beta^4 = \frac{3(1-\nu^2)}{r_0^2 (4h^2 + 6ht + 3t^2)}$ $\beta^4 = \frac{3(1-\nu^2)}{(h_1 + h_0)^4 + 12h_1 h_0 t (h_1 + h_0 + t)} \left[\frac{h_1 + h_0}{r_0} \right]^2$	<p>For $\nu = 0.3$, $\Delta s \leq h$</p> $\Delta s \leq \frac{3.11(r_0 h)^{\frac{1}{2}}}{(1+\nu)^{\frac{1}{4}}}$ $\Delta s \leq 3.11 \left[r_0^2 (4h^2 + 6ht + 3t^2) \right]^{\frac{1}{4}}$ $\Delta s \leq 3.11 \left[\frac{r_0}{h_1 + h_0} \right]^{\frac{1}{2}} \left[(h_1 + h_0)^4 + 12h_1 h_0 t (h_1 + h_0 + t) \right]^{\frac{1}{4}}$
---	---	--

Approximate formulas can be obtained for near cylindrical regions of generally curved surfaces. The length parameter,

$$\Lambda = (1 + \gamma)^{\frac{1}{2}} \lambda \Delta \phi$$

should be held to about 4.0. In this expression " γ " has the same definition as in the cylinder case.

" λ " is a measure of the rate of decay of a disturbance in the shell.

" $\Delta \phi$ " = $\frac{\Delta s}{r_1}$ is the angle intercepted by a meridional arc length " Δs ".

The values of λ^4 and Δs for various shell geometries are given below:

<p>Homogeneous Construction</p> <p>Sandwich Construction - Equal Face Sheets</p> <p>Sandwich Construction - Unequal Face Sheets</p>	$\lambda^4 = 3(1-\nu^2) \frac{r_1^4}{r_2^2 h^2}$ $\lambda^4 = \frac{3(1-\nu^2) r_1^4}{r_2^2 (4h^2 + 6ht + 3t^2)}$ $\lambda^4 = \frac{3(1-\nu^2) r_1^4}{(h_1 + h_0)^4 + 12h_1 h_0 t (h_1 + h_0 + t)} \left[\frac{h_1 + h_0}{r_2} \right]^2$	<p>For $\nu = 0.3$, $\Delta s \leq h$:</p> $\Delta s \leq \frac{3.11(r_2 h)^{\frac{1}{2}}}{(1+\nu)^{\frac{1}{4}}}$ $\Delta s \leq 3.11 \left[r_2^2 (4h^2 + 6ht + 3t^2) \right]^{\frac{1}{4}}$ $\Delta s \leq 3.11 \left[\frac{r_2}{h_1 + h_0} \right]^{\frac{1}{2}} \left[(h_1 + h_0)^4 + 12h_1 h_0 t (h_1 + h_0 + t) \right]^{\frac{1}{4}}$
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The minimum allowable segment length is 1×10^{-3}
 (inches or radians according to segment sizing).

	<u>Column</u>	<u>Format</u>
3. Geometric Description Card		
A. Ellipsoid and sphere (Figure 2-4)		
1. Semi-axis <u>perpendicular</u> to Z-direction (a)	1-14	E14.1
2. Ratio of semi-axis in the Z-direction (b) to (a), $\beta = \left(\frac{b}{a}\right)$	15-28	E14.1
3. C = offset distance (\pm) (C = 0.0 if no offset)	29-42	E14.1
B. Modified ellipse shape (Figure 2-5)		
1. Axis ratio coefficient (n)	1-14	E14.1
2. Semi-axis <u>perpendicular</u> to Z-direction (a)	15-28	E14.1
C. Ogive (Figure 2-6)		
1. r_1 = radius	1-14	E14.1
2. C = offset distance (\pm)	15-28	E14.1
D. General Geometry (Figure 2-7)		
1. Number of pairs of Z versus r_o points (≤ 14)	1-2	I2
2. Z versus r_o points, <u>in pairs</u> , starting with Z value (7 values per card, including first card, for up to 4 cards total).	3-72 1-70	F10.0 or F10.0
In the input table the first Z value is taken as $Z_1 = 0$, and furthermore $Z_i > 0$ ($i = 2 - 14$) (see Figure 2-7).		
E. Cone (Figure 2-8)		
1. Angle ϕ in radians (for flat plate, $\phi = 0$). Keep in mind that this ϕ is a constant for a given cone and should not be confused with the ϕ on the MAGIC Control Card.	1-14	E14.1
F. Cylinder (Figure 2-9)		
1. Radius	1-14	E14.1

4. Master Clue Card

This card contains a series of clues which determine the program and table locations to be used for the segment being described. For a master flow chart of clues and options in the program see Figure 2-1.

Note: In a two loading condition stability analysis only one condition can involve temperature. Thus the thermal clue on this card refers to that load condition. One load clue card in this case must contain a zero in column 1 (see card set 8).

A. Material Table Type Clue 1-4 A4

This clue defines the type of material property table to be expected for the segment: This, as well as the following clue determines the material properties that will be used in the structural analysis for the segment. Thus these two clues should match the two clues used on the identification card of the corresponding material property table. As mentioned before on page 2-19, the three possibilities are:

ISOT
ORTH
STIF

B. Material Title 11-14 A4

This name should be the same as the name which appears on the material property table which contains the properties to be utilized for this segment.

C. Sheet Clue 21-24 A4

This clue informs the program as to what kind of shell wall cross section to expect. If the shell is of single sheet construction, the clue to be used is: SING. If the shell wall is an equal-size face sheet sandwich, the clue to be used is: EQUA. If the shell wall is a sandwich but the face sheets are not equal, the clue to be used is: UNEQ. Finally, if the shell segment is reinforced by rings, stringers, a waffle, or an isogrid, the clue to be used is: BLAN.

D. Reinforcement Clue 31-34 A4

This clue describes the type of reinforcement that is present on the shell. If the shell is purely of single sheet or equal or unequal-size face sheet honeycomb construction (no reinforcing), the clue to be used is: THIC. If the reinforcement consists of rings or stringers or both, located along the coordinate axes (θ and ϕ or s), three clues are possible depending upon the basic shell wall construction. If the basic

wall construction is a single sheet, the clue to be used is ST11. If the basic shell wall is an equal-size face sheet sandwich, the clue to be used is ST12. If the basic shell wall is a sandwich but the face sheets are unequal, the clue to be used is ST13. If the reinforcement consists of a waffle which is rotated at an arbitrary angle β from the meridional axis the following three clues are possible depending upon the basic shell wall construction. If the basic wall construction is a single sheet, the clue to be used is RWA1. If the basic shell wall is an equal-size face sheet sandwich, the clue to be used is RWA2. If the basic shell wall is a sandwich but the face sheets are unequal, the clue to be used is RWA3. If the reinforcement consists of an isogrid construction of general angle β from the meridional axis (normally $\beta = 30^\circ$) the following three clues are possible depending upon the basic shell wall construction. If the basic wall construction is a single sheet, the clue to be used is ISG1. If the basic shell wall is an equal-size face sheet sandwich, the clue to be used is ISG2. If the basic shell wall is a sandwich but the face sheets are unequal, the clue to be used is ISG3. Two other clues are available, namely ST10 and RWAF, if the user wishes to input his own stiffness constants. These constants may represent any wall construction as long as the basic Hooke's Laws used with the clues are appropriate to describe the construction to be considered. The Hooke's Laws used with these clues are given under the description of segment card set 6.

Note: The reinforcement described in the segment cards is closely spaced reinforcement which will be smeared over the segment. Discrete rings at segment ends in a region are described at the end of all segment data for that region.

E. Thermal Clue

41-44

A4

This clue describes the type of thermal problem which exists in the segment. The user is reminded that in a stability run only one of the two possible load cases can be thermal, and this clue pertains to that case. If there is no thermal load on the segment, the clue to be used is NOTH. If the thermal loading on the segment is of general, standard type, that is if there is variation

of temperature through the thickness as well as in the coordinate directions, the clue to be used is THST. If the thermal load is such that the variation is all in the coordinate directions, and there is no thermal variation through the thickness, the clue to be used is THCN. The last clue concerns a shell which is inhomogeneous in the meridional direction. This is not really a thermal problem at all, but merely a manipulation of the material property tables. If a structure has a wide variation in material properties in the meridional direction, without this last option one must take short segments of constant properties for analysis. With this option, however, the property variation is placed in the material property table, and expressed on the segment as a function of temperature. No thermal loads are calculated, however, and the temperatures are only used to interpolate for material properties as integration is progressing along the segment. Thus continual variation of properties in the meridional direction is accommodated. The clue for this option is THIN.

F. Stress-free Temperature

51-60

E10.1

The value of the temperature (usually room temperature) at which the segment has no thermal stresses or distortions induced, is provided here. This is the temperature at which the shell was manufactured. If there is to be no thermal analysis, this value is not used and can be set to zero (0.0).

- G. Table control - Number of points in each of the following tables.

71-72

I2

This can vary from 2 to 30 depending upon the shell geometry and loading. For a linearly varying geometry and/or loading only 2 input points would be required. These two points would be the end points. For more general loading and/or geometry a larger number of points are required. In particular, each abrupt change is specified by two points. One should use as many points as necessary (up to 30) in order to completely describe the problem, rather than using very short segments.

5. Table of ϕ or s Values

- A. Initial, intermediate and final values of ϕ or s. Each point requires 14 columns on a card and thus there can be 5 values per card and up to 6 cards to make a total of up to 30 points. The points to be specified are the beginning point of the segment, any point of discontinuity, and the end point of the segment. The input must be consistent with item G of the previous card.

5E14.7

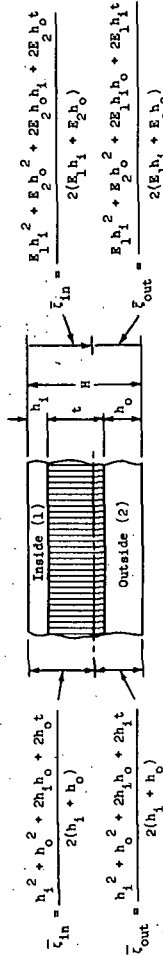
6. Table of Wall Crosssection Geometry

The contents of these cards (up to 6 cards per item below) are dependent upon the clues registered on the Master Clue Card. If the shell to be described contains no reinforcing, the pertinent clue is item 4C, the Sheet Clue. The geometry is input and the stiffnesses are calculated by the program (see Figure 2-10). The input is presented below as a function of the Sheet Clue.

If the Sheet Clue is SING (single sheet construction):

- A. Initial, intermediate and final values of wall thickness (h_1) at points defined by table of ϕ or s values.

5E14.7



E, v, Constant through thickness

Unequal material properties for the face sheets.
Restriction: properties are such that a neutral plane exists.

Configuration	Extensional Stiffness	Bending Stiffness	Shear Stiffness
<p>Orthotropic h_1 t</p>	$K_{11} = \frac{E_1 h_1}{1 - \nu_1^2 \theta_1}$ $K_{22} = \frac{E_2 h_2}{1 - \nu_2^2 \theta_2}$	$D_{11} = \frac{E_1 h_1^3}{12(1 - \nu_1^2 \theta_1^2)}$ $D_{22} = \frac{E_2 h_2^3}{12(1 - \nu_2^2 \theta_2^2)}$	$K_{33} = G_1 \theta_1$ $D_{33} = \frac{G_1 h_1^3}{12}$
<p>Equal Face Sheets h_1 t t h_1</p>	$K_{11} = \frac{E_1 h_1}{1 - \nu_1^2 \theta_1} + \frac{E_2 h_2}{1 - \nu_2^2 \theta_2}$ $K_{22} = \frac{E_1 h_1}{1 - \nu_1^2 \theta_1} + \frac{E_2 h_2}{1 - \nu_2^2 \theta_2}$ $K_{11} = \frac{E_1 h_1}{1 - \nu_1^2 \theta_1} + \frac{E_2 h_2}{1 - \nu_2^2 \theta_2}$ $K_{22} = \frac{E_1 h_1}{1 - \nu_1^2 \theta_1} + \frac{E_2 h_2}{1 - \nu_2^2 \theta_2}$	$D_{11} = \frac{E_1 h_1^3}{12(1 - \nu_1^2 \theta_1^2)} + \frac{E_2 h_2^3}{12(1 - \nu_2^2 \theta_2^2)}$ $D_{22} = \frac{E_1 h_1^3}{12(1 - \nu_1^2 \theta_1^2)} + \frac{E_2 h_2^3}{12(1 - \nu_2^2 \theta_2^2)}$ $D_{11} = \frac{E_1 h_1^3}{12(1 - \nu_1^2 \theta_1^2)} + \frac{E_2 h_2^3}{12(1 - \nu_2^2 \theta_2^2)}$ $D_{22} = \frac{E_1 h_1^3}{12(1 - \nu_1^2 \theta_1^2)} + \frac{E_2 h_2^3}{12(1 - \nu_2^2 \theta_2^2)}$	$K_{33} = h_1(G_{\theta 1} + G_{\theta 2})$ $D_{33} = \frac{h_1^3}{12}(G_{\theta 1} + G_{\theta 2}) + h_1[G_{\theta 1}(\frac{h_1}{2})^2 + G_{\theta 2}(\frac{h_2}{2})^2]$
<p>Unequal Face Sheets h_1 t h_0</p>	$K_{11} = \frac{E_1 h_1}{1 - \nu_1^2 \theta_1} + \frac{E_2 h_0}{1 - \nu_2^2 \theta_2}$ $K_{22} = \frac{E_1 h_1}{1 - \nu_1^2 \theta_1} + \frac{E_2 h_0}{1 - \nu_2^2 \theta_2}$	$D_{11} = \frac{E_1 h_1^3}{12(1 - \nu_1^2 \theta_1^2)} + \frac{E_2 h_0^3}{12(1 - \nu_2^2 \theta_2^2)}$ $D_{22} = \frac{E_1 h_1^3}{12(1 - \nu_1^2 \theta_1^2)} + \frac{E_2 h_0^3}{12(1 - \nu_2^2 \theta_2^2)}$	$K_{33} = G_1 \theta_1 + G_2 \theta_2$ $D_{33} = \frac{h_1^3}{12} G_{\theta 1} + \frac{h_0^3}{12} G_{\theta 2} + G_{\theta 1} h_1 (\frac{h_1}{2})^2 + G_{\theta 2} h_0 (\frac{h_0}{2})^2$

Figure 2-10 Shell Section Properties

ColumnFormat

If the Sheet Clue is EQUA (equal-size face sheet sandwich):

A. Initial, intermediate and final values of face sheet thickness (h_i) at points defined by table of ϕ or s values. 5E14.7

B. Initial, intermediate and final values of core thickness (t) at points defined by table of ϕ or s values. 5E14.7

If the Sheet Clue is UNEQ (unequal-size face sheet sandwich):

A. Initial, intermediate and final values of inner face sheet thickness (h_i) at points defined by table of ϕ or s values. 5E14.7

B. Initial, intermediate and final values of core thickness (t) at points defined by table of ϕ or s values. 5E14.7

C. Initial, intermediate and final values of outer face sheet thickness (h_o) at points defined by table of ϕ or s values. 5E14.7

If the shell is reinforced, the Sheet Clue will be BLAN. In this case it is the following, or Reinforcement Clue (item 4D) which will determine the contents of card series 6. For the reinforcement cases the geometry can be complex and varied, since all types of reinforcing are to be included. The reinforced shell input is presented below as a function of the Reinforcement Clue.

If the Reinforcement Clue is ST11 (single sheet reinforced by rings and/or stringers):

A. Initial, intermediate and final values of the torsional stiffness in the ϕ direction (GJ_ϕ) at points defined by table of ϕ or s values. 5E14.7

B. Initial, intermediate and final values of the torsional stiffness in the θ direction (GJ_θ) at points defined by table of ϕ or s values. 5E14.7

C. Initial, intermediate and final values of stringer area (A_ϕ) at points defined by table of ϕ or s values. 5E14.7

D. Initial, intermediate and final values of ring area (A_θ) at points defined by table of ϕ or s values. 5E14.7

E. Initial, intermediate and final values of stringer eccentricity (measured inwards from base shell centroid as positive) at points defined by table of ϕ or s values. 5E14.7

	<u>Column</u>	<u>Format</u>
F. Initial, intermediate and final values of ring eccentricity (measured inwards from base shell centroid as positive) at points defined by table of ϕ or s values.		5E14.7
G. Initial, intermediate and final values of stringer moment of inertia (about base shell centroidal axis) at points defined by table of ϕ or s values.		5E14.7
H. Initial, intermediate and final values of ring moment of inertia (about base shell centroidal axis) at points defined by table of ϕ or s values.		5E14.7
I. Initial, intermediate and final values of stringer spacing at points defined by table of ϕ or s values. (Do <u>not</u> set to zero if no stringers.)		5E14.7
J. Initial, intermediate and final values of ring spacing at points defined by table of ϕ or s values. (Do <u>not</u> set to zero if no rings.)		5E14.7
K. Initial, intermediate and final values of base shell wall thickness (h_i) at points defined by table of ϕ or s values.		5E14.7

If the Reinforcement Clue is ST12 (equal face sheet sandwich reinforced by rings and/or stringers):

A. through J. The items contained on these cards are those described for the ST11 clue above.	10 sets of	5E14.7
K. Initial, intermediate and final values of base shell face sheet thickness (h_i) at points defined by table of ϕ or s values.		5E14.7
L. Initial, intermediate and final values of base shell core thickness (t) at points defined by table of ϕ or s values.		5E14.7

If the Reinforcement Clue is ST13 (unequal face sheet sandwich reinforced by rings and/or stringers):

A. through J. The items contained on these cards are those described for the ST11 clue above.	10 sets of	5E14.7
K. Initial, intermediate and final values of base shell <u>inner</u> face sheet thickness (h_i) at points defined by table of ϕ or s values.		5E14.7
L. Initial, intermediate and final values of base shell core thickness (t) at points defined by table of ϕ or s values.		5E14.7

M. Initial, intermediate and final values of base shell outer face sheet thickness (h_0) at points defined by table of ϕ or s values. 5E14.7

If the Reinforcement Clue is RWA1 (single sheet reinforced by a waffle rotated at an arbitrary angle from the meridional direction):

A. Initial, intermediate and final values of waffle grid area at points defined by table of ϕ or s values. 5E14.7

B. Initial, intermediate and final values of waffle grid eccentricity (measured inwards from base shell centroid as positive) at points defined by table of ϕ or s values. 5E14.7

C. Initial, intermediate and final values of waffle grid moment of inertia (about base shell centroidal axis) at points defined by table of ϕ or s values. 5E14.7

D. Initial, intermediate and final values of waffle grid spacing at points defined by table of ϕ or s values. 5E14.7

E. Initial, intermediate and final values of waffle grid rotation angle, β , (in radians from the meridional direction) at points defined by table of ϕ or s values. 5E14.7

F. Initial, intermediate and final values of extreme distance from base shell centroid to waffle outer edge (\pm value, positive inwards), at points defined by table of ϕ or s values. 5E14.7

G. Initial, intermediate and final values of base shell wall thickness (h_i) at points defined by table of ϕ or s values. 5E14.7

If the Reinforcing Clue is RWA2 (equal face sheet sandwich reinforced by a waffle rotated at an arbitrary angle from the meridional direction):

A. through F. The items contained on these cards are those described for the RWA1 clue above. 6 sets of 5E14.7

G. and H. The items contained on these cards are those described for the ST12 clue above as items K. and L. 2 sets of 5E14.7

If the Reinforcing Clue is RWA3 (unequal face sheet sandwich reinforced by a waffle rotated at an arbitrary angle from the meridional direction):

A. through F. The items contained on these cards are those described for the RWA1 clue above. 6 sets of 5E14.7

G. through I. The items contained on these cards are those described for the ST13 clue above as items K. through M. 3 sets of 5E14.7

If the Reinforcing Clue is ISG1 (single sheet reinforced by a general angle isogrid construction):

- A. through D. The items contained on these cards are identical to those described for the RWAL clue above, but with reference to the isogrid. 4 sets of 5E14.7
- E. Initial, intermediate and final values of the isogrid angle, β , (in radians from the meridional direction, see Reference 1 Appendix A). For the normal isogrid, the angle is 30° (input in radians). 5E14.7
- F. Initial, intermediate and final values of base shell wall thickness (h_i) at points defined by table of ϕ or s values. 5E14.7

If the Reinforcing Clue is ISG2 (equal face sheet sandwich reinforced by a general angle isogrid construction):

- A. through E. The items contained on these cards are those described for the ISG1 clue above. 5 sets of 5E14.7
- F. and G. The items contained on these cards are those described for the ST12 clue above as items K. and L. 2 sets of 5E14.7

If the Reinforcing Clue is ISG3 (unequal face sheet sandwich reinforced by a general angle isogrid construction):

- A. through E. The items contained on these cards are those described for the ISG1 clue above. 5 sets of 5E14.7
- F. through H. The items contained on these cards are those described for the ST13 clue above as items K. through M. 3 sets of 5E14.7

If the Reinforcing Clue is ST10 the following Hooke's Laws will be used by the program for the description of the shell wall:

$$N_\theta = K_{11} \epsilon_{\theta_0} + K_{12} \epsilon_{\phi_0} - C_{11} k_\theta - N_{T\theta}$$

$$N_\phi = K_{22} \epsilon_{\phi_0} + K_{12} \epsilon_{\theta_0} - C_{22} k_\phi - N_{T\phi}$$

$$N_{\phi\theta} = N_{\theta\phi} = K_{33} \gamma_{\phi\theta_0}$$

$$M_{\theta} = D_{11}k_{\theta} + D_{12}k_{\phi} + C_{11}\epsilon_{\theta} - M_{T\theta}$$

$$M_{\phi} = D_{22}k_{\phi} + D_{12}k_{\theta} + C_{22}\epsilon_{\phi} - M_{T\phi}$$

$$M_{\phi\theta} = -M_{\theta\phi} = -2D_{33}k_{\phi\theta}$$

Therefore the input is (see Ref. 1 Appendix A):

- | | |
|--|--------|
| A. Initial, intermediate and final values of K_{11} at points defined by table of ϕ or s values. | 5E14.7 |
| B. Initial, intermediate and final values of K_{12} at points defined by table of ϕ or s values. | 5E14.7 |
| C. Initial, intermediate and final values of K_{22} at points defined by table of ϕ or s values. | 5E14.7 |
| D. Initial, intermediate and final values of K_{33} at points defined by table of ϕ or s values. | 5E14.7 |
| E. Initial, intermediate and final values of D_{11} at points defined by table of ϕ or s values.
(Should be input as <u>negative</u> for sign convention.) | 5E14.7 |
| F. Initial, intermediate and final values of D_{12} at points defined by table of ϕ or s values.
(Should be input as <u>negative</u> for sign convention.) | 5E14.7 |
| G. Initial, intermediate and final values of D_{22} at points defined by table of ϕ or s values.
(Should be input as <u>negative</u> for sign convention.) | 5E14.7 |
| H. Initial, intermediate and final values of D_{33} at points defined by table of ϕ or s values. | 5E14.7 |
| I. Initial, intermediate and final values of C_{11} at points defined by table of ϕ or s values. | 5E14.7 |
| J. Initial, intermediate and final values of C_{22} at points defined by table of ϕ or s values. | 5E14.7 |

If the Reinforcing Clue is RWAf the following Hooke's Laws will be used by the program for the description of the shell wall:

$$N_{\theta} = K_{11}\epsilon_{\theta} + K_{12}\epsilon_{\phi} - C_{11}k_{\theta} - C_{15}k_{\phi} - N_{T\theta}$$

$$N_{\phi} = K_{22}\epsilon_{\phi} + K_{12}\epsilon_{\theta} - C_{15}k_{\theta} - C_{22}k_{\phi} - N_{T\phi}$$

$$N_{\phi\theta} = K_{33}\gamma_{\phi\theta} - 2C_{16}k_{\phi\theta}$$

$$M_{\theta} = D_{11} k_{\theta} + D_{12} k_{\phi} + C_{11} \epsilon_{\theta_0} + C_{15} \epsilon_{\phi_0} - M_{T\theta}$$

$$M_{\phi} = D_{22} k_{\phi} + D_{12} k_{\theta} + C_{15} \epsilon_{\theta_0} + C_{22} \epsilon_{\phi_0} - M_{T\phi}$$

$$M_{\phi\theta} = -2D_{33} k_{\phi\theta} + C_{16} \gamma_{\phi\theta_0}$$

Therefore the input is (see Ref. 1 Appendix A):

- A. through J. The items contained on these cards are those described for the ST10 clue above. 10 sets of 5E14.7
- K. Initial, intermediate and final values of C_{15} at points defined by table of ϕ or s values. 5E14.7
- L. Initial, intermediate and final values of C_{16} at points defined by table of ϕ or s values. 5E14.7

7. Table of Input Stress Resultants (Stability Only)

This card set is included only if the Prestress Input Clue (Item I page 2 -15) is set to unity.

- A. Initial, intermediate and final values of the hoop stress resultant, N_{θ} , at points defined by table of ϕ or s values. 5E14.7
- B. Initial, intermediate and final values of the meridional stress resultant, N_{ϕ} , at points defined by table of ϕ or s values. 5E14.7

If the number of loading conditions (item G page 2-14) is set to two, then the above two card sets A and B refer to the first (fixed magnitude) load condition. They should be then followed by two more card sets, C and D, identifying the assumed N_{θ} , and N_{ϕ} respectively, for the second (eigen-value) load condition. Do not use normalized values for buckling load or stress resultant assumptions since the program equations are not normalized, and thus such values will be too small for proper calculations.

7. Table of Mass Densities (Vibrations Only)

Dimensions = weight/volume/acceleration due to gravity.

The contents of these cards (up to 6 cards per item below) are dependent upon the clues registered on the Master Clue Card. If the shell to be described contains no reinforcing, the pertinent clue is item 4C, the sheet clue. The input is presented below as a function of the Sheet Clue.

	<u>Column</u>	<u>Format</u>
If the Sheet Clue is SING (single sheet construction):		
A. Initial, intermediate and final values of the wall mass density at points defined by table of ϕ or s values.		5E14.7
If the Sheet Clue is EQUA or UNEQ (sandwich construction):		
A. Initial, intermediate and final values of the core mass density at points defined by table of ϕ or s values.		5E14.7
B. Initial, intermediate and final values of the face sheet mass density at points defined by table of ϕ or s values.		5E14.7
If the shell is reinforced, the Sheet Clue will be BLAN. In this case it is the following, or Reinforcement Clue (item 4D) which will determine the contents of card series 7. The reinforced shell input is presented below as a function of the Reinforcement Clue.		
If the Reinforcement Clue is ST11 (single sheet reinforced by rings and/or stringers):		
A. Initial, intermediate and final values of the base shell mass density at points defined by table of ϕ or s values.		5E14.7
B. Initial, intermediate and final values of the stringer mass density at points defined by table of ϕ or s values.		5E14.7
C. Initial, intermediate and final values of the ring mass density at points defined by table of ϕ or s values.		5E14.7
If the Reinforcement Clue is ST12 or ST13 (sandwich reinforced by rings and/or stringers):		
A. Initial, intermediate and final values of the base shell core mass density at points defined by table of ϕ or s values.		5E14.7
B. Initial, intermediate and final values of the base shell face sheet mass density at points defined by table of ϕ or s values.		5E14.7
C. and D. The items contained on these cards are those described for the ST11 clue as items B. and C.	2 sets of	5E14.7

If the Reinforcement Clue is RWA1 or ISG1 (single sheet reinforced by a rotated waffle or isogrid):

- A. Initial, intermediate and final values of the base shell mass density at points defined by table of φ or s values. 5E14.7
- B. Initial, intermediate and final values of the reinforcement mass density at points defined by table of φ or s values. 5E14.7

If the Reinforcement Clue is RWA2, RWA3, ISG2 or ISG3 (sandwich reinforced by a rotated waffle or isogrid):

- A. Initial, intermediate and final values of the base shell core mass density at points defined by table of φ or s values. 5E14.7
- B. Initial, intermediate and final values of the base shell face sheet mass density at points defined by table of φ or s values. 5E14.7
- C. Initial, intermediate and final values of the reinforcement mass density at points defined by table of φ or s values. 5E14.7

If the Reinforcing Clue is ST10 or RWA4 the program does not have any crosssection description available to it for calculations. Thus the required input in card set 7 for these clues is (see Refs. 1 and 5):

- A. The meridional distributed load on the crosssection due to rotation at points defined by table of φ or s values. For example for a layered section this can be expressed as: 5E14.7

$$r_{\varphi}^1 = \sum_{i=1}^n \rho_i \omega^2 r_i^2 t_i \cos \varphi$$

- B. The normal distributed load on the crosssection due to rotation at points defined by table of φ or s values. For example for a layered section this can be expressed as: 5E14.7

$$r_{\zeta}^1 = - \sum_{i=1}^n \rho_i \omega^2 r_i^2 t_i \sin \varphi$$

- C. The circumferential distributed moment load on the crosssection due to rotation at points defined by table of φ or s values. For example for a layered section this can be expressed as:

$$m_{\theta} = - \sum_{i=1}^n \rho_i \omega_i^2 r_i t_i \bar{y}_i \cos \varphi$$

Note: The sign convention for the above loads is as shown in Figures 2-11.

- | | |
|--|--------|
| D. The crosssection parameter a_0 at points defined by table of φ or s values. | 5E14.7 |
| E. The crosssection parameter a_1 at points defined by table of φ or s values. | 5E14.7 |
| F. The crosssection parameter a_2 at points defined by table of φ or s values. | 5E14.7 |

The crosssection parameters a_j can be defined as follows:

$$a_j = \int_{\text{thickness}} \rho \zeta^{(j)} d\zeta, \quad j = 0, 1, 2$$

where ζ is measured from the centroid (inwards positive).

8. Loading Clue Card (These cards and card sequence 9 are omitted under the following conditions:

Stability - if the prestress input clue (item I page 2- 15) is unity.

Vibrations - if the Dynamic Analysis description clue (item A page 2- 18) is FREV, CRSP or CRSR.)

The contents of this card are numerical clues which alert the program to the types of loads that exist on the segment. In addition, if the clue indicates that some load does not exist, the appropriate cards in series 9 which would ordinarily contain the numerical values of this load are omitted from the sequence.

The series of cards 8 and 9 are repeated for the number of loading conditions indicated on the Program Control Card (item G) up to a maximum of 2 (except in Vibrations - see below). If for one of these loading conditions, no load exists on the segment, then a blank Loading Clue Card is inserted in the sequence at this point and the load cards are entirely omitted (see Ref. 6).

Only in a stability analysis can there possibly be two sets of cards 8 and 9. In vibrations analysis with Dynamic analysis description clues of VPRE, PCRS or PCSR only the prestress load state is described here, the dynamic loads being calculated internally by the program.

The appropriate clues are as follows:

A. Thermal Clue

If there are no thermal loads (Item 4E is NOTH) the clue number is zero (0).

If there is a standard thermal variation through the thickness (Item 4E is THST) the clue number is four (4).

If the temperature is constant through the thickness (Item 4E is THCN) or if the inhomogeneous option is used (Item 4E is THIN) the clue number is one (1).

In a stability analysis only one loading condition can contain temperature. Thus in the case of two load conditions on the shell the above item must be zero on one of the clue cards

B. Enter a zero (0) in column 2.

C. Meridional Load Clue (f_ϕ)

If there are no meridional loads, then the clue number is zero (0).

If there are meridional loads, then the clue number is one (1).

D. Normal Load Clue (f_r)

If there are no normal loads, then the clue number is zero (0).

If there are normal loads, then the clue number is one (1).

	1		I1
	2		I1
	3		I1
	4		I1

Column Format

- E. Circumferential Moment Load Clue (m_θ) 5 I1
 If there are no circumferential moment loads, then the clue number is zero (0).
 If there are circumferential moment loads, then the clue number is one (1).
- F. Enter a zero (0) in column 6 6 I1
- G. Any alphameric information (load description) 7-70 16A4

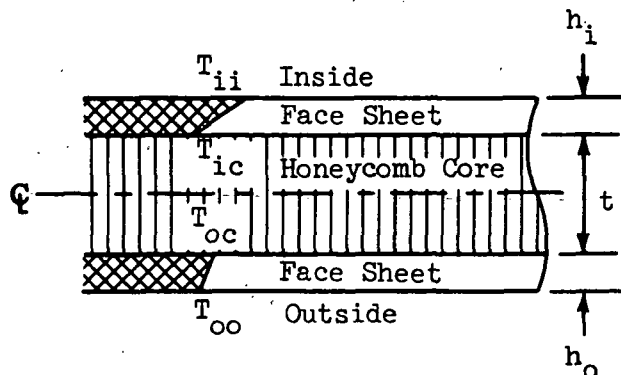
9. Table of Applied Loads (see Figures 2-11a, b for sign convention).

The appropriate card sequence is given below as a function of the Loading Clues on card 8. If the Thermal Clue is one (1):

- A. Initial, intermediate and final values of the temperature of the shell at points defined by table of ϕ or s values. (These values will be used either for a thermal problem where there is no thermal variation through the thickness {Clue = THCN}, or to calculate varying material properties along the shell for an inhomogeneous problem {Clue = THIN}.) 5E14.7

If the Thermal Clue is four (4):

- A. Initial, intermediate and final values of the temperature T_{ij} at points defined by table of ϕ or s values. (The subscripts "nm" indicate temperature location - see below.) 5E14.7



Column Format

- B. Initial, intermediate and final values of the temperature T_{ic} at points defined by table of ϕ or s values. 5E14.7
- C. Initial, intermediate and final values of the temperature T_{oc} at points defined by table of ϕ or s values. 5E14.7
- D. Initial, intermediate and final values of the temperature T_{oo} at points defined by table of ϕ or s values. 5E14.7

If the Thermal Clue is zero (0), the above cards are omitted.

If the Meridional Load Clue is one (1):

- E. Initial, intermediate and final values of the meridional loads f_{ϕ} at points defined by table of ϕ or s values. 5E14.7

If the Meridional Load Clue is zero (0), cards E are omitted.

If the Normal Load Clue is one (1):

- F. Initial, intermediate and final values of the normal loads f_{ζ} at points defined by table of ϕ or s values. 5E14.7

If the Normal Load Clue is zero (0), cards F are omitted.

If the Circumferential Moment Load Clue is one (1):

- G. Initial, intermediate and final values of the circumferential moment loads m_{θ} at points defined by table of ϕ or s values. 5E14.7

If the Circumferential Moment Load Clue is zero (0), cards G are omitted.

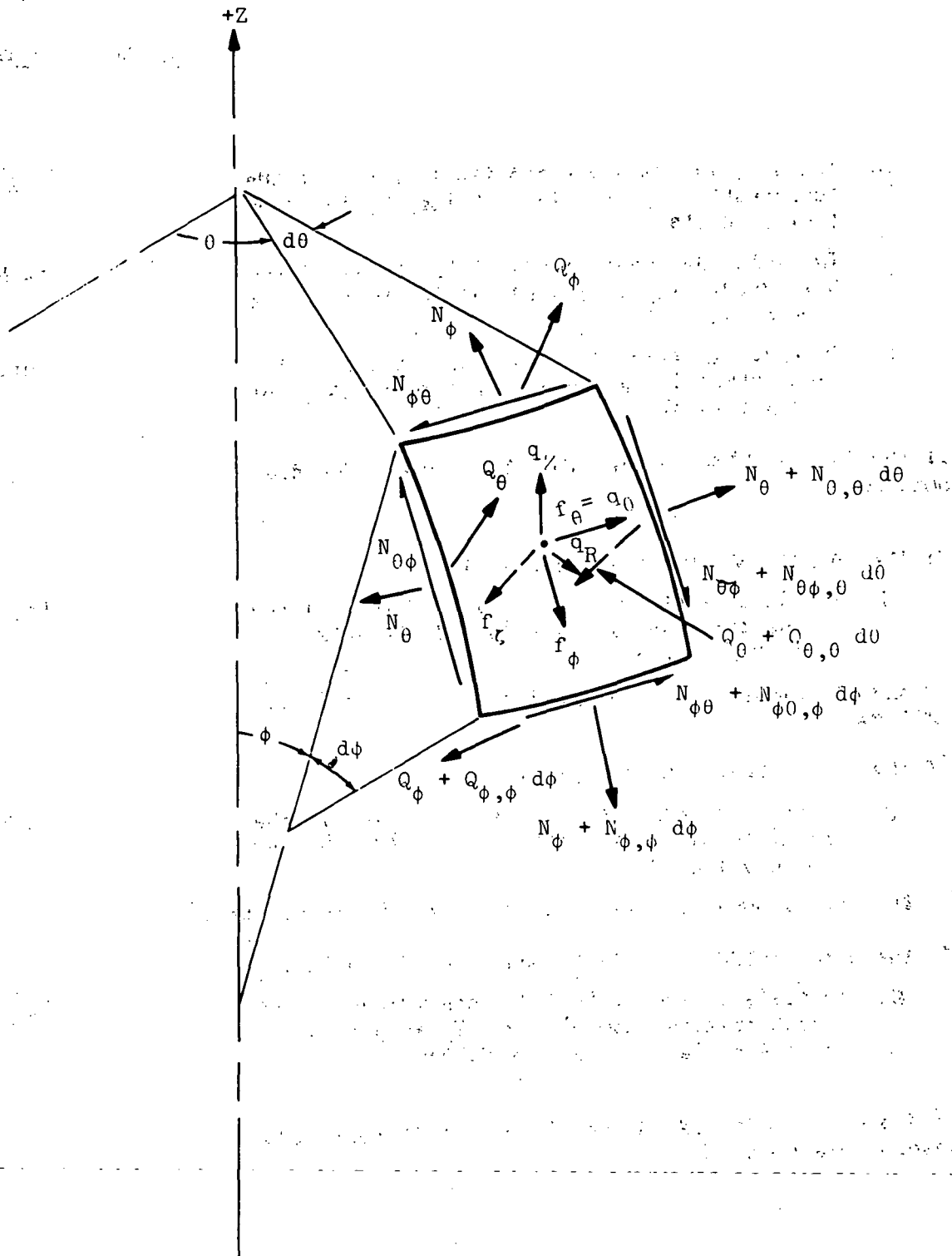


Figure 2-11a. Forces on Shell Element

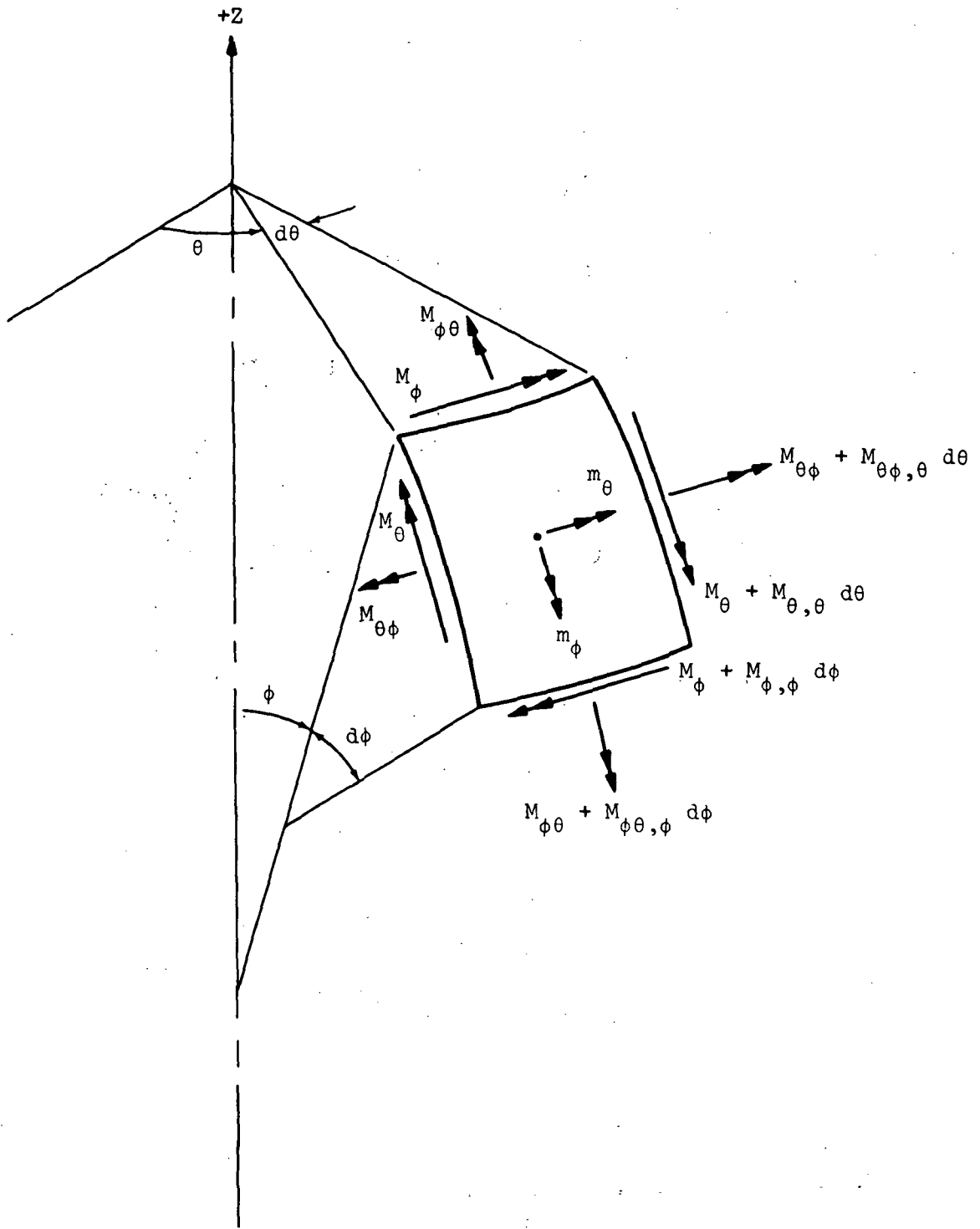


Figure 2-11b. Moments on Shell Element

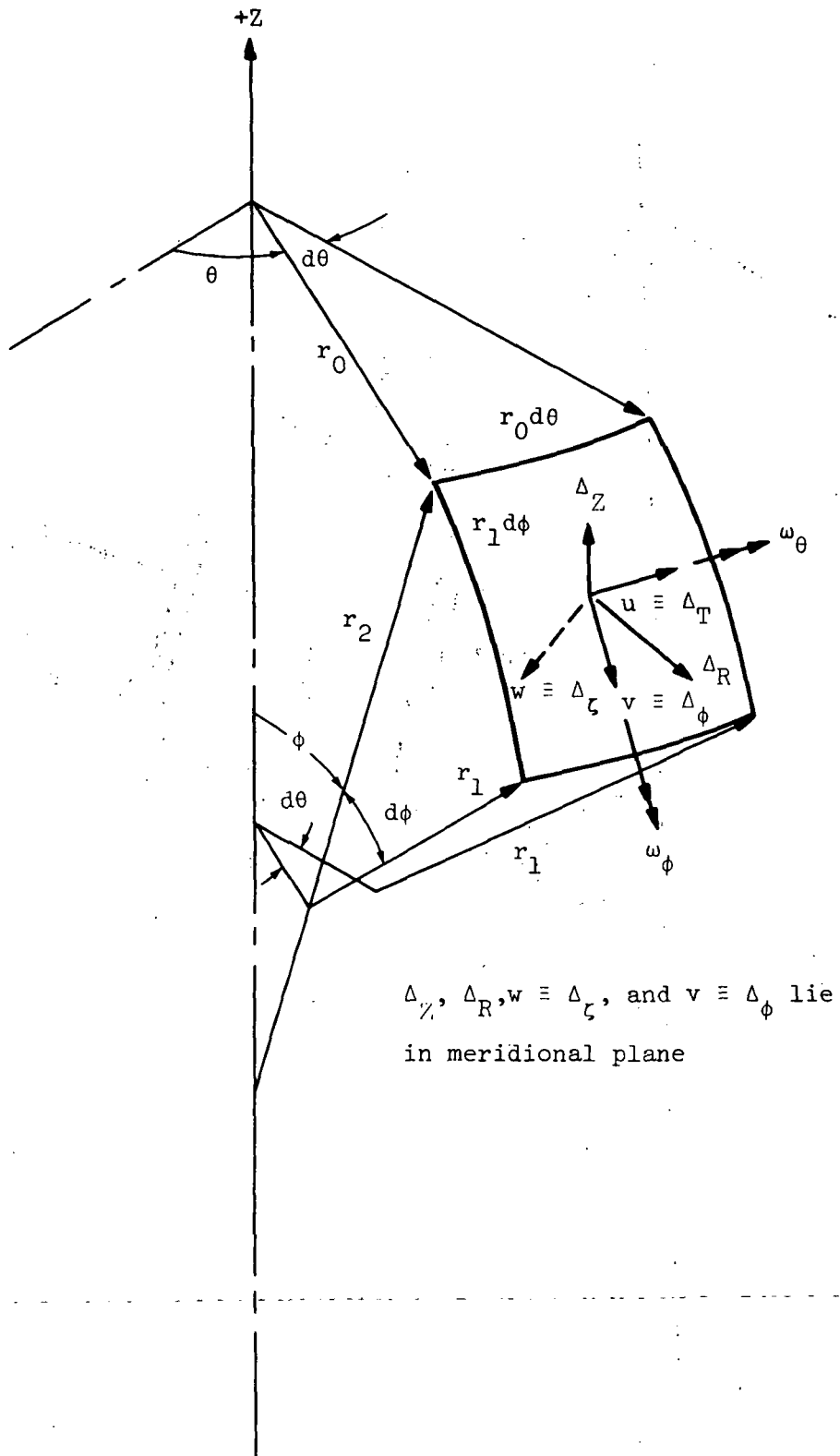


Figure 2-11c. Shell Element Geometry and Displacements

	<u>Column</u>	<u>Format</u>
10. Segment Topology Cards		
A. Segment number	1-5	I5
Number of the segment under consideration.		
B. Joint (i)	6-10	I5
Joint associated with i th end of the segment (TIC).		
C. Joint (j)	11-15	I5
Joint associated with the j th end of the segment (STOP).		

Since within a region the segments are all singly connected, the segment joint numbers should be in adjacent numerical pairs. That is, if joint (j) is 6, joint (i) could only be 5 or 7. This is true only within a region.

In addition, the initial joint of each region must be 1 in segment topology numbering, and the final joint of each region must be the last (highest) number in the segment topology numbering (see Figure 2-12). The coordinate ϕ or s increases from TIC to STOP, i to j. The user is again advised to see Figures 2-3 to 2-9.

D-A-S-H S-E-P-A-R-A-T-O-R C-A-R-D
(See General Notes - Data Debugging)

minus in 1-80

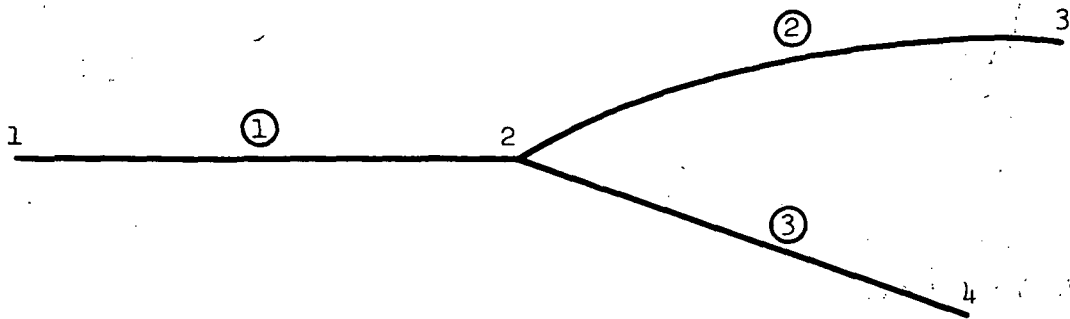
INTRA-REGION DISCRETE RING CARDS

These cards, if any exist (region introductory card, item 1C), are placed at the end of all the segment data for the region. They contain the following information for each ring (in groups of 4 cards):

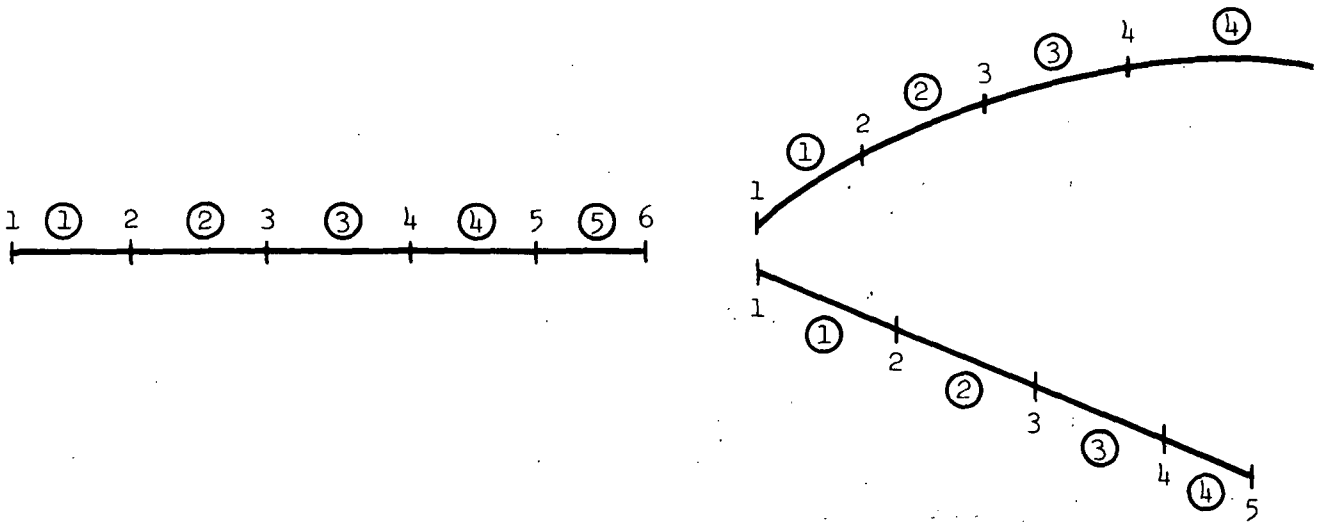
1. Ring Location and Property Card

- | | | |
|---|-----|----|
| A. Segment joint number to which the ring is attached. If there is also a radial discontinuity at this location necessitating a kinematic link, the joint number of the ring is the <u>independent</u> joint number of the link (see Figure 2-13a). | 1-2 | I2 |
|---|-----|----|

	<u>Column</u>	<u>Format</u>
B. Ring extensional stiffness (EA)	3-16	E14.7
C. Ring bending stiffness about centroidal y axis (EI_y). See Figure 2-14.	17-30	E14.7
D. Ring cross-bending stiffness about centroidal axes (EI_{xy}).	31-44	E14.7
E. Ring torsional stiffness (GJ)	45-58	E14.7
F. Ring bending stiffness about centroidal x axis (EI_x).	59-72	E14.7
2. Ring Geometry Card (see Figure 2-14)		
A. Ring thermal coefficient of expansion (α_R).	1-12	E12.5
B. Ring centroidal radius (r_c).	13-24	E12.5
C. Distance (\pm) between ring centroid and shear center in the x direction (x_c).	25-36	E12.5
D. Distance (\pm) between ring centroid and shear center in the y direction (y_c).	37-48	E12.5
E. Offset (\pm) of ring shear center from attached shell joint (see item 1A) in the x direction (\bar{x}).	49-60	E12.5
F. Offset (\pm) of ring shear center from attached shell joint (see item 1A) in the y direction (\bar{y}). <u>Note:</u> The shear center (S) is the origin of the x, y axes shown in Figure 2-14.	61-72	E12.5
3. Ring Thermal Description Card (See Figure 2-14)		
A. Distance (\pm) between ring shear center and the closest (innermost) radially measured ring point x_I (in x = radial direction).	1-14	E14.7
B. Distance (\pm) between ring shear center and the farthest (outermost) radially measured ring point, x_O (in x = radial direction). <u>Note:</u> Items A & B <u>cannot both</u> be input as zero.	15-28	E14.7

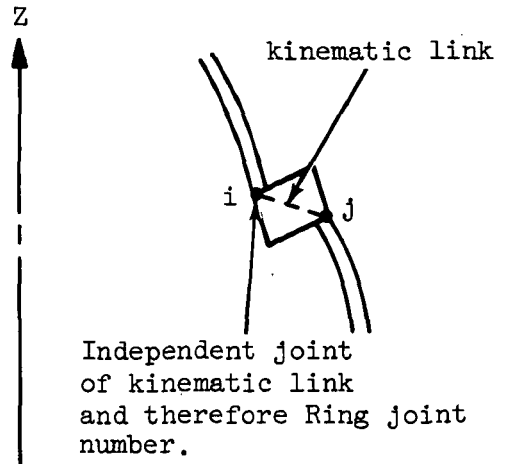
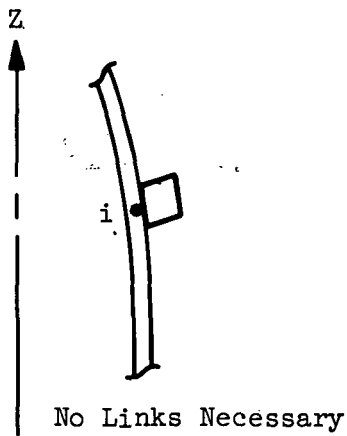


Region Numbering



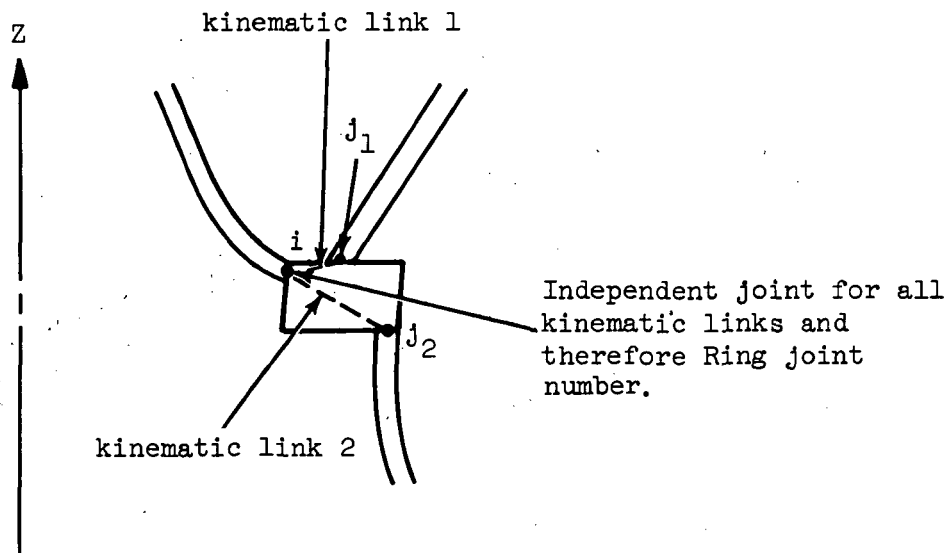
Numbering of Segments Within Regions

Figure 2-12. Topology Schemes



Kinematic Link Necessary

(a) Segment or Simple Region Rings



(b) Possible Region Multi-connected Rings

Figure 2-13. Discrete Ring Topology

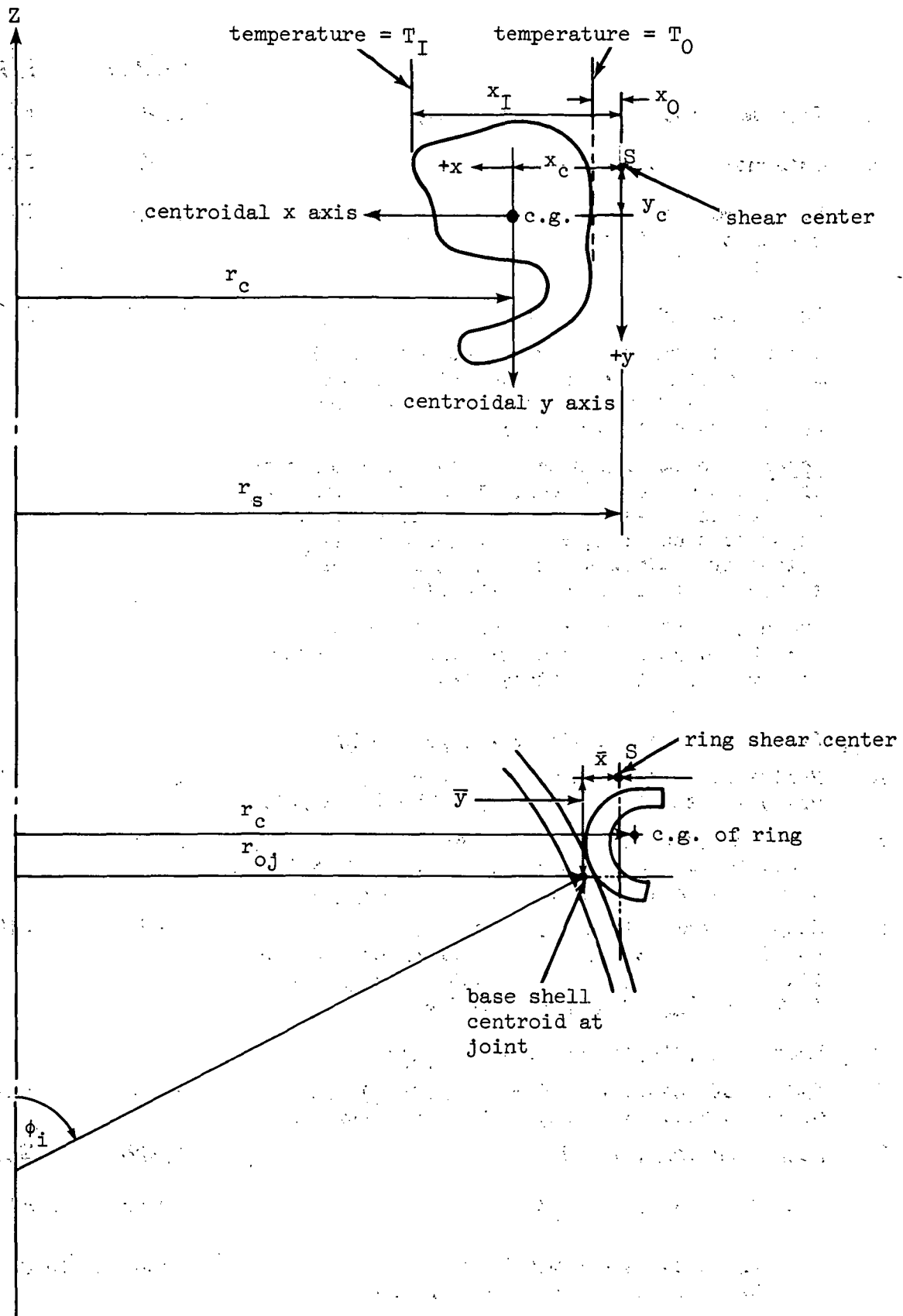


Figure 2-14. Discrete Ring Geometry

	<u>Column</u>	<u>Format</u>
C. Innermost point temperature (T_I)	29-42	E14.7
D. Outermost point temperature (T_O)	43-56	E14.7
E. Ring stress-free temperature (room or manufacturing temperature (see Note for Master Clue Card item F)).	57-70	E14.7
F. Load Case Number (Stability analysis <u>only</u>)	71-72	I2
<p>Enter the load case number (either 1 or 2) which contains the above described thermal load. This should be consistent with the segment thermal load order.</p> <p><u>Note:</u> Thermal loads on the rings are input on the above cards. Mechanical loads on the ring must be input as a load distribution on the segments connecting to the ring. A higher intensity loading may be distributed near the segment ends connected to the ring.</p> <p>The number of sets of discrete ring cards must be equal the number specified in item 1C, of the region introductory card.</p>		
4. Ring Prestress Card (Stability analysis <u>only</u>)		
A. Radius of revolution at the segment joint which is used to identify the ring (Item 1A).	1-14	E14.7
B. Hoop prestress in the ring due to load condition 1. (Enter <u>only</u> if the prestress input clue, item I page 2-15, is set to <u>unity</u> .)	15-28	E14.7
C. Hoop prestress in the ring due to load condition 2. (Enter <u>only</u> if the prestress input clue, item I page 2-15, is set to <u>unity</u> , and there are <u>two</u> loading conditions.)	29-42	E14.7
4. Ring Mass Card (Vibrations analysis <u>only</u>)		
A. Radius of revolution at the segment joint which is used to identify the ring (item 1A).	1-14	E14.7
B. Ring mass density (ρ)	15-28	E14.7
C. Ring Young's Modulus (E)	29-42	E14.7
D-A-S-H S-E-P-A-R-A-T-O-R C-A-R-D (See General Notes - Data Debugging)	minus in 1-80	

INTRA-REGION KINEMATIC LINK CARDS

These cards, if any exist (region introductory card, item 1B), are placed at the end of all the discrete ring data for the region. They contain the following information:

- | | | |
|--|------|-------|
| A. Joint (j) dependent joint | 1-2 | I2 |
| B. Joint (i) independent joint | 3-4 | I2 |
| <p>For intra-region kinematic links these joints must be in consecutive descending order. That is, joint (j) should always be greater than joint (i) by one.</p> | | |
| C. Angle γ in radians (see Figure 2-15) | 5-19 | E14.7 |
| <p>γ cannot equal 0 or π.</p> | | |

The angle γ describes the orientation of the link; it is the inclination angle of the link from the vertical (Z axis).

The number of kinematic link cards must equal the number specified in item 1B, of the region introductory card.

D-A-S-H S-E-P-A-R-A-T-O-R C-A-R-D
(See General Notes - Data Debugging)

minus in 1-80

REGION JOINT CONTROL DATA

These cards are placed at the end of all the data for all regions.

- | | | |
|--|-------|----|
| 1. Joint Control Data Card | | |
| A. Number of region joints | 1-5 | I5 |
| <p>Total number of <u>region</u> joints (Max. = 30).</p> | | |
| B. Number of discrete rings | 6-10 | I5 |
| <p>Total number of discrete rings <u>between</u> regions.</p> | | |
| C. Number of kinematic links | 11-15 | I5 |
| <p>Total number of kinematic links <u>between</u> regions.</p> | | |

2. Discrete Ring Cards (inter-region, if any exist)

A. Ring Location and Property Card

a.	Region joint number to which the ring is attached. If there are also radial discontinuities at this location necessitating kinematic links, or multi-connections, the joint number of the ring is the <u>independent</u> joint number of <u>all</u> the links (see Figure 2-13b).	1-2	I2
b.	Ring extensional stiffness (EA)	3-16	E14.7
c.	Ring bending stiffness about centroidal y axis (EI_y). See Figure 2-14.	17-30	E14.7
d.	Ring cross-bending stiffness about centroidal axes (EI_{xy}).	31-44	E14.7
e.	Ring torsional stiffness (GJ)	45-58	E14.7
f.	Ring bending stiffness about centroidal x axis (EI_x).	59-72	E14.7

B. Ring Geometry Card (see Figure 2-14)

a.	Ring thermal coefficient of expansion (α_R).	1-12	E12.5
b.	Ring centroidal radius (r_c).	13-24	E12.5
c.	Distance (\pm) between ring centroid and shear center in the x direction (x_c).	25-36	E12.5
d.	Distance (\pm) between ring centroid and shear center in the y direction (y_c).	37-48	E12.5
e.	Offset (\pm) of ring shear center from attached shell joint (see item Aa) in the x direction (\bar{x}).	49-60	E12.5
f.	Offset (\pm) of ring shear center from shell joint (see item Aa) in the y direction (\bar{y}).	61-72	E12.5

Note: The shear center (S) is the origin of the x,y axes shown in Figure 2-14.

	<u>Column</u>	<u>Format</u>
C. Ring Thermal Description Card (See Figure 2-14)		
a. Distance (\pm) between ring shear center and the closest (innermost) radially measured ring point, x_I (in x = radial direction).	1-14	E14.7
b. Distance (\pm) between ring shear center and the farthest (outermost) radially measured ring point, x_O (in x = radial direction). <u>Note:</u> Items a & b cannot both be input as zero.	15-28	E14.7
c. Innermost point temperature (T_I).	29-42	E14.7
d. Outermost point temperature (T_O).	43-56	E14.7
e. Ring stress-free temperature (room or manufacturing temperature (see Note for Master Clue Card item F)).	57-70	E14.7
f. Load Case Number (Stability analysis <u>only</u>)	71-72	I2
Enter the load case number (either 1 or 2) which contains the above described thermal load. This should be consistent with the segment thermal load order.		
<u>Note:</u> Thermal loads on the ring are input on the above cards. Mechanical loads on the ring must be input as line loads or moments on the shell joint (item Aa) assigned to the ring.		
The number of sets of discrete ring cards must equal the number specified in item 1B, of the Joint Control Data Card.		
D. Ring Prestress Card (Stability analysis <u>only</u>)		
a. Radius of revolution at the region joint which is used to identify the ring (Item Aa).	1-14	E14.7
b. Hoop prestress in the ring due to load condition 1. (Enter <u>only</u> if the prestress input clue, item I page 2-15, is set to <u>unity</u> .)	15-28	E14.7
c. Hoop prestress in the ring due to load condition 2. (Enter <u>only</u> if the prestress input clue, item I page 2-15, is set to <u>unity</u> , and there are <u>two</u> loading conditions.)	29-42	E14.7

Column Format

D. Ring Mass Card (Vibrations analysis only)

- | | | |
|---|-------|-------|
| a. Radius of revolution at the region joint which is used to identify the ring (Item Aa). | 1-14 | E14.7 |
| b. Ring mass density (ρ) | 15-28 | E14.7 |
| c. Ring Young's Modulus (E) | 29-42 | E14.7 |

D-A-S-H S-E-P-A-R-A-T-O-R C-A-R-D
(See General Notes - Data Debugging)

minus in 1-80

3. Kinematic Link Cards (inter-region, if any exist)

- | | | |
|--------------------------------|-----|----|
| A. Joint (j) dependent joint | 1-2 | I2 |
| B. Joint (i) independent joint | 3-4 | I2 |

For kinematic links between regions there are no restrictions upon joint numbering.

The only restriction is that between successive kinematic link data cards the (j) joint entry should be in increasing order (not necessarily consecutive). For example:

	$\frac{j}{i}$	$\frac{i}{j}$	$\frac{\gamma}{\gamma}$
Must be	{	3	2
in		4	2
increasing		9	1
order.		12	6

- | | | |
|--|------|-------|
| C. Angle γ in radians (see Figure 2-15) | 5-19 | E14.7 |
|--|------|-------|

γ cannot equal 0 or π .

The angle γ describes the orientation of the link; it is the inclination angle of the link from the vertical (Z axis). The number of kinematic link cards must equal the number specified in item 1C of the joint Control Data Card.

Column Format

D-A-S-H S-E-P-A-R-A-T-O-R C-A-R-D
(See General Notes - Data Debugging)

minus in 1-80

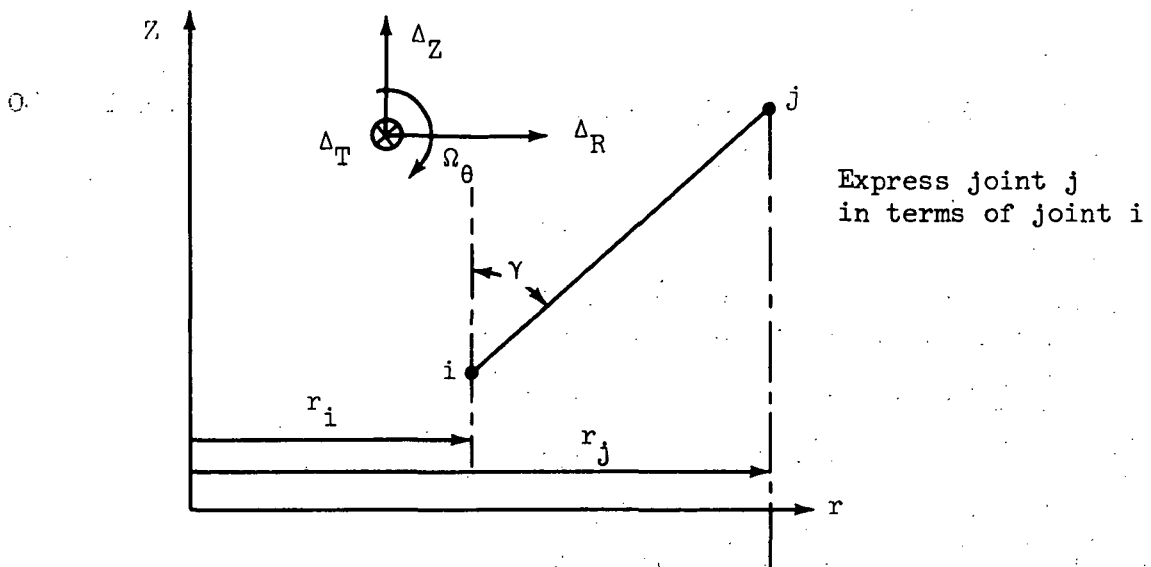
4. Boundary Condition Cards (Joint Data - one card per region joint)

This is the first set of boundary conditions. If the number of boundary condition sets is input as greater than 1 (item H page 2-14), they will be used for the static analysis and for the $n = 0$ eigenvalue analysis. If the eigenvalue harmonic search is specified to start with a harmonic other than zero (item D page 2-14) then they will be used for static analysis only. If the number of boundary conditions is input as unity, these will be used throughout the analysis.

A. Joint Number	1-2	I2
B. Joint component conditions on:		
1) Δ_T	3-4	F2.0
2) Δ_Z or Δ_N (see Figure 2-16)	5-6	F2.0
3) Δ_R or Δ_Q	7-8	F2.0
4) Ω_θ	9-10	F2.0
C. Angle α in radians	11-24	E14.1

To be used only in conjunction with a 2 or 3 code.

Note: There must be as many boundary condition cards as there are joints as indicated in item 1A of the Joint Control Data Card.



$$\begin{Bmatrix} \Delta_{T_j} \\ \Delta_{Z_j} \\ \Delta_{R_j} \\ \Omega_{\theta_j} \end{Bmatrix} = \begin{bmatrix} \frac{r_j}{r_i} & 0 & 0 & 0 \\ 0 & +1 & 0 & -(r_j - r_i) \\ 0 & 0 & +1 & (r_j - r_i) \cot \gamma \\ 0 & 0 & 0 & +1 \end{bmatrix} \begin{Bmatrix} \Delta_{T_i} \\ \Delta_{Z_i} \\ \Delta_{R_i} \\ \Omega_{\theta_i} \end{Bmatrix}$$

Figure 2-15. Kinematic Link

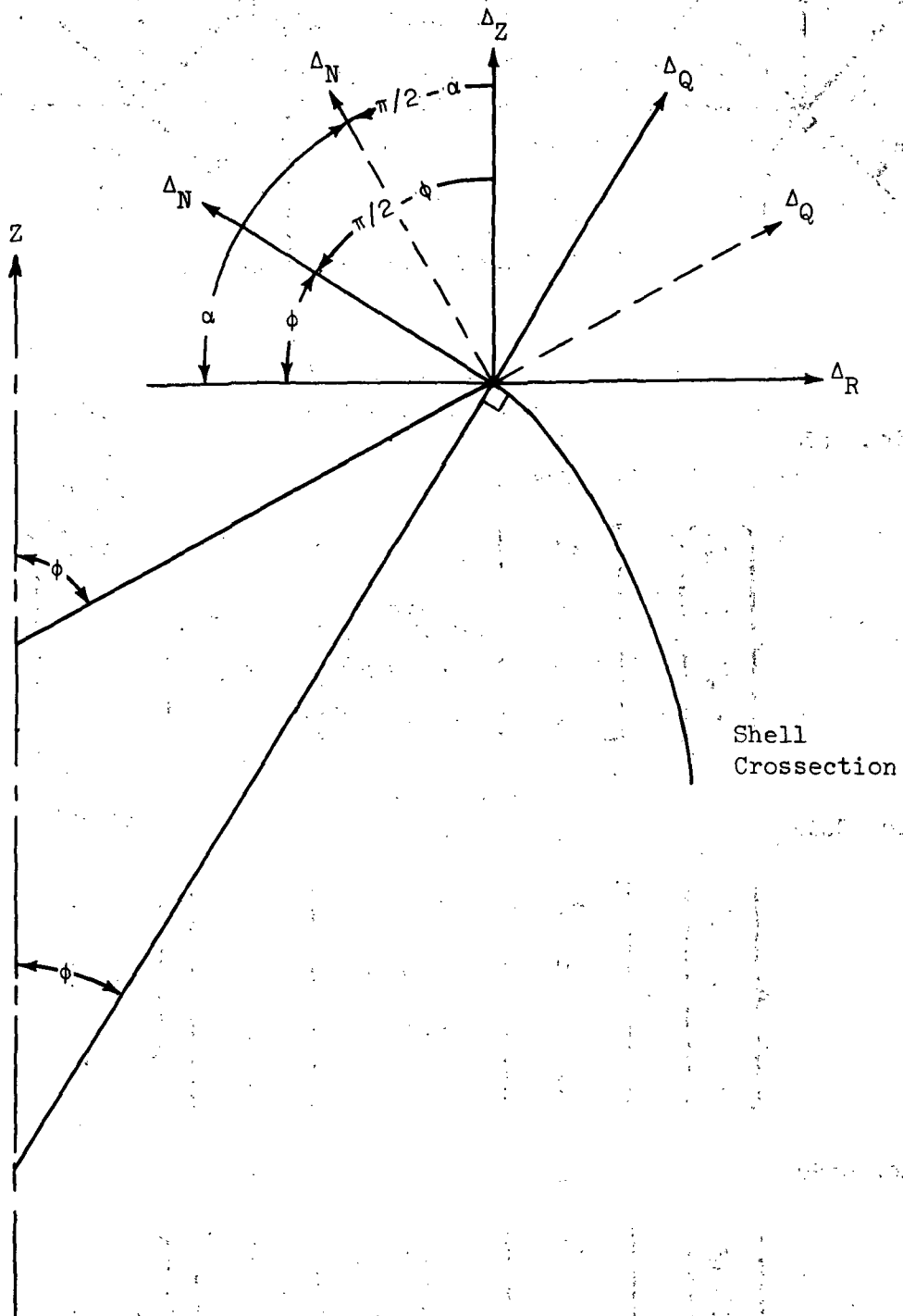
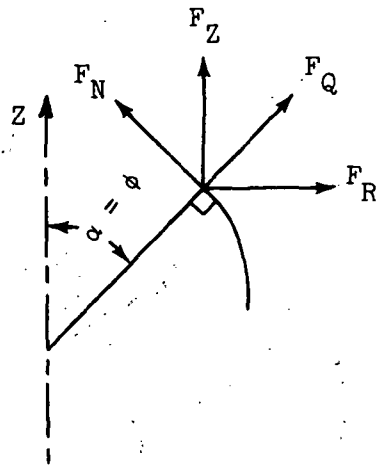
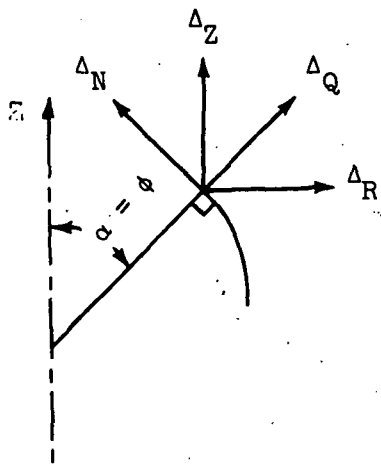


Figure 2-16a. Description of General Coordinate Rotation ($\alpha \neq \phi$)



Rotation Code

1

2

3

1

Matrix

$$\begin{Bmatrix} \Delta_T \\ \Delta_Z \\ \Delta_R \\ \Omega_\theta \end{Bmatrix} = \begin{bmatrix} +1 & 0 & 0 & 0 \\ 0 & \sin \alpha & \cos \alpha & 0 \\ 0 & -\cos \alpha & \sin \alpha & 0 \\ 0 & 0 & 0 & +1 \end{bmatrix} \begin{Bmatrix} \Delta_T \\ \Delta_N \\ \Delta_Q \\ \Omega_\theta \end{Bmatrix}$$

Rotation Code

1

2

0

1

Matrix

$$\begin{Bmatrix} \Delta_T \\ \Delta_Z \\ \Delta_R \\ \Omega_\theta \end{Bmatrix} = \begin{bmatrix} +1 & 0 & 0 \\ 0 & \sin \alpha & 0 \\ 0 & -\cos \alpha & 0 \\ 0 & 0 & +1 \end{bmatrix} \begin{Bmatrix} \Delta_T \\ \Delta_N \\ \Omega_\theta \end{Bmatrix}$$

Rotation Code

1

0

3

1

Matrix

$$\begin{Bmatrix} \Delta_T \\ \Delta_Z \\ \Delta_R \\ \Omega_\theta \end{Bmatrix} = \begin{bmatrix} +1 & 0 & 0 \\ 0 & \cos \alpha & 0 \\ 0 & \sin \alpha & 0 \\ 0 & 0 & +1 \end{bmatrix} \begin{Bmatrix} \Delta_T \\ \Delta_Q \\ \Omega_\theta \end{Bmatrix}$$

Figure 2-16b. Provision for Local Rotations

There are 4 different codes that are used to prescribe joint component conditions. They are:

- a. 0 = no displacement allowed.
- b. 1 = displacement allowed in the indicated direction.
- c. 2 = Δ_Z and Δ_R are rotated through an angle of $\pi/2 - \alpha$ and become Δ_N and Δ_Q respectively, while a displacement is allowed in the Δ_N direction.
- d. 3 = Δ_Z and Δ_R are rotated through an angle of $\pi/2 + \alpha$ and become Δ_N and Δ_Q respectively, while a displacement is allowed in the Δ_Q direction.

See Figure 2-16 for a geometric explanation of codes 2 and 3.

When using rotation codes:

Code 2 can exist only as Δ_Z coding.

Code 3 can exist only as Δ_R coding.

Codes 0 and 1 can appear in either column 4 or column 6, in addition to columns 8 and 10. Thus, there are twelve possible boundary conditions when rotation codes are used. ($\alpha = \phi$ for table below.)

	Free edge (possible to apply shear and/or membrane loads)	$\Delta_Q = 0$, normal support (possible to apply membrane load)	$\Delta_N = 0$, membrane support (possible to apply shear load)
Δ_T, Ω_θ free	1,2,3,1	1,2,0,1	1,0,3,1
Δ_T, Ω_θ fixed	0,2,3,0	0,2,0,0	0,0,3,0
Δ_T fixed Ω_θ free	0,2,3,1	0,2,0,1	0,0,3,1
Δ_T free Ω_θ fixed	1,2,3,0	1,2,0,0	1,0,3,0

Apex boundary conditions:

Since the closed apex ($\phi = 0$) angle is not acceptable input, the apex boundary conditions must be simulated at a small ϕ angle. These boundary conditions vary per Fourier harmonic, and are as follows:

n	Δ_T	Δ_Z	Δ_R	Ω_θ	angle
0.0	0	0	3	0	$\alpha = \phi$
1.0	1	2	0	1	$\alpha = \phi$
> 2.0	0	0	0	0	---

For a further discussion see Reference 1, Appendix C.

General Notes:

- 1) To establish a datum for measuring displacement, free body motion must be eliminated from the structure. This should be accomplished by suitably applied boundary conditions.
- 2) The ability of a dependent joint in a kinematic link to prescribe motion independently should be removed by setting all boundary conditions of that joint to zero. See pages 2-63 and 2-74.
- 3) In the axisymmetric static and eigenvalue analysis all torsion degrees of freedom should be removed. A second boundary condition set, allowing torsional freedom, should be used for the other harmonic eigenvalue analyses.

D-A-S-H S-E-P-A-R-A-T-O-R C-A-R-D
(See General Notes - Data Debugging)

minus in 1-80

JOINT LOAD DATA (These card sets are omitted if the Prestress input clue is set to unity in a stability analysis, or if the Dynamic analysis description clue is FREV, CRSP or CRSR in a vibrations analysis.)

1. Load Control Data Card.

A. Number of Joint Loads

1-4

I4

Total number of joint loads in analysis.
(Line loads can only be applied to region joints.)

B. Any alphameric information (load description)

5-68

16A4

Note: If there are no Joint Loads for the structure, card 1 of the JOINT LOAD DATA is blank and card set 2 is omitted.

2. Joint Load Cards (as many as in item 1A above)

A. Load Condition Number

1-5

I5

Number of loading condition in which the line load exists. (See Program Control Card item 2G. For a vibrations analysis this number is always unity.)

B. Row Identification

6-10

I5

The identification is the location of the degree of freedom at which the load is applied. This is obtained by counting the non-zero codes entered in the Boundary Conditions Cards, starting with Joint 1; T, Z, R, Ω_0 , Joint 2; T, Z,.....etc., and stopping at the joint and degree of freedom where the line load is to be applied. The location number of this degree of freedom is the information necessary.

C. Applied Joint Load

11-24

E14.7

The input is $2\pi r$ times the running load in lb./in. In the particular case of the axial axisymmetric load, this is simply the net force. For sign convention see Figures 2-11, 2-16 and 2-17.

D-A-S-H S-E-P-A-R-A-T-O-R C-A-R-D
(See General Notes - Data Debugging)

minus in 1-80

SUPPLEMENTARY BOUNDARY CONDITION DATA (The maximum number of sets of this data can be two. If the number of boundary conditions is input as 2 (item H page 2- 14) the set of boundary conditions here will be used on all the eigenvalue analyses other than $n=0$. If the number of boundary conditions is input as 3 (item H page 2- 14) the first set of the boundary conditions here will be used on the first $n \neq 0$ eigenvalue analysis, while the second set here will be used on all the following eigenvalue analyses.

1. Boundary Condition Card Set 2 (Omitt unless the number of boundary conditions is input as ≥ 2)

Joint Data - one card per region joint (See notes on page 2- 64).

A. Joint Number	1-2	I2
B. Joint component conditions on:		
1) Δ_T	3-4	F2.0
2) Δ_Z or Δ_N (see Figure 2-16)	5-6	F2.0
3) Δ_R or Δ_Q	7-8	F2.0
4) Ω_θ	9-10	F2.0
C. Angle α in radians	11-24	E14.1

Note: There must be as many boundary condition cards as there are joints as indicated in item 1A of the Joint Control Data Card.

D-A-S-H S-E-P-A-R-A-T-O-R C-A-R-D minus in 1-80
(See General Notes - Data Debugging)

2. Boundary Condition Card Set 3 (Omitt unless the number of boundary conditions is input as 3)

Joint Data - one card per region joint (see notes on page 2- 64).

A. Joint Number	1-2	I2
B. Joint component condition on:		
1) Δ_T	3-4	F2.0
2) Δ_Z or Δ_N (see Figure 2-16)	5-6	F2.0
3) Δ_R or Δ_Q	7-8	F2.0
4) Ω_θ	9-10	F2.0
C. Angle α in radians	11-24	E14.1

Note: There must be as many boundary condition cards as there are joints as indicated in item 1A of the Joint Control Data Card.

D-A-S-H S-E-P-A-R-A-T-O-R C-A-R-D minus in 1-80
(See General Notes - Data Debugging)

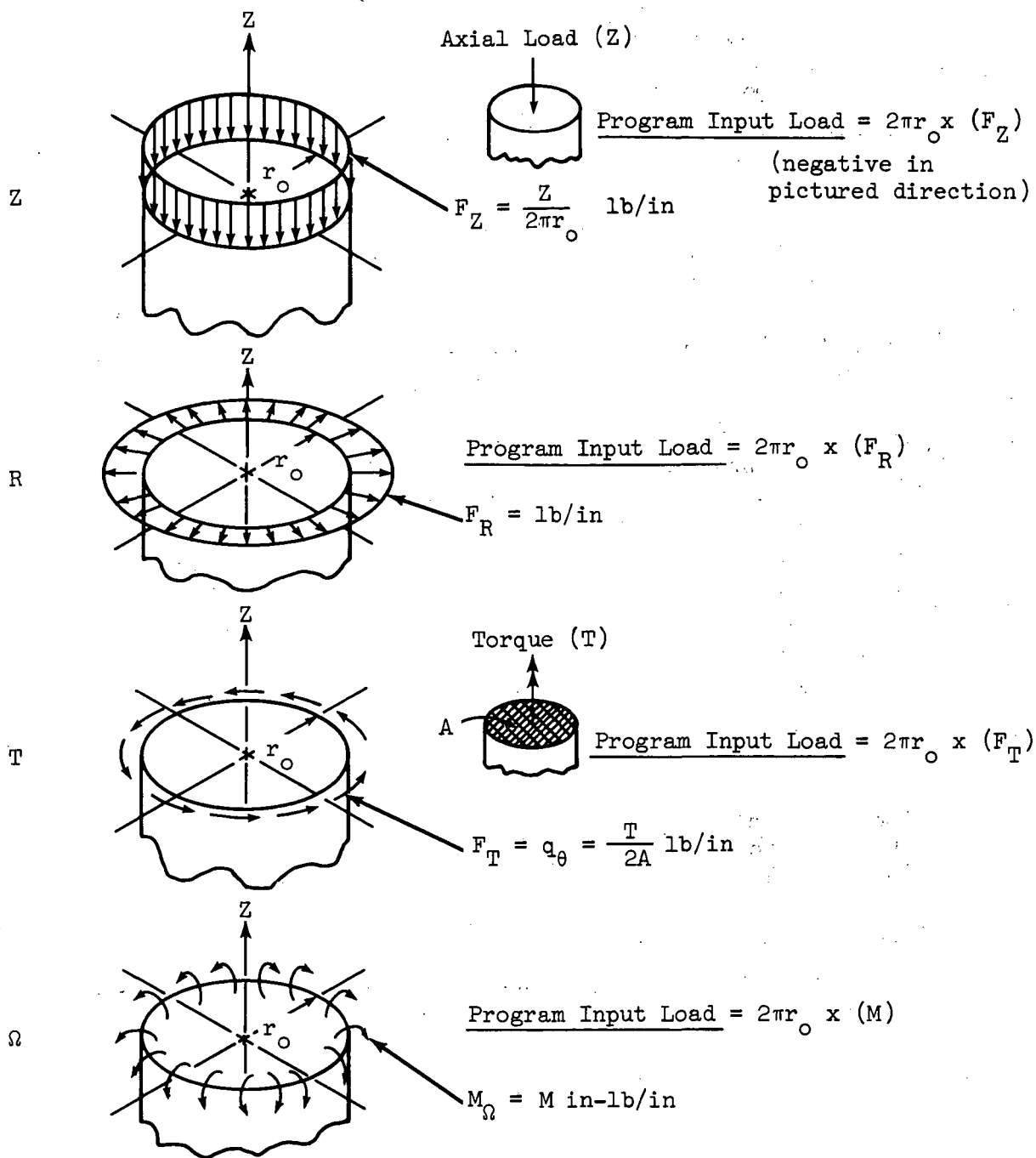


Figure 2-17a. Line Loading for Harmonic $n = 0.0$

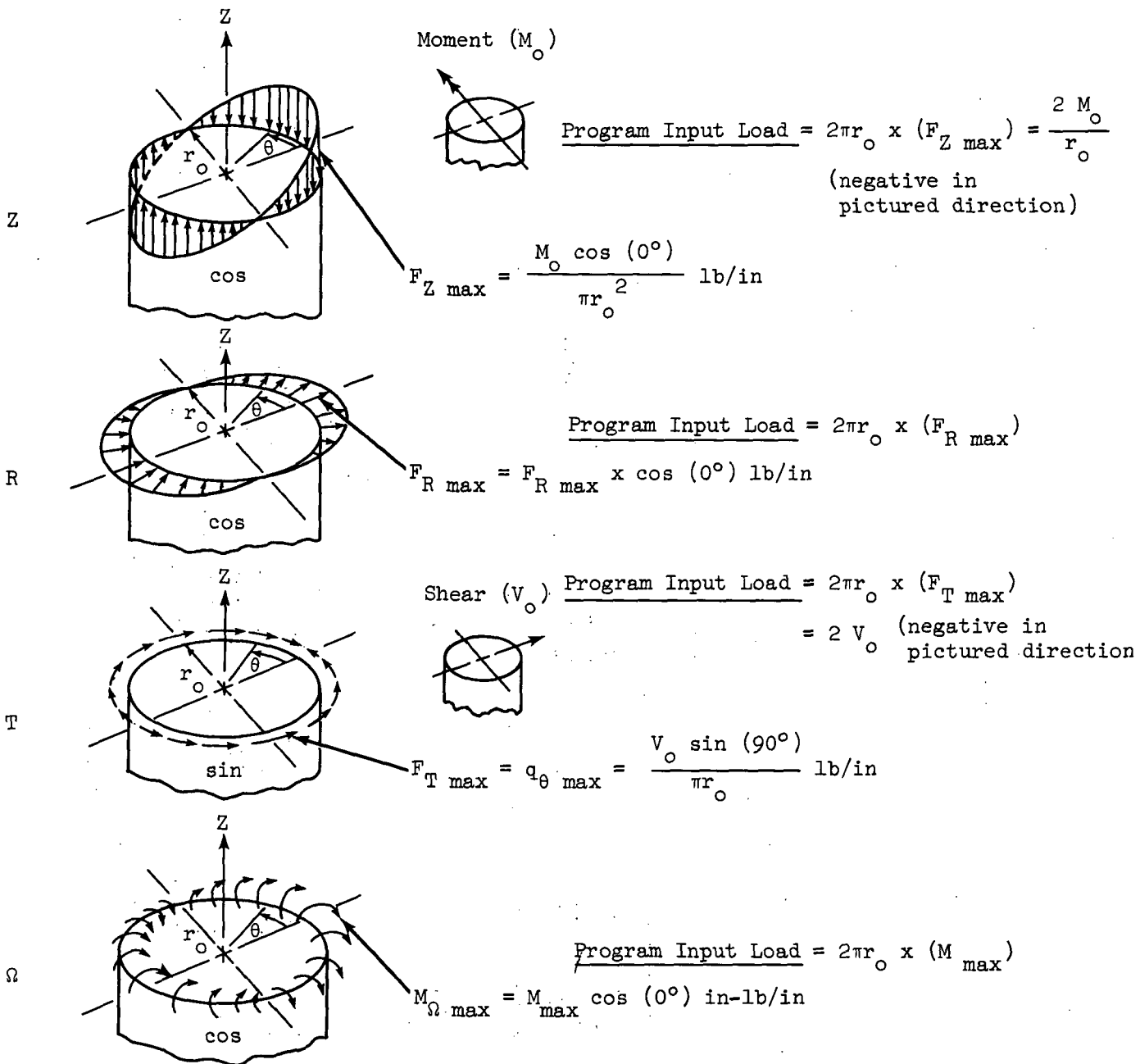


Figure 2-17b Line Loading for Harmonic n = 1.0

It is hoped that the user is now able to use the STARS-2B,-2V programs to good advantage. They are powerful tools, which will increase in value to the user as he uses them. One of the more complex areas of usage is the description of topology, especially when involved with rotation codes and joint loads. An illustrative example of a Y joint representation is therefore presented below. (See Figures 2-18 and 2-19 for the structure and idealization.) The idealized structure contains four regions and two kinematic links. The joints are numbered from 1 to 7. Membrane loading is applied to joints 1 and 5 and the structure is supported by membrane action at joint 7. All regions must be coupled.

The second card in each region description (topology card) is as follows:

<u>Region</u>	<u>Joint (i)</u>	<u>Joint (j)</u>
1	1	2
2	2	3
3	4	5
4	6	7

The Joint Control Data card would contain a 7 in column 5 and a 2 in column 15.

In this example, the restraints at joints 1, 5 and 7 must be rotated from the fixed (global system) to a local system such that membrane action may be applied. In addition, joints 3 and 4, and 6 and 3 are to be coupled with kinematic links. Thus, the motions of joints 4 and 6 are dependent upon the motion of joint 3. This dependence will be insured by using 2 kinematic link cards and setting the displacements of joints 4 and 6 equal to zero. It should be noted in this particular case that the motion of joints 4 and 6 is not being equated to zero, but rather, the ability to prescribe motion independently is being removed. The required data has the following appearance.

A. Kinematic Link Cards (2 cards)

<u>Joint (j)</u>	<u>Joint (i)</u>	<u>Angle</u>	} <u>Note:</u> In a double link of the type shown in Figure 2-19, one joint must be consistently independent (joint 3 in example).
4	3	$\gamma + \pi$	
6	3	γ	

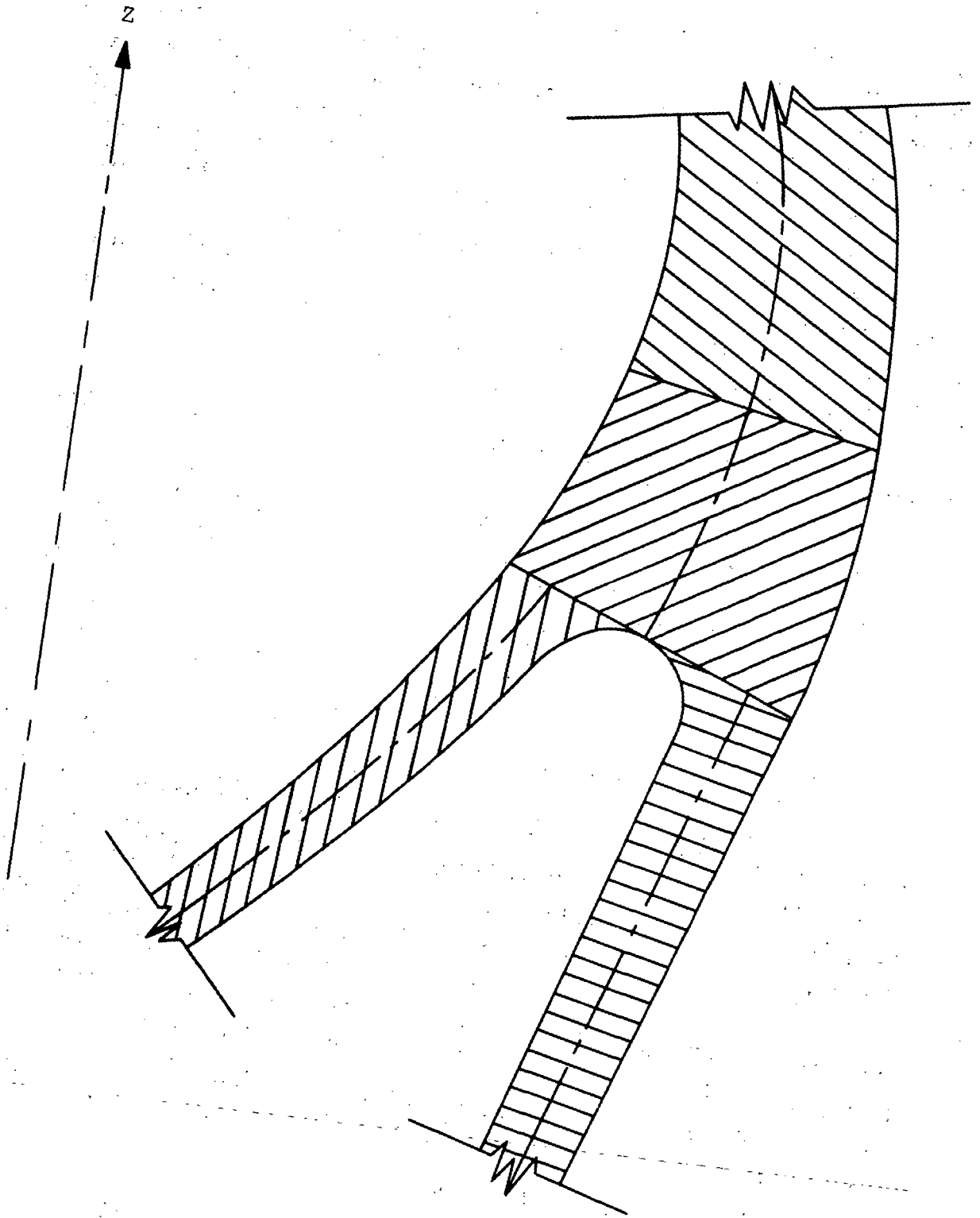


Figure 2-18. Y-Joint (Distorted Geometry)

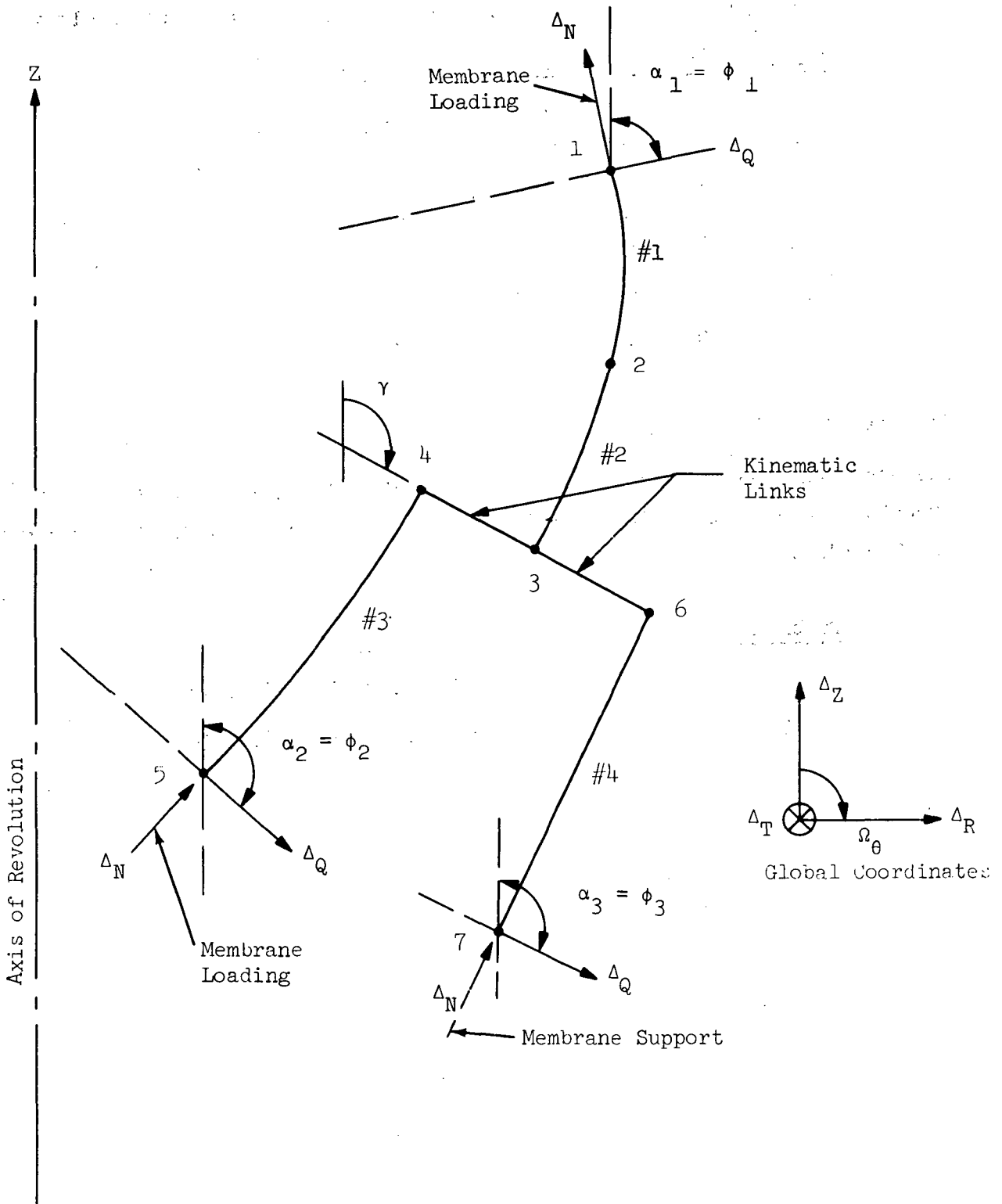


Figure 2-19. Idealized Y-Joint

B. Boundary Condition Cards for higher harmonic eigenvalue analysis
(7 cards)

<u>Joint</u>	<u>T</u>	<u>Z</u>	<u>R</u>	<u>θ</u>	<u>Angle</u>
1	1	2	3	1	α_1
2	1	1	1	1	
3	1	1	1	1	
4	0	0	0	0	
5	1	2	3	1	α_2
6	0	0	0	0	
7	0	0	3	1	α_3

The Load Control Data card would contain a 2 in column 4.

The external membrane loads (one load problem assumed) are applied to the structure through the Joint Load Cards which, in this example, would appear as (2 cards):

<u>Problem No.</u>	<u>Row</u>	<u>Load</u>
1	2	$2\pi r_0$ x Membrane Load (lb./in.)
1	14	$2\pi r_0$ x Membrane Load (lb./in.)

SECTION 3

OUTPUT INFORMATION

The output of the STARS-2B,-2V programs is straightforward, however a description is in order since the user should learn the significance of the various checks that are provided. It is important to point out that the output of the program will include a print-out of the input data. This gives the user the opportunity to check whether or not the input data was correct. In the detailed description of the complete output which follows, the user should refer to the output of the problems in Section 4 as an example.

The title page of the output contains all the data from the General Introductory Cards, prominently placed, and needs no comment. The next page of the output contains the first region Identification Card in the center. The following output is then presented for each segment in this region (in order of appearance):

1. Contents of segment Identification Card.
2. Contents of MAGIC Control Card
3. Contents of Geometric Description Card (Cards)
4. Contents of Master Clue Card
5. The material property table used for the segment
6. Crosssection description table
7. Temperature load table (if any)
8. Distributed load tables (printed per loading condition; if any)
9. Prestress input (if any) STABILITY ONLY
10. Segment influence coefficients (MAGIC output)
11. Segment stiffness matrix
12. Stiffness matrix symmetry check
13. Segment load matrices
14. Radius of revolution at i^{th} and j^{th} ends of segment.

Item 12, the stiffness matrix symmetry check, is a check upon the validity of segment sizing and the accumulation of round-off error. For perfect symmetry to exist, it is necessary to have zeros above the main diagonal, and zeros or ones below the diagonal. The amount of error induced by improper sizing or round-off is related to the amount that the off-diagonal terms in the lower triangle differ from unity. An attempt should be made to keep the upper limit on this difference at one percent (maximum number in lower triangle should be 0.1010... E 01).

As mentioned previously, items 1-14 are repeated for all the segments within region one. The radius of revolution at every joint should be checked at corresponding joints of adjacent segments to make sure that proper coupling has been specified. At this stage in the output, the topology of the segments within the region, and the description of the intra-region rings and kinematic links is presented.

Next the region matrices are presented. Given in order are: the region stiffness matrix, the stiffness matrix symmetry check, and the region load matrices. Again the numerical round-off, evident in the symmetry check, should be kept to a maximum of one percent (0.1010... E 01 in lower triangle). The output to this point, that is, sets of items 1-14, segment topology and links, and the region matrices, are now repeated as a group for each region within the structure. When this is completed, the region topology is presented. The next items to be provided by the output are the descriptions of the inter-region rings and kinematic links and the boundary conditions. At external points of the structure these are physical boundary conditions. At internal points they merely state the fact that no restraint exists and the joint in question is free to move. The last column in this set, gives the angle α , which is zero unless a rotation code is indicated. It is important to refer to Figure 2-6 once more and point out that α represents a rotation of the coordinate system.

There are a variety of errors that can be made in submitting input data. The STARS-2B,-2V programs are set so that as an error is detected, (input or in the matrix calculations) the program is stopped. Therefore, to avoid delays in getting an answer, the SATELLITE-1B,-1V programs were created to debug input data, and to check for other possible inconsistencies. The use of these programs is described in Reference 3, and all the STARS error messages are contained in the listings therein.

After having corrected any errors, so that it is now possible for the program to run to completion, the problem solution can be discussed. From the above point in the output, further output will depend upon the intermediate print clue. If this clue is set for full output all stiffness and prestressed (or dynamic in the case of vibrations) stiffness matrices will be printed for all segments, regions, and structures in all harmonics and all estimates. If the print clue is set for abbreviated print, only that noted below will be printed:

1. The applied line loads.
2. The region end deflections per problem, in numerical order, starting from region joint 1.
3. A description of the calculated prestress state (if any). This will include the hoop and meridional stress resultants and the meridional rotation. The print will be for two loading cases if so input.
4. New boundary conditions for eigenvalue analyses (if any).
5. The current harmonic number and the current estimate (iteration) number for that harmonic.
6. All the eigenvalues for the estimated prestress or frequency state, and the current load (frequency) multiplier for the next estimate.
7. Prints 5 and 6 are repeated until convergence (or a cutoff value) is reached for this harmonic. At this point the load multiplier represents the lowest eigenvalue. (The frequency is printed in a vibrations analysis.) Two eigenvectors are then printed in global coordinates, and expanded in local deformation coordinates throughout all the segments in shell. In a stability analysis these two vectors will correspond to the lowest two eigenvalues. In a vibrations analysis they will correspond to the two lowest eigenvalues, or the two eigenvalues closest to the estimated frequency, as requested by input.

8. Prints 4-7 are repeated for all the harmonics under investigation.

SECTION 4

EXAMPLES OF INPUT AND SOLUTIONS

This section contains the full input and output of two example test problems for the STARS-2B program, and one example test problem for the STARS-2V program. Since the test problem for the STARS-2S program [6] exemplified all crosssection options available in the programs, the present test problems will be more physical in nature, while still exemplifying various analysis options. A comparative description of the present test problems with other analyses is presented in Reference 1.

The first stability test problem is presented in Figure 4-1. A prolate spheroid is loaded in hydrostatic compression and the stability load is being sought. Since it is known [1] that the critical harmonic for this case is $n = 3$, only the 2nd and 3rd harmonics are investigated. The input is set so that the program will calculate the prestress state, and a cutoff value is set at 1.5. No intermediate output is required. It should be noted in this problem, that the boundary conditions to simulate an apex must be changed for harmonics $n = 2, 3$ from those used for the $n = 0$ static analysis (see Section 2).

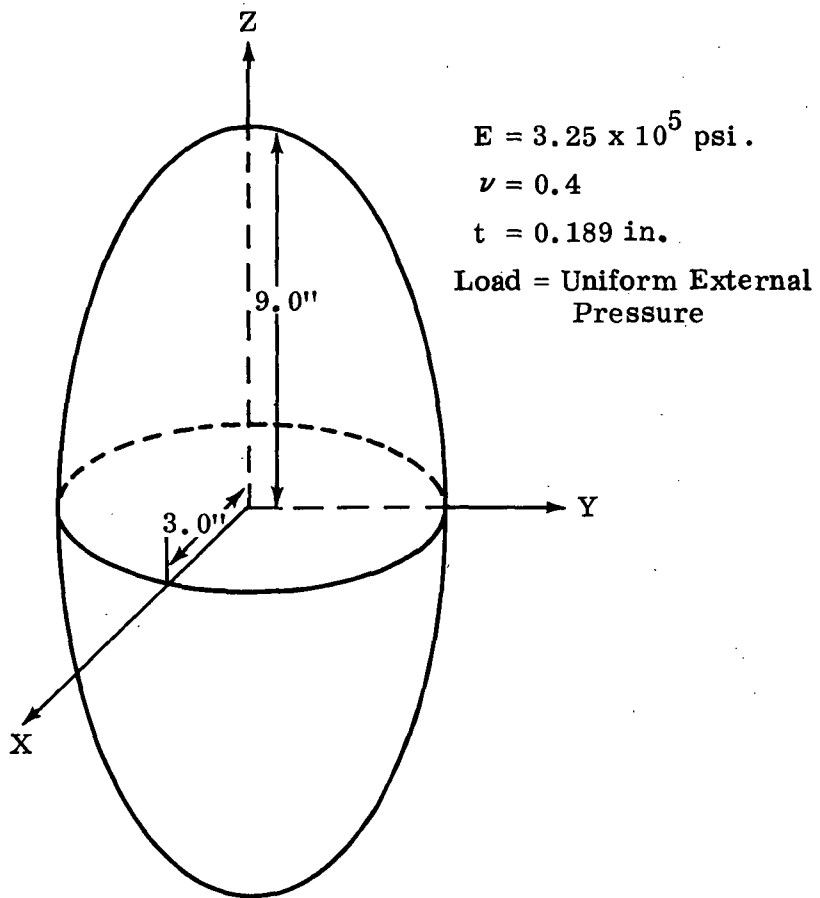


Figure 4-1 Test Problem 1

ELLIPSE STABILITY TEST

10 20 1 2 3 1 1 2 0 1.40
 EPRE ISØT

3.25 E 05

.4

2 0 ELLIPSE REGION

1 1
 11 ELLIPSE SEGMENT
 .040909 E-01 1.0 E-04 .081818 E-02 0.
 3.0
 ISØT EPRE .075 SING THIC NØTH 0.0 2
 .034091
 .189
 000100
 137.
 1 1 2 137.

11 ELLIPSE SEGMENT

.05 E-01 1.0 E-04 .10 E-02 0.
 3.0
 ISØT EPRE .125 SING THIC NØTH 0.0 2
 .075
 .189
 000100
 137.
 2 2 3 137.

2 0 ELLIPSE REGION

2 2 3
 11 ELLIPSE SEGMENT
 .055 E-01 1.0 E-04 .110 E-02 0.
 3.0
 ISØT EPRE .125 SING THIC NØTH 0.0 2
 .189
 .189
 000100
 137.
 1 1 2 137. ‡

11 ELLIPSE SEGMENT

.06 E-01 1.0 E-04 .12 E-02 0.
 3.0
 ISØT EPRE .24 SING THIC NØTH 0.0 2
 .18
 .189
 000100

137.
2 2 3

2 0 ELLIPSE REGION

11 ELLIPSE SEGMENT

3.0	E-01	1.0	E-04	.14	E-02		0.
.24	EPRE	3.0	SING		NØTH	0.0	3
.189		.275	THIC				
000100		.31	THIC				
137.		.189	THIC				
		137.					

11 ELLIPSE SEGMENT

3.0	E-01	1.0	E-04	.16	E-02		0.
.31	EPRE	3.0	SING		NØTH	0.0	3
.189		.35	THIC				
000100		.39	THIC				
137.		.189	THIC				
		137.					

2 0 ELLIPSE REGION

11 ELLIPSE SEGMENT

3.0	E-01	1.0	E-04	.18	E-02		0.
.39	EPRE	3.0	SING		NØTH	0.0	3
.189		.435	THIC				
000100		.48	THIC				
137.		.189	THIC				
		137.					

11 ELLIPSE SEGMENT

3.0	E-01	1.0	E-04	.20	E-02		0.
.48	EPRE	3.0	SING		NØTH	0.0	3
.189		.53	THIC				
000100		.58	THIC				
137.		.189	THIC				
		137.					

2 0 ELLIPSE REGION

11 ELLIPSE SEGMENT

3.0	E-01	1.0	E-04	.20	E-02		0.
.58	EPRE	3.0	SING		NØTH	0.0	3
.189		.63	THIC				
000100		.68	THIC				
137.		.189	THIC				
		137.					

11 ELLIPSE SEGMENT

3.0	E-01	1.0	E-04	.20	E-02		0.
.189	EPRE	3.0	SING		NØTH	0.0	3
000100		.63	THIC				
137.		.68	THIC				
		.189	THIC				
		137.					

3.0	EPRE	3.0	SING	THIC	NØTH	0.0	0.0	3
ISØT	.68	.73		.78				
	.189	.189		.189				
000100		.137.		.137.				
137.								
2	2	3						

2 0 ELLIPSE REGION

6
7

11 ELLIPSE SEGMENT

.10 E-01 1.0 E-04 .20 E-02 0.0

3.0	EPRE	3.0	SING	THIC	NØTH	0.0	0.0	3
ISØT	.83	.88		.88				
	.189	.189		.189				
000100		.137.		.137.				
137.								
1	1	2						

11 ELLIPSE SEGMENT

.10 E-01 1.0 E-04 .20 E-02 0.0

3.0	EPRE	3.0	SING	THIC	NØTH	0.0	0.0	3
ISØT	.93	.98		.98				
	.189	.189		.189				
000100		.137.		.137.				
137.								
2	2	3						

2 0 ELLIPSE REGION

7
8

11 ELLIPSE SEGMENT

.08 E-01 1.0 E-04 .16 E-02 0.0

3.0	EPRE	3.0	SING	THIC	NØTH	0.0	0.0	3
ISØT	.98	1.02		1.06				
	.189	.189		.189				
000100		.137.		.137.				
137.								
1	1	2						

11 ELLIPSE SEGMENT

.08 E-01 1.0 E-04 .16 E-02 0.0

3.0	EPRE	3.0	SING	THIC	NØTH	0.0	0.0	3
ISØT	1.06	1.10		1.14				
	.189	.189		.189				
000100		.137.		.137.				
137.								
2	2	3						

2 0 ELLIPSE REGION

8
9

11 ELLIPSE SEGMENT

.08 E-01 1.0 E-04 .16 E-02 0.0

3.0	EPRE	3.0	SING	THIC	NØTH	0.0	0.0	3
ISØT	1.14	1.18		1.22				
	.189	.189		.189				
000100		.137.		.137.				
137.								
2	2	3						

137. 1 1 137. 137.

11 ELLIPSE SEGMENT
 E-01 1.0 E-04 .16 E-02 0. 5
 3.0
 ISØT EPRE 3.0 SING THIC NØTH 0.0 1.3
 1.22 1.24 1.26 1.28 .189 .189
 .189 .189
 000100
 137. 137. 137. 137.

2 0 ELLIPSE REGION
 9 10
 11 ELLIPSE SEGMENT
 E-01 1.0 E-04 .16 E-02 0. 5
 3.0
 ISØT EPRE 3.0 SING THIC NØTH 0.0 1.38
 1.3 1.32 1.34 1.36 .189 .189
 .189 .189
 000100
 137. 137. 137. 137.

11 ELLIPSE SEGMENT
 E-01 1.0 E-04 .13 E-02 0. 5
 3.0
 ISØT EPRE 3.0 SING THIC NØTH 0.0 1.445
 1.38 1.395 1.41 1.43 .189 .189
 .189 .189
 000100
 137. 137. 137. 137.

2 0 ELLIPSE REGION
 10 10 11
 11 ELLIPSE SEGMENT
 E-01 1.0 E-04 .12 E-02 0. 5
 3.0
 ISØT EPRE 3.0 SING THIC NØTH 0.0 1.505
 1.445 1.46 1.475 1.49 .189 .189
 .189 .189
 000100
 137. 137. 137. 137.

11 ELLIPSE SEGMENT
 E-01 1.0 E-04 .131586 E-02 0. 5
 3.0
 ISØT EPRE 3.0 SING THIC NØTH 0.0 1.570793
 1.505 1.52 1.54 1.555 .189 .189
 .189 .189
 000100
 137. 137. 137. 137.

11 . . 0
 1 0 1 0 0
 2 0 1 1 1
 3 0 1 1 1

4 0 1 1 1
5 0 1 1 1
6 0 1 1 1
7 0 1 1 1
8 0 1 1 1
9 0 1 1 1
10 0 1 1 1
11 0 0 1 0

1 0 0 0 0
2 1 1 1 1
3 1 1 1 1
4 1 1 1 1
5 1 1 1 1
6 1 1 1 1
7 1 1 1 1
8 1 1 1 1
9 1 1 1 1
10 1 1 1 1
11 1 0 1 0

UNSYMMETRIC, ORTHOTROPIC, REINFORCED SHELL ANALYSIS WITH COUPLING OF AT MOST 29 SHELL REGIONS

STANS-28

AS OF NOVEMBER 1, 1972

NUMBER OF SEGMENTS = 20 NUMBER OF REGIONS = 10 NUMBER OF MATERIAL PROPERTY TABLES USED = 1 NUMBER OF PROBLEMS = 1

NUMBER OF BOUNDARY CONDITION MATRICES = 2

STABILITY HARMONICS (N) = 2 TO 3 INCREMENTED BY 1

THE GIVEN INPUT INDICATES THAT THE PREBUCKLING STATE WILL BE CALCULATED

ELLIPSE STABILITY TEST

FOR INFORMATION CALL V. SVALBONAS

(516) 575-7701

P. OGILVIE

REGION NUMBER 1

THERE ARE 2 SEGMENTS AND 3 KINEMATIC LINKS WITHIN THIS REGION

SEGMENT NUMBER 1 SEGMENT CODE 11 ELLIPSE SEGMENT
 DELTA STEP DELTA
 .409000+02 .100000+03 .618100-03 .000000

GEOMETRY INPUT VARIABLES
 .300000+01 .300000+01 .000000

TSOT EPRE SING THIC NOTH T FREE = .0000 NUMBER OF TABLE COLUMNS = 2

MATERIAL PROPERTY TABLE USED

.00000	.00000	.00000	.00000	.00000	.00000	.00000	.00000	.00000	.00000
.32500+06	.00000	.00000	.00000	.00000	.00000	.00000	.00000	.00000	.00000
.00000+00	.00000	.00000	.00000	.00000	.00000	.00000	.00000	.00000	.00000
.00000	.00000	.00000	.00000	.00000	.00000	.00000	.00000	.00000	.00000

TABLE ORDER PHI OR S VS. CRUSSESECTION PROPERTIES

.3409100-01 .7500000-01
 .1890000+00 .1890000+00
 .1370000+03

PROBLEM 1 TABLE ORDER PHI OR S VS. DISTRIBUTED LOADS (F THETA, F PHI, F ZETA, M THETA, M PHI)

LOAD IDENTIFICATION CLUES 000100

.782892-02	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000
.0000000	.7135027+06	-5361327+05	-1074038+04	.0000000	.9777138+00	.0000000	.0000000	.0000000	.0000000
.0000000	-2433349+05	.1828438+04	.3662923+02	.0000000	.4162911-01	.0000000	.0000000	.0000000	.0000000
.0000000	-5277268+03	.3985389+02	-2125047+04	.0000000	.9028239-03	.0000000	.0000000	.0000000	.0000000
.0000000	.2060993+00	.0000000	.0000000	.1356762-05	.0000000	.0000000	.0000000	.0000000	.0000000
.0000000	.7409962+00	-4168462+01	-8346698+03	.0000000	.4080881-06	.0000000	.0000000	.0000000	.0000000
.0000000	.2312501-01	.4532606+00	.2293497+01	.0000000	.6399895-08	.0000000	.0000000	.0000000	.0000000
.0000000	.3051449-01	-2272884+02	.7617164+00	.0000000	-5220399-07	.0000000	.0000000	.0000000	.0000000
.0000000	-8180743-01	-4090411+01	-68187926+01	.0000000	-11462235-07	.0000000	.0000000	.0000000	.0000000

MATRIX X AND Y (TRANSPOSED) MAGIC OUTPUT

.0000000	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000
.0000000	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000
.0000000	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000
.0000000	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000
.0000000	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000
.0000000	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000
.0000000	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000
.0000000	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000
.0000000	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000
.0000000	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000

STIFFNESS COEFFICIENTS

	DELTA T1	DELTA Z1	DELTA R1	THETA 1	DELTA T2	DELTA Z2	DELTA R2	THETA 2
FORCT1	.3478717+06	.0000000	.0000000	.0000000	-.157269+06	.0000000	.0000000	.0000000
FORCZ1	.0000000	.1311920+08	.6425479+06	-.2219254+06	.0000000	-.1311920+08	-.6576855+06	-.2914968+06
FORCR1	.0000000	.6425479+06	.5463329+06	-.1125694+05	.0000000	-.6425479+06	-.5584159+06	-.1495203+05
MOME 1	.0000000	-.2219254+06	-.1125694+05	.5283147+04	.0000000	.2219254+06	.1162910+05	.3369819+04
FORCT2	-.157269+06	.0000000	.0000000	.0000000	.7169569+05	.0000000	.0000000	.0000000
FORCZ2	.0000000	-.1311920+08	-.6425479+06	.2219254+06	.0000000	.1311920+08	.6576855+06	.2914968+06
FORCR2	.0000000	-.6576855+06	-.5584159+06	.1162910+05	.0000000	.6576855+06	.9161192+06	.1564111+05
MOME 2	.0000000	-.2914968+06	-.1495203+05	.3369819+04	.0000000	.2914968+06	.1564111+05	.9098598+04

SEGMENT SYMMETRY CHECK

.3478717+06	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000
.1000000+01	.1311920+08	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000
.1000000+01	.1000000+01	.5463329+06	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000
.1000000+01	.1000000+01	.1000000+01	.5283147+04	.0000000	.0000000	.0000000	.0000000	.0000000
.1000000+01	.1000000+01	.1000000+01	.1000000+01	.7169569+05	.0000000	.0000000	.0000000	.0000000
.1000000+01	.1000000+01	.1000000+01	.1000000+01	.1000000+01	.1311920+08	.0000000	.0000000	.0000000
.1000000+01	.1000000+01	.1000000+01	.1000000+01	.1000000+01	.1000000+01	.1000000+01	.9161192+06	.0000000
.1000000+01	.1000000+01	.1000000+01	.1000000+01	.1000000+01	.1000000+01	.1000000+01	.1000000+01	.9098598+04

SEGMENT LOAD MATRICES

.0000000
.7719603+00
.3191264+01
-.5034461-02
.0000000
.1156083+01
.7873083-01

•8052422-02

RZER011 = 3.4102J1-02

RZER01J = 7.511738-02

SEGMENT NUMBER 2 SEGMENT CODE 11 ELLIPSE SEGMENT
 DTAU DIFF STEP DELTA
 .500000E-02 .100000E-03 .100000E-02 .000000

GEOMETRY INPUT VARIABLES
 .300000E+01 .300000E+01 .000000

NUMBER OF TABLE COLUMNS = 2

ISOT EPRE SING THIC NOYH T FREE .000

MATERIAL PROPERTY TABLE USED

.00000	.00000	.00000	.00000	.00000	.00000	.00000	.00000	.00000	.00000	.00000	.00000	.00000	.00000
.32500E+06	.00000	.00000	.00000	.00000	.00000	.00000	.00000	.00000	.00000	.00000	.00000	.00000	.00000
.40000E+00	.00000	.00000	.00000	.00000	.00000	.00000	.00000	.00000	.00000	.00000	.00000	.00000	.00000
.00000	.00000	.00000	.00000	.00000	.00000	.00000	.00000	.00000	.00000	.00000	.00000	.00000	.00000

TABLE ORDER PHI OR S VS. CROSSSECTION PROPERTIES

.750000E-01 .125000E+00
 .189000E-00 .189000E+00

PROBLEM 1 TABLE ORDER PHI OR S VS. DISTRIBUTED LOADS (P THETA, F PHI, F ZETA, H THETA, M PHI)
 LOAD IDENTIFICATION CLUES 000100

.137000E+03 .137000E+03

MATRIX X AND Y (TRANSPOSED) MAGTC OUTPUT

.2633787E-01	.0000000	.0000000	.1671340E+01	.0000000	.0000000	.0000000	.0000000
.0000000	.2609403E+06	-.3278849E+05	-.8193686E+03	.0000000	.9187997E+00	-.4594955E-01	.0384825E-01
.0000000	-.1960730E+05	.2463758E+04	.6156813E+02	.0000000	-.5598673E-01	.9988475E+09	-.4797418E-02
.0000000	-.5094756E+03	.6401822E+02	-.7766039E+03	.0000000	.1454767E-02	.4743060E-01	.9203522E+00
.3579942E-00	.0000000	.0000000	.0000000	.1839895E-05	.0000000	.0000000	.0000000
.0000000	.8060132E+00	-.5609445E-01	-.1901769E-02	.0000000	-.5532977E-06	-.1324966E-07	.1092309E-06
.0000000	.3438619E-01	.3438872E-01	.3438872E-01	.0000000	.1111363E-07	-.7678359E-07	-.4213415E-05
.0000000	.3801114E-01	-.4776395E-02	.8072278E+00	.0000000	-.1085382E-06	-.5013740E-05	-.1860786E-03
.0000000	-.1368812E+00	-.5547321E-01	-.1383943E+00	.0000000	-.2974204E-07	.1422371E-06	.1077575E-04

STIFFNESS COEFFICIENTS

	DELTA T1	DELTA Z1	DELTA R1	THETA 1	DELTA T2	DELTA Z2	DELTA R2	THETA 2
FORCT1	.4287382+06	.0000000	.0000000	.0000000	-.2565236+06	.0000000	.0000000	.0008000
FORCZ1	.0000000	.1260753+08	.1152076+07	-.2867468+06	.0000000	-.1260753+08	-.1146543+07	-.3411542+06
FORCR1	.0000000	.1152076+07	.8967101+06	-.2746508+05	.0000000	-.1152076+07	-.9649091+06	-.3356629+05
HOME 1	.0000000	-.2867468+06	-.2746508+05	.8967101+06	.0000000	.2867468+06	.2803992+05	.5228263+04
FORCT2	-.2565236+06	.0000000	.0000000	.0000000	.1534838+06	.0000000	.0000000	.0000000
FORCZ2	.0000000	-.1260753+08	-.1152076+07	.2867468+06	.0000000	.1260753+08	.1146543+07	.3411542+06
FORCR2	.0000000	-.1146543+07	-.9649091+06	.2803992+05	.0000000	.1146543+07	.1265185+07	.3408050+05
HOME 2	.0000000	-.3411542+06	-.3356629+05	.5228263+04	.0000000	.3411542+06	.3409050+05	.1266200+05

SEGMENT SYMMETRY CHECK

.4287382+06	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000
.1260753+08	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000
.1000000+01	.0000000+01	.0000000+01	.0000000+01	.0000000+01	.0000000+01	.0000000+01	.0000000+01	.0000000+01
.1000000+01	.0000000+01	.0000000+01	.0000000+01	.0000000+01	.0000000+01	.0000000+01	.0000000+01	.0000000+01
.1000000+01	.0000000+01	.0000000+01	.0000000+01	.0000000+01	.0000000+01	.0000000+01	.0000000+01	.0000000+01
.1000000+01	.0000000+01	.0000000+01	.0000000+01	.0000000+01	.0000000+01	.0000000+01	.0000000+01	.0000000+01
.1000000+01	.0000000+01	.0000000+01	.0000000+01	.0000000+01	.0000000+01	.0000000+01	.0000000+01	.0000000+01
.1000000+01	.0000000+01	.0000000+01	.0000000+01	.0000000+01	.0000000+01	.0000000+01	.0000000+01	.0000000+01
.1000000+01	.0000000+01	.0000000+01	.0000000+01	.0000000+01	.0000000+01	.0000000+01	.0000000+01	.0000000+01

SEGMENT LOAD MATRICES

.0000000	.1889509+01	.1577970+00	.1560924+01	.0000000	.2465665+01	.2684038+00
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*2121776-01

RZERO(1) = 7*511738-52 RZERO(J) = 1*255951-U1

INPUT DATA FOR SEGMENT COUPLING

REGION NUMBER 1 NUMBER OF SEGMENT JOINTS 3 NUMBER OF KINEMATIC LINKS 0

SEGMENT JOINT(I) JOINT(J)

1 1 2 3
2 2 3

REGION STIFFNESS MATRIX

	DELTA T1	DELTA Z1	DELTA R1	THETA 1	DELTA T2	DELTA Z2	DELTA R2	THETA 2
FORCT1	.2980332+06	.0000000	.0000000	.0000000	-.8095370+05	.0000000	.0000000	.0000000
F0RCZ1	.0000000	.1773356+07	.9587958+05	-.5510696+05	.0000000	-.1773356+07	-.9723642+05	-.8857167+05
F0RCR1	.0000000	.9587958+05	.3545450+06	-.3482105+04	.0000000	-.9587958+05	-.2752501+06	-.5983746+04
M0ME 1	.0000000	-.5510696+05	-.3482105+04	.2750048+04	.0000000	.5510695+05	.3798538+04	.1956229+04
F0RCZ2	-.8095370+05	.0000000	.0000000	.0000000	.2198918+05	.0000000	.0000000	.0000000
F0RCR2	.0000000	-.1773356+07	-.9587958+05	.5510695+05	.0000000	.1773357+07	.9723643+05	.8857168+05
M0ME 2	.0000000	-.9723642+05	-.2752501+06	.3798538+04	.0000000	.9723643+05	.7236980+06	.7534205+04
	.0000000	-.8857167+05	-.5983746+04	.1956229+04	.0000000	.8857168+05	.7534205+04	.6558416+04

REGION SYMMETRY CHECK

.2980332+06	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000
.1000000+01	.1773356+07	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000
.1000000+01	.1000000+01	.3545450+06	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000
.1000000+01	.1000000+01	.1000000+01	.2750048+04	.0000000	.0000000	.0000000	.0000000	.0000000
.1000000+01	.1000000+01	.1000000+01	.1000000+01	.2198918+05	.0000000	.0000000	.0000000	.0000000
.1000000+01	.1000000+01	.1000000+01	.1000000+01	.1000000+01	.1773357+07	.0000000	.0000000	.0000000
.1000000+01	.1000000+01	.1000000+01	.1000000+01	.1000000+01	.1000000+01	.7236980+06	.0000000	.0000000

.1000000+01 .1000000+01 .1000000+01 .1000000+01 .1000000+01 .6558416+04

REGION LOAD MATRIX

.0000000
•2193717+01
•1059610+00
-•2978503-01
•0000000
•4089500+01
•8454750+00
•6405492-01

REGION NUMBER 2

THERE ARE 2 SEGMENTS AND 0 KINEMATIC LINKS WITHIN THIS REGION

SEGMENT NUMBER 1 SEGMENT CODE 11 ELLIPSE SEGMENT

DTAU DIFF STEP DELTA

.350000-02 .100000-03 .110000-02 .000000

GEOMETRY INPUT VARIABLES

.300000+01 .500000+01 .000000

ISOT EPKE SING THIC N0TH T FREE .0000 NUMBER OF TABLE COLUMNS = 2

MATERIAL PROPERTY TABLE USED

.00000	.00000	.00000	.00000	.00000	.00000	.00000	.00000	.00000	.00000
.32500+06	.00000	.00000	.00000	.00000	.00000	.00000	.00000	.00000	.00000
.40000+00	.00000	.00000	.00000	.00000	.00000	.00000	.00000	.00000	.00000
.00000	.00000	.00000	.00000	.00000	.00000	.00000	.00000	.00000	.00000

TABLE ORDER PHI OR S VS. CROSSSECTION PROPERTIES

.125000+00 .180000+00

.180000+00 .180000+00

PROBLEM 1 TABLE ORDER PHI OR S VS. DISTRIBUTED LOADS (P THETA, F PHI, F ZETA, M THETA, M PHI)

LOAD IDENTIFICATION CLUES 000100

.137000+03 .137000+03

MATRIX X AND Y (TRANSPOSED) MAGIC OUTPUT

.6100132-01	.000000	.000000	.144680+01	.000000	.000000	.000000	.000000	.000000	.000000
.000000	.126137+06	-.2295315+05	-.6459470+03	.000000	.916050+00	-.511570+01	.5647908-01	.000000	.000000
.000000	-.1584981+05	.2884182+04	.8116456+02	.000000	.6533095-01	.9980085+00	-.67096807-02	.000000	.000000
.000000	.4562117+03	.6301663+02	-.3744667+03	.000000	.1880494-02	.5363725+01	.9179284+00	.000000	.000000
.477354+00	.000000	.000000	.000000	.2179723-05	.000000	.000000	.000000	.000000	.000000
.000000	.8415345+00	-.26554439+01	-.1844524-02	.000000	.6554018-06	-.1651089-07	.1612769+06	.000000	.000000
.000000	.419739+01	.6894226+00	.4275503-01	.000000	.1463022-07	-.1162355+06	-.5800433-05	.000000	.000000
.000000	.387021+01	-.7043697-02	.8431122+00	.000000	-.1595604-06	-.6567227+05	-.2204675-03	.000000	.000000
.000000	-.1787192+00	-.6574059-01	-.1844496+00	.000000	-.4295018-07	.2360894-06	.1610457-04	.000000	.000000

STIFFNESS COEFFICIENTS

	DELTA T1	DELTA Z1	DELTA R1	THETA 1	DELTA T2	DELTA Z2	DELTA R2	THETA 2
FORCT1	.5235875+06	.0000000	.0000000	.0000000	-.3618914+06	.0000000	.0000000	.0000000
FORCZ1	.0000000	.1352936+08	.1878344+07	-.3594667+06	.0000000	-.1352936+08	-.1858305+07	-.4068378+06
FORCR1	.0000000	.1878344+07	.1387801+07	-.5421759+05	.0000000	-.1878344+07	-.1485915+07	-.6215720+05
HOME 1	.0000000	-.3594667+06	-.5421759+05	.1285239+05	.0000000	.3594667+06	.5429303+05	.7254204+04
FORCT2	-.3618914+06	.0000000	.0000000	.0000000	.2501308+06	.0000000	.0000000	.0000000
FORCZ2	.0000000	-.1352936+08	-.1878344+07	.3594667+06	.0000000	.1352936+08	.1858305+07	.4068378+06
FORCR2	.0000000	-.1858305+07	-.1485915+07	.5429303+05	.0000000	.1858305+07	.1753775+07	.6260142+05
HOME 2	.0000000	-.4068378+06	-.6215720+05	.7254204+04	.0000000	.4068378+06	.6260142+05	.1662934+05

SEGMENT SYMMETRY CHECK

.5235875+06	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000
.1000000+01	.1352936+08	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000
.1000000+01	.1387801+07	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000
.1000000+01	.1000000+01	.1000000+01	.1285239+05	.0000000	.0000000	.0000000	.0000000	.0000000
.1000000+01	.1000000+01	.1000000+01	.1000000+01	.2501308+06	.0000000	.0000000	.0000000	.0000000
.1000000+01	.1000000+01	.1000000+01	.1000000+01	.1000000+01	.1352936+08	.0000000	.0000000	.0000000
.1000000+01	.1000000+01	.1000000+01	.1000000+01	.1000000+01	.1000000+01	.1753775+07	.0000000	.0000000
.1000000+01	.1000000+01	.1000000+01	.1000000+01	.1000000+01	.1000000+01	.1000000+01	.1662934+05	

SEGMENT LOAD MATRICES

.0000000
.3357190+01
.4536957+00
-.3152022+01
.0000000
.4056553+01
.6991845+00

3932265-01

RZERO(I) = 1255451-01

RZERO(J) = 1816357-01

SEGMENT NUMBER 2 SEGMENT CODE 11 ELLIPSE SEGMENT
 DTAU DIFF STEP DELTA
 .000000-02 .100000-03 .120000-04 .000000

GEOMETRY INPUT VARIABLES
 .300000*01 .300000*01 .000000

ISOT EPKE SING THIC NOTH T FREL = .000 NUMBER OF TABLE COLUMNS = 2

MATERIAL PROPERTY TABLE USED

.00000	.00000	.00000	.00000	.00000	.00000	.00000	.00000	.00000	.00000
.32500*06	.00000	.00000	.00000	.00000	.00000	.00000	.00000	.00000	.00000
.40000*00	.00000	.00000	.00000	.00000	.00000	.00000	.00000	.00000	.00000
.00000	.00000	.00000	.00000	.00000	.00000	.00000	.00000	.00000	.00000

TABLE ORDER PHI OR S VS. CRUSSECTION PROPERTIES

.180000*00	.240000*00
.180000*00	.180000*00

PROBLEM 1 TABLE ORDER PHI OR S VS. DISTRIBUTED LOADS (F THETA, F PHI, F ZETA, M THETA, M PHI)
 LOAD IDENTIFICATION CLUS 000000

MATRIX A AND Y (TRANPOSED) MAGIC OUTPUT

.119194*00	.000000	.134287*01	.000000	.000000
.000000	.735632*05	-.180215*05	.000000	.921903*00
.000000	-.133862*05	.327564*04	.103814*03	.738478*01
.000000	.430023*03	.105234*03	-.217141*03	.000000
.554551*00	.000000	.000000	.252272*05	.000000
.000000	.864156*00	-.742171*01	-.235181*02	.000000
.000000	.484095*01	.742434*00	.506820*01	.181258*07
.000000	.411816*01	-.100778*01	.866094*00	.000000
.000000	.226056*00	-.276036*01	-.244007*00	.000000
.000000			-.576842*07	.384916*06
				.000000
				-.562453*01
				.997523*00
				.605524*01
				.000000
				.198193*07
				-.170575*04
				-.844081*05
				.230905*06
				-.746465*05
				-.255180*03
				.232455*04

STIFFNESS COEFFICIENTS

	DELTA T1	DELTA Z1	DELTA R1	THETA 1	DELTA T2	DELTA Z2	DELTA R2	THETA 2
FORC1	.6075007+06	.0000000	.0000000	.0000000	-.4523873+06	.0000000	.0000000	.0000000
FORC2	.0000000	.1301396+08	.2447386+07	-.3978021+06	.0000000	-.1301396+08	-.2414319+07	-.4388162+06
FORC4	.0000000	.2447386+07	.1904616+07	-.8360808+05	.0000000	-.2447386+07	-.2016905+07	-.9348882+05
HOME 1	.0000000	-.3978021+06	-.8360808+05	.1634786+05	.0000000	.3978021+06	.8359467+05	.9009884+04
FORCZ	-.4523873+06	.0000000	.0000000	.0000000	.3368793+06	.0000000	.0000000	.0000000
FORCZ2	.0000000	-.1301396+08	-.2447386+07	.3978021+06	.0000000	.1301396+08	.2414319+07	.4388162+06
FORCZ3	.0000000	-.2414319+07	-.2016905+07	.8359467+05	.0000000	.2414319+07	.2266665+07	.9391466+05
HOME 2	.0000000	-.4388162+06	-.9348882+05	.9009884+04	.0000000	.4388162+06	.9391466+05	.2008550+05

SEGMENT SYMMETRY CHECK

.6075007+06	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000
.1000000+01	.1301396+08	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000
.1000000+01	.1000000+01	.1904616+07	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000
.1000000+01	.1000000+01	.1000000+01	.1634786+05	.0000000	.0000000	.0000000	.0000000	.0000000
.1000000+01	.1000000+01	.1000000+01	.1000000+01	.3368792+06	.0000000	.0000000	.0000000	.0000000
.1000000+01	.1000000+01	.1000000+01	.1000000+01	.1000000+01	.1301396+08	.0000000	.0000000	.0000000
.1000000+01	.1000000+01	.1000000+01	.1000000+01	.1000000+01	.1000000+01	.2266665+07	.0000000	.0000000
.1000000+01	.1000000+01	.1000000+01	.1000000+01	.1000000+01	.1000000+01	.9391466+05	.2008550+05	.0000000

SEGMENT LOAD MATRICES

.0000000	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000
.5281456+01	.1017575+01	-.5637968-01	.0000000	.6123617+01	.1432160+01	.0000000	.0000000	.0000000

•6727540-01

RZER011J = 1.816357-01

RZER011J = 2.439066-01

INPUT DATA FOR SEGMENT COUPLING

REGION NUMBER 2 NUMBER OF SEGMENT JOINTS 3 NUMBER OF KINEMATIC LINKS 0

SEGMENT JOINT(I) JOINT(J)

1 1 2
2 2 3

REGION STIFFNESS MATRIX

	DELTA T1	DELTA Z1	DELTA K1	THETA 1	DELTA T2	DELTA Z2	DELTA K2	THETA 2
FORCT1	.3708817+06	.0000000	.0000000	.0000000	-.1908921+06	.0000000	.0000000	.0000000
FORCZ1	.0000000	.1725417+07	.1963591+06	-.8926414+05	.0000000	-.1725417+07	-.1677271+06	-.1116004+06
FORCR1	.0000000	.1963591+06	.6320364+06	-.1512423+05	.0000000	-.1963591+06	-.6645688+06	-.2063800+05
MOME 1	.0000000	-.8926414+05	-.1512423+05	.6441501+04	.0000000	.8926414+05	.1488700+05	.3966312+04
FORCT2	-.1908921+06	.0000000	.0000000	.0000000	.9825195+05	.0000000	.0000000	.0000000
FORCZ2	.0000000	-.1725417+07	-.1963591+06	.8926414+05	.0000000	.1725417+07	.1677271+06	.1116004+06
FORCR2	.0000000	-.1677271+06	-.6645688+06	.1488700+05	.0000000	.1677271+06	.9962789+06	.2199959+05
MOME 2	.0000000	-.1116004+06	-.2063800+05	.3966312+04	.0000000	.1116004+06	.2199959+05	.1019914+05

REGION SYMMEY CHECK

.3708817+06	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000
.1000000+01	.1725417+07	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000
.1000000+01	.1000000+01	.6320364+06	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000
.1000000+01	.1000000+01	.1000000+01	.8926414+05	.0000000	.0000000	.0000000	.0000000	.0000000
.1000000+01	.1000000+01	.1000000+01	.1000000+01	.9825195+05	.0000000	.0000000	.0000000	.0000000
.1000000+01	.1000000+01	.1000000+01	.1000000+01	.1000000+01	.1725417+07	.0000000	.0000000	.0000000
.1000000+01	.1000000+01	.1000000+01	.1000000+01	.1000000+01	.1000000+01	.1000000+01	.9962789+06	.0000000

.100000+01 .100000+01 .100000+01 .100000+01 .100000+01 .1019914+05

REGION LOAD MATRIX

.0000000
-7867053+01
+1154944+01
-11536856+00
+0000000
+1095377+02
+2433576+01
+228314+00

REGION NUMBER 3

THERE ARE 2 SEGMENTS AND 0 KINEMATIC LINKS WITHIN THIS REGION

ELLIPSE SEGMENT

SEGMENT NUMBER 1 SEGMENT CODE 11

DTAU DIFF STEP DELTA

.700000E-02 .100000E-03 .140000E-02 .000000

GEOMETRY INPUT VARIABLES

.300000E+01 .300000E+01 .000000

NUMBER OF TABLE COLUMNS = 3

ISOT EPRE SING THIC NOTH T FREE = .000

MATERIAL PROPERTY TABLE USED

.00000	.00000	.00000	.00000	.00000	.00000	.00000	.00000	.00000	.00000
.32500E+06	.00000	.00000	.00000	.00000	.00000	.00000	.00000	.00000	.00000
.40000E-00	.00000	.00000	.00000	.00000	.00000	.00000	.00000	.00000	.00000
.00000	.00000	.00000	.00000	.00000	.00000	.00000	.00000	.00000	.00000

TABLE ORDER PHI OR S VS. CROSSSECTION PROPERTIES

.240000E+00 .275000E+00 .310000E+00
 .189000E+00 .189000E+00 .189000E+00

PROBLEM 1 TABLE ORDER PHI OR S VS. DISTRIBUTED LOADS (F THETA, F PHI, F ZETA, H THETA, H PHI)

LOAD IDENTIFICATION CLUES 000100

MATRIX X AND Y (TRANSPUSED) MAGIC OUTPUT

.2236538E+00	.0000000	.0000000	.1305961E+01	.0000000	.0000000	.0000000	.0000000
.0000000	.5003033E+05	-.1602609E+05	-.6203359E+03	.0000000	.9247110E+00	-.6542763E+01	.7424162E+01
.0000000	-.1224326E+05	.3921852E+04	.1518065E+03	.0000000	.8776802E+01	.9264461E+01	-.1816816E+01
.0000000	-.4733998E+03	.1529243E+03	-.01453495E+03	.0000000	.3422919E+02	.7408997E+01	.9276450E+00
.5863558E+00	.0000000	.0000000	.0000000	.0000000	.3108133E+05	.0000000	.0000000
.0000000	.8728296E+00	-.8845823E+01	-.03423639E+02	.0000000	.9341546E+06	-.2555994E+07	.4097173E+04
.0000000	.5794646E+01	.7624763E+00	.6298879E+01	.0000000	.2386119E+07	-.3122822E+06	-.1157137E+04
.0000000	.5533894E+01	-.1785472E+01	.8754181E+00	.0000000	.0000000	-.3996789E+06	-.3144701E+03
.0000000	-.3249206E+00	-.9372061E+01	-.3605531E+00	.0000000	.0000000	-.9918892E+07	.4302199E+04

STIFFNESS COEFFICIENTS

	DELTA T1	DELTA Z1	DELTA R1	THETA 1	DELTA T2	DELTA Z2	DELTA R2	THETA 2
FOKCT1	.6433228+06	.0000000	.0000000	.0000000	-.4930645+06	.0000000	.0000000	.0000000
FOKZ1	.0000000	.9299041+07	.2166154+07	-.3511718+06	.0000000	-.9299041+07	-.22119671+07	-.3834031+06
FORCR1	.0000000	-.2166154+07	.2123487+07	-.9763943+05	.0000000	-.2166154+07	-.2238239+07	-.1086136+06
MOKE 1	.0000000	-.3511718+06	-.9763943+05	.1794102+05	.0000000	.3511718+06	.9751383+05	.9798899+04
FOKCT2	-.4930645+06	.0000000	.0000000	.0000000	.3775496+06	.0000000	.0000000	.0000000
FOKZ2	.0000000	-.9299041+07	-.2166154+07	.3511718+06	.0000000	.9299041+07	.2119671+07	.3834031+06
FORCR2	.0000000	-.2119671+07	-.2238239+07	.9751382+05	.0000000	.2119671+07	.2479632+07	-.1091127+06
MOKE 2	.0000000	-.3834031+06	-.1086136+06	.9798899+04	.0000000	.3834031+06	.1091127+06	.2161936+05

SEGMENT SYMMETRY CHECK

.6433228+06	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000
.1000000+01	.9299040+07	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000
.1000000+01	.1000000+01	.2123487+07	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000
.1000000+01	.1000000+01	.1000000+01	.1794102+05	.0000000	.0000000	.0000000	.0000000	.0000000
.1000000+01	.1000000+01	.1000000+01	.1000000+01	.3775496+06	.0000000	.0000000	.0000000	.0000000
.1000000+01	.1000000+01	.1000000+01	.1000000+01	.9299040+07	.0000000	.0000000	.0000000	.0000000
.1000000+01	.1000000+01	.1000000+01	.1000000+01	.1000000+01	.2479632+07	.0000000	.0000000	.0000000
.1000000+01	.1000000+01	.1000000+01	.1000000+01	.1000000+01	.1000000+01	.1000000+01	.1000000+01	.2161936+05

SEGMENT LOAD MATRICES

- .0000000
- .8449485+01
- .2176780+01
- .1115372+00
- .0000000
- .9611152+01
- .2451578+01

•1308946+00

RZER011 = 2.437066-01

RZER0(J) = 3.185169-01

SEGMENT NUMBER 2 SEGMENT CODE 11 ELLIPSE SEGMENT
 DTAU DIFF STEP DELTA
 .8000000-02 .1000000-03 .1600000-02 .0000000
 GEOMETRY INPUT VARIABLES
 .3000000*01 .3000000*01 .0000000
 NUMBER OF TABLE COLUMNS = 3
 TSPY EPRE STING TRIC NOTH T FREE = .000

MATERIAL PROPERTY TABLE USED

.00000	.00000	.00000	.00000	.00000	.00000	.00000	.00000	.00000	.00000
.3250*06	.00000	.00000	.00000	.00000	.00000	.00000	.00000	.00000	.00000
.4000*00	.00000	.00000	.00000	.00000	.00000	.00000	.00000	.00000	.00000
.00000	.00000	.00000	.00000	.00000	.00000	.00000	.00000	.00000	.00000

TABLE ORDER PHI OM S VS. CROSSSECTION PROPERTIES

.3100000*00 .3500000*00 .3900000*00
 .1890000*00 .1890000*00 .1890000*00

PROBLEM 1 TABLE ORDER PHI OR S VS. DISTRIBUTED LOADS (F THETA, F PHI, F ZETA, H THETA, H PHI)

LOAD IDENTIFICATION CLUES 000100
 .1370000*03 .1370000*03 .1370000*03

MATRIX X AND Y (TRANSPOSED) ARGIC OUTPUT

.3778796*00	.0000000	.0000000	.1278669*01	.0000000	.0000000	.0000000	.0000000
.0000000	.3507948*05	-.1441959*05	.0000000	.0000000	.9269551*00	-.7423995*01	.9969980*01
.0000000	-.1123692*05	.4618992*04	-.2186755*03	.0000000	.1022885*00	.9949839*00	-.3193659*01
.0000000	.5321237*03	-.2187321*03	-.9787833*02	.0000000	.4845862*02	.9050041*01	.9305524*00
.6116658*00	.0000000	.0000000	.3821503*05	.0000000	.0000000	.0000000	.0000000
.0000000	.8793752*00	-.1035094*00	-.4898036*02	.0000000	.1148261*05	-.2873599*07	.7153840*06
.0000000	.6778698*01	.7774432*00	.7794553*01	.0000000	.2864823*07	-.5709727*06	-.1741882*04
.0000000	.7523193*01	-.3112998*01	.8825814*00	.0000000	.6898077*06	-.1811374*04	-.3867392*03
.0000000	-.4564856*00	-.1152386*02	-.5540707*00	.0000000	.1560842*06	.1900900*05	.7862236*04

STIFFNESS COEFFICIENTS

	DELTA J1	DELTA Z1	DELTA R1	THETA 1	DELTA T2	DELTA Z2	DELTA R2	THETA 2
FORC1	.6696222+06	.0000000	.0000000	.0000000	-.5236947+06	.0000000	.0000000	.0000000
FORC2	.0000000	.6441358+07	.1731011+07	-.2994898+06	.0000000	-.6441358+07	-.1670050+07	-.3240286+06
FORC3	.0000000	.1731011+07	.2241876+07	-.1074827+06	.0000000	-.1731011+07	-.2355792+07	-.1193889+06
MOME 1	.0000000	-.2994898+06	-.1074827+06	.1915869+05	.0000000	.2994898+06	.1072099+06	.1039172+05
FORC12	-.5236947+06	.0000000	.0000000	.0000000	.4095631+06	.0000000	.0000000	.0000000
FORC22	.0000000	-.6441358+07	-.1731011+07	.2994898+06	.0000000	.6441358+07	.1670050+07	.3240286+06
FORC32	.0000000	-.1670050+07	-.2355792+07	.1072099+06	.0000000	.1670050+07	.2589283+07	.1200045+06
MOME 2	.0000000	-.3240286+06	-.1193889+06	.1039172+05	.0000000	.3240286+06	.1200045+06	.2274945+05

SEGMENT SYMMETRY CHECK

.6696322+06	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000
.1000000+01	.6441358+07	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000
.1000000+01	.1000000+01	.2241876+07	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000
.1000000+01	.1000000+01	.1000000+01	.1915869+05	.0000000	.0000000	.0000000	.0000000	.0000000
.1000000+01	.1000000+01	.1000000+01	.1000000+01	-.4095631+06	.0000000	.0000000	.0000000	.0000000
.1000000+01	.1000000+01	.1000000+01	.1000000+01	.1000000+01	.6441358+07	.0000000	.0000000	.0000000
.1000000+01	.1000000+01	.1000000+01	.1000000+01	.1000000+01	.1000000+01	.2589283+07	.0000000	.0000000
.1000000+01	.1000000+01	.1000000+01	.1000000+01	.1000000+01	.1000000+01	.1000000+01	.1000000+01	.2274945+05

SEGMENT LOAD MATRICES

.0000000
.1308516+02
.4403342+01
-.2152850+00
.0000000
.1463222+02
.5777613+01

•249787•00

RZERO(I) = 3.185169-01

RZERO(J) = 4.072498-01

INPUT DATA FOR SEGMENT COUPLING

REGION NUMBER 3 NUMBER OF SEGMENT JOINTS 3 NUMBER OF KINEMATIC LINKS 0

SEGMENT JOINT(I) JOINT(J)

1 1 2
2 2 3

REGION STIFFNESS MATRIX

	DELTA T1	DELTA Z1	DELTA R1	THETA 1	DELTA T2	DELTA Z2	DELTA R2	THETA 2
FORCT1	.4117639+06	.0000000	.0000000	.0000000	-.2465811+06	.0000000	.0000000	.0000000
FORCZ1	.0000000	.1042193+07	.8244002+05	-.7809098+05	.0000000	-.1042193+07	-.2612880+05	-.9112546+05
FORCR1	.0000000	.8244002+05	.7740444+06	-.2310934+05	.0000000	-.8244001+05	-.8307681+06	-.31444346+05
MOME 1	.0000000	-.7809098+05	-.2310934+05	.8486097+04	.0000000	.7809098+05	.2212762+05	.4987121+04
FORCT2	-.2465811+06	.0000000	.0000000	.0000000	.1476638+06	.0000000	.0000000	.0000000
FORCZ2	.0000000	-.1042193+07	-.8244001+05	.7809098+05	.0000000	.1042193+07	.2612880+05	.9112547+05
FORCR2	.0000000	.8244002+05	-.8307681+06	.2212762+05	.0000000	.2612880+05	.1127615+07	.3344493+05
MOME 2	.0000000	-.9112546+05	-.31444346+05	.4987121+04	.0000000	.9112547+05	.3344493+05	.1212275+05

REGION SYMMETRY CHECK

.4117639+06	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000
.1000000+01	.1042193+07	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000
.1000000+01	.1000000+01	.7760444+06	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000
.1000000+01	.1000000+01	.1000000+01	.8486097+04	.0000000	.0000000	.0000000	.0000000	.0000000
.1000000+01	.1000000+01	.1000000+01	.1476638+06	.0000000	.0000000	.0000000	.0000000	.0000000
.1000000+01	.1000000+01	.1000000+01	.1000000+01	.1000000+01	.1042193+07	.0000000	.0000000	.0000000
.1000000+01	.1000000+01	.1000000+01	.1000000+01	.1000000+01	.1000000+01	.1000000+01	.1127615+07	.0000000

REGION NUMBER 4

THERE ARE 2 SEGMENTS AND 0 KINEMATIC LINKS WITHIN THIS REGION

SEGMENT NUMBER 1 SEGMENT CODE 11 ELLIPSE SEGMENT
 DTAX DIFF STEP DELTA
 .9000000-02 .1000000-03 .1800000-02 .0000000
 GEOMETRY INPUT VARIABLES
 .3000000+01 .3000000+01 .0000000

ISOT EPRE SING THIC NOTH T FREE = .000 NUMBER OF TABLE COLUMNS = 3
 .00000 .00000 .00000 .00000 .00000 .00000 .00000 .00000
 .00000 .00000 .00000 .00000 .00000 .00000 .00000 .00000
 .00000 .00000 .00000 .00000 .00000 .00000 .00000 .00000
 .00000 .00000 .00000 .00000 .00000 .00000 .00000 .00000

MATERIAL PROPERTY TABLE USED
 TABLE ORDER PHI OR S VS. CROSSSECTION PROPERTIES
 .3900000+00 .4350000+00 .4800000+00
 .1890000+00 .1890000+00 .1890000+00

PROBLEM 1 TABLE ORDER PHI OR S VS. DISTRIBUTED LOADS (F THETA, F PHI, F ZETA, M THETA, M PHI)
 LOAD IDENTIFICATION CLUES 000100
 .1370000+03 .1370000+03 .1370000+03

MATRIX X AND Y (TRANSPosed) MAGIC OUTPUT
 .5770912+00 .0000000 .0000000 .1259648+01 .0000000 .0000000
 .0000000 .2519122+05 -.1311482+05 -.7696308+03 .0000000 .9283388+00
 .0000000 -.1035497+05 .530911+04 .3163605+03 .0000000 .1176716+00
 .0000000 -.6028237+03 .3138366+03 -.66306368+02 .0000000 .6856623-02
 .6302733+00 .0000000 .0000000 .4745516-05 .0000000 .0000000
 .0000000 .8936982+00 -.1197579+00 -.7023390-02 .0000000 .1425700-05
 .0000000 .7812441-01 .7812441-01 .9721464-01 .0000000 -.2856009-07
 .0000000 .1058143+00 -.5508807+01 .8872410+00 .0000000 -.1204106+05
 .0000000 -.6381283+00 -.1431083+02 -.8292870+00 .0000000 -.2302015-06
 .0000000 .0000000 .0000000 .0000000 .0000000 .0000000
 .1389715+00 .0000000 .0000000 .0000000 .0000000 .0000000
 .5712490-01 .9928105+00 .1118511+00 .9322805+00
 .0000000 .0000000 .0000000 .0000000
 .1267809-05 .2678228-04 .4803641+03 .1488162-03

STIFFNESS COEFFICIENTS

	DELTA T1	DELTA Z1	DELTA R1	THETA 1	DELTA T2	DELTA Z2	DELTA R2	THETA 2
FORCT1	.0792141*06	.0000000	.0000000	.0000000	-.5392093*06	.0000000	.0000000	.0000000
FORCZ1	.0000000	.4242238*07	.1163257*07	-.2420061*06	.0000000	-.4242238*07	-.1086791*07	-.2593938*06
FORCR1	.0000000	.1163257*07	.2199387*07	-.1100099*06	.0000000	-.1163257*07	-.2308742*07	-.1225897*06
MOME 1	.0000000	-.2420061*06	-.1100099*06	.1980369*05	.0000000	.2420061*06	.1095288*06	.1068713*05
FORCT2	-.5392093*06	.0000000	.0000000	.0000000	.4280648*06	.0000000	.0000000	.0000000
FORCZ2	.0000000	-.4242238*07	-.1163257*07	.2420061*06	.0000000	.4242238*07	.1086791*07	.2593938*06
FORCR2	.0000000	-.1086791*07	-.2308742*07	.1095288*06	.0000000	.1086791*07	.2534459*07	.1233920*06
MOME 2	.0000000	-.2593938*06	-.1225897*06	.1068713*05	.0000000	.2593938*06	.1233920*06	.2327095*05

SEGMENT SYMMETRY CHECK

.0792141*06	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000
.1000000*01	.4242238*07	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000
.1000000*01	.1000000*01	.2199387*07	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000
.1000000*01	.1000000*01	.1000000*01	.1980369*05	.0000000	.0000000	.0000000	.0000000	.0000000
.1000000*01	.1000000*01	.1000000*01	.1000000*01	.7280648*06	.0000000	.0000000	.0000000	.0000000
.1000000*01	.1000000*01	.1000000*01	.1000000*01	.1000000*01	.4242238*07	.0000000	.0000000	.0000000
.1000000*01	.1000000*01	.1000000*01	.1000000*01	.1000000*01	.1000000*01	.2534459*07	.0000000	.0000000
.1000000*01	.1000000*01	.1000000*01	.1000000*01	.1000000*01	.1000000*01	.1000000*01	.1000000*01	.2327095*05

SEGMENT LOAD MATRICES

.0000000
 .1992380*02
 .8594535*01
 -.4174731*09
 .0000000
 .2193656*02
 .1097598*02

479210+00

RZER0(J) = 4.072498-01

RZER0(J) = 5.129445-01

SEGMENT NUMBER 2 SEGMENT CODE 11 ELLIPSE SEGMENT

DTAU DIFF STEP DELTA
 .1000000-01 .1000000-03 .2000000-02 .0000000

GEOMETRY INPUT VARIABLES
 .3000000+01 .3000000+01 .0000000

ISOT EPRE SING NOTH T FREE NUMBER OF TABLE COLUMNS = 3

MATERIAL PROPERTY TABLE USED

.00000	.00000	.00000	.00000	.00000	.00000	.00000	.00000	.00000	.00000
.32500+06	.00000	.00000	.00000	.00000	.00000	.00000	.00000	.00000	.00000
.40000+00	.00000	.00000	.00000	.00000	.00000	.00000	.00000	.00000	.00000
.00000	.00000	.00000	.00000	.00000	.00000	.00000	.00000	.00000	.00000

TABLE ORDER PHI OR S VS. CROSSSECTION PROPERTIES

.4800000+00 .5300000+00 .5800000+00
 .1890000+00 .1890000+00 .1890000+00

PROBLEM 1 TABLE ORDER PHI OR S VS. DISTRIBUTED LOADS (F THETA, F PHI, F ZETA, M THETA, M PHI)
 LOAD IDENTIFICATION CLUES: 000100

.1370000+03 .1370000+03 .1370000+03

MATRIX X AND Y (TRANPOSED) MAGIC OUTPUT

.7952555+00	.0000000	.0000000	.0000000	.1248005+01	.0000000	.0000000	.0000000
.0000000	.1837195+05	-.1204983+05	-.8972788+03	.0000000	.9288815+00	-.8829154+01	.2058839+00
.0000000	-.99575049+04	.6273270+04	.4681743+03	.0000000	.1343617+00	.9889953+00	-.1071854+00
.0000000	-.7018986+03	.4598618+03	-.3224957+02	.0000000	.9868336+02	.1415174+00	.9318123+00
.6421249+00	.0000000	.0000000	.0000000	.0023490+05	.0000000	.0000000	.0000000
.0000000	.8856852+00	-.1378656+00	-.1027475+01	.0000000	.1810050+05	-.2449494+08	.2350810+05
.0000000	.8960314+01	.7910801+00	.1236753+00	.0000000	.1075723+07	-.2195021+05	-.3308244+04
.0000000	.1555943+00	-.1019405+00	.8885372+00	.0000000	-.2189687+05	-.4640594+04	-.6097446+03
.0000000	-.90355593+00	-.1816323+02	-.1332241+01	.0000000	-.2859474+06	.1138977+04	.3024048+03

STIFFNESS COEFFICIENTS

	DELTA T1	DELTA Z1	DELTA R1	THETA 1	DELTA T2	DELTA Z2	DELTA R2	THETA 2
FORCT1	.6677568+06	.0000000	.0000000	.0000000	-.5350594+06	.0000000	.0000000	.0000000
FORCZ1	.0000000	.2658315+07	.5490843+06	-.1816563+06	.0000000	-.2658315+07	-.4562875+06	-.1921163+06
FORCR1	.0000000	.5490843+06	.1964752+07	-.1030288+06	.0000000	-.5490843+06	-.2065205+07	-.1159651+06
MOM1	.0000000	-.1816563+06	-.1030288+06	.1969990+05	.0000000	.1816563+06	.1022261+06	.1059248+05
FORCT2	-.5350594+06	.0000000	.0000000	.0000000	.4287343+06	.0000000	.0000000	.0000000
FORCZ2	.0000000	-.2658315+07	-.5490843+06	.1816563+06	.0000000	.2658315+07	.4562875+06	.1921163+06
FORCR2	.0000000	-.4562875+06	-.2065205+07	.1022261+06	.0000000	.4562875+06	.2283067+07	.1170803+06
MOM2	.0000000	-.1921163+06	-.1159651+06	.1059248+05	.0000000	.1921163+06	.1170803+06	.2299979+05

SEGMENT SYMMETRY CHECK

.6677568+06	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000
.1000000+01	.2658315+07	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000
.1000000+01	.1000000+01	.1964752+07	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000
.1000000+01	.1000000+01	.1000000+01	.1969990+05	.0000000	.0000000	.0000000	.0000000	.0000000
.1000000+01	.1000000+01	.1000000+01	.1000000+01	.4287343+06	.0000000	.0000000	.0000000	.0000000
.1000000+01	.1000000+01	.1000000+01	.1000000+01	.1000000+01	.2658315+07	.0000000	.0000000	.0000000
.1000000+01	.1000000+01	.1000000+01	.1000000+01	.1000000+01	.1000000+01	.2283067+07	.0000000	.0000000
.1000000+01	.1000000+01	.1000000+01	.1000000+01	.1000000+01	.1000000+01	.1000000+01	.1000000+01	.2299979+05

SEGMENT LOAD MATRICES

- .0000000
- .3025195+02
- .1652256+02
- .8403206+00
- .0000000
- .3284150+02
- .2064475+02

9597337*00

RZRO(I) = 5.129495-G1

RZRO(J) = 6.408022-U1

INPUT DATA FOR SEGMENT COUPLING

REGION NUMBER 4 NUMBER OF SEGMENT JOINTS 3 NUMBER OF KINEMATIC LINKS 0

SEGMENT JOINT(I) JOINT(J)

1 1 2
2 2 3

REGION STIFFNESS MATRIX

	DELTA T1	DELTA Z1	DELTA R1	THETA 1	DELTA T2	DELTA Z2	DELTA R2	THETA 2
FORCT1	.4138911+06	.0000000	.0000000	.0000000	-.2632810+06	.0000000	.0000000	.0000000
FORCZ1	.0000000	.5693219+06	-.1374452+06	-.5231184+05	.0000000	-.5693218+06	.2251325+06	-.5521432+05
FORCR1	.0000000	-.1374452+06	.7182301+06	-.2296168+05	.0000000	.1374453+06	-.7654291+06	-.3423194+05
MOME 1	.0000000	-.5231184+05	-.2296168+05	.9158445+04	.0000000	.5231184+05	.2041335+05	.5219634+04
FORCT2	-.2632810+06	.0000000	.0000000	.0000000	.1674796+06	.0000000	.0000000	.0000000
FORCZ2	.0000000	-.5693218+06	.1374453+06	.5231184+05	.0000000	.5693218+06	-.2251325+06	.5521432+05
FORCR2	.0000000	.2251325+06	-.7654291+06	.2041335+05	.0000000	-.2251325+06	.1042775+07	.3795437+05
MOME 2	.0000000	-.5521432+05	-.3423194+05	.5219634+04	.0000000	.5521432+05	.3795437+05	.1255887+05

REGION SYMMETRY CHECK

.4138911+06	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000
.1000000+01	.5693219+06	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000
.1000000+01	.1000000+01	.7182301+06	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000
.1000000+01	.1000000+01	.1000000+01	.9158445+04	.0000000	.0000000	.0000000	.0000000	.0000000
.1000000+01	.1000000+01	.1000000+01	.1674796+06	.0000000	.0000000	.0000000	.0000000	.0000000
.1000000+01	.1000000+01	.1000000+01	.1000000+01	.1000000+01	.5693218+06	.0000000	.0000000	.0000000
.1000000+01	.1000000+01	.1000000+01	.1000000+01	.1000000+01	.1000000+01	.1000000+01	.1042775+07	.0000000

REGION NUMBER 5

THERE ARE 2 SEGMENTS AND 0 KINEMATIC LINKS WITHIN THIS REGION

STIFFNESS COEFFICIENTS

	DELTA T1	DELTA Z1	DELTA R1	THETA 1	DELTA T2	DELTA Z2	DELTA R2	THETA 2
FORC1	.6821238+06	.0000000	.0000000	.0000000	-.5591228+06	.0000000	.0000000	.0000000
FORC2	.0000000	.2089629+07	.2104068+06	-.1517861+06	.0000000	-.2089629+07	-.1017695+06	-.1569814+06
FORC3	.0000000	.2104068+06	.1870240+07	-.1061270+06	.0000000	-.2104068+06	-.1962720+07	-.1192268+06
MOM1	.0000000	-.1517861+06	-.1061270+06	.2072579+05	.0000000	.1517861+06	.1050311+06	.1105348+05
FORC4	-.5591228+06	.0000000	.0000000	.0000000	.4583051+06	.0000000	.0000000	.0000000
FORC5	.0000000	-.2089629+07	-.2104068+06	.1517861+06	.0000000	.2089629+07	.1017695+06	.1569814+06
FORC6	.0000000	-.1017695+06	-.1962720+07	.1050311+06	.0000000	.1017695+06	.2167803+07	.1206965+06
MOM2	.0000000	-.1569814+06	-.1192268+06	.1105348+05	.0000000	.1569814+06	.1206965+06	.2381743+05

SEGMENT SYMMETRY CHECK

.6821238+06	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000
.1000000+01	.2089629+07	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000
.1000000+01	.1000000+01	.1870240+07	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000
.1000000+01	.1000000+01	.1000000+01	.2072579+05	.0000000	.0000000	.0000000	.0000000	.0000000
.1000000+01	.1000000+01	.1000000+01	.1000000+01	.4583051+06	.0000000	.0000000	.0000000	.0000000
.1000000+01	.1000000+01	.1000000+01	.1000000+01	.1000000+01	.2089629+07	.0000000	.0000000	.0000000
.1000000+01	.1000000+01	.1000000+01	.1000000+01	.1000000+01	.1000000+01	.2167803+07	.0000000	.0000000
.1000000+01	.1000000+01	.1000000+01	.1000000+01	.1000000+01	.1000000+01	.1000000+01	.1000000+01	.2381743+05

SEGMENT LOAD MATRICES

.0000000
.4166008+02
.2869090+02
-.1457899+01
.0000000
.493037+02
.3445096+02

•1642554•01

RZERO(I) = 6400822-01

RZERO(J) = 7807928-01

SEGMENT NUMBER 2 SEGMENT CODE 11 ELLIPSE SEGMENT
 DTAU DIFF STEP DELTA

.100000+01 .100000-03 .200000+02 .00000000

GEOMETRY INPUT VARIABLES

.300000+01 .300000+01 .00000000

1507 EPRE SING THIC N0TH T FREE # .000 NUMBER OF TABLE COLUMNS = 3

MATERIAL PROPERTY TABLE USED

.00000	.00000	.00000	.00000	.00000	.00000	.00000	.00000	.00000	.00000
.32500+06	.00000	.00000	.00000	.00000	.00000	.00000	.00000	.00000	.00000
.40000+00	.00000	.00000	.00000	.00000	.00000	.00000	.00000	.00000	.00000
.00000	.00000	.00000	.00000	.00000	.00000	.00000	.00000	.00000	.00000

TABLE ORDER PHI OR S VS. CROSSSECTION PROPERTIES

.680000+00 .700000+00 .780000+00
 .189000+00 .189000+00 .189000+00

PROBLEM 1 TABLE ORDER PHI OR S VS. DISTRIBUTED LOADS (F THETA, F PHI, F ZETA, H THETA, H PHI)
 LOAD IDENTIFICATION CLUES 000100

.137000+03 .137000+03 .137000+03

MATRIX X AND Y (TRANSPOSED) MAGIC OUTPUT

.9108530+00	.0000000	.0000000	.0000000	.1203427+01	.0000000	.0000000	.0000000
.0000000	.8995429+04	-.8898832+04	-.9703103+03	.0000000	.9356701+00	-.7895460+01	.3225993+00
.0000000	-.7274256+04	.7196141+04	.7846525+03	.0000000	.1478146+00	.9781203+00	-.2608736+00
.0000000	.0765258+03	-.7570412+03	.2785665+02	.0000000	.1563745+01	.265370+00	.4294913+00
.6905953+00	.0000000	.0000000	.0000000	.8854065+05	.0000000	.0000000	.0000000
.0000000	.8991855+00	-.1544377+00	-.1676987+01	.0000000	.2665905+05	.1715677+06	.5563994+05
.0000000	.9909525+01	.8109677+00	.1834661+00	.0000000	-.11274208+06	-.6760511+05	-.9224849+04
.0000000	.2851316+00	-.2424993+00	.8936697+00	.0000000	-.15022963+05	-.9816891+04	-.8947540+03
.0000000	-.1356673+01	-.2665903+02	-.2835490+01	.0000000	.2551910+06	.5051841+06	.9310837+03

STIFFNESS COEFFICIENTS

	DELTA T1	DELTA Z1	DELTA X1	THETA 1	DELTA T2	DELTA Z2	DELTA X2	THETA 2
FORCT1	.6667955+06	.0000000	.0000000	.0000000	-.5540807+06	.0000000	.0000000	.0000000
FORCZ1	.0000000	.1635032+07	-.1359328+06	-.1152132+06	.0000000	-.1635032+07	.2591381+06	-.1150238+06
FORCR1	.0000000	-.1359328+06	.1572483+07	-.0690392+05	.0000000	.1359328+06	-.1652489+07	-.1097730+06
MOME 1	.0000000	-.1152132+06	-.09690392+05	.2063281+05	.0000000	.1152132+06	.9535692+05	.1093562+05
FORCT2	-.5540807+06	.0000000	.0000000	.0000000	.4604236+06	.0000000	.0000000	.0000000
FORCZ2	.0000000	-.1635032+07	.1359328+06	.1152132+06	.0000000	.1635032+07	-.2591381+06	.1150238+06
FORCR2	.0000000	.2591381+06	-.1652489+07	.0535692+05	.0000000	-.2591381+06	.1846235+07	.1115783+06
MOME 2	.0000000	-.1150238+06	-.1097730+06	.1093562+05	.0000000	.1150238+06	.1115783+06	.2348584+05

SEGMENT SYMMETRY CHECK

.6667955+06	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000
.1000000+01	.1635032+07	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000
.1000000+01	.1572483+07	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000
.1000000+01	.1000000+01	.2063281+05	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000
.1000000+01	.1000000+01	.1000000+01	.4604236+06	.0000000	.0000000	.0000000	.0000000	.0000000
.1000000+01	.1000000+01	.1000000+01	.1000000+01	.1635032+07	.0000000	.0000000	.0000000	.0000000
.1000000+01	.1000000+01	.1000000+01	.1000000+01	.1000000+01	.1846235+07	.0000000	.0000000	.0000000
.1000000+01	.1000000+01	.1000000+01	.1000000+01	.1000000+01	.1000000+01	.1000000+01	.1000000+01	.2348584+05

SEGMENT LOAD MATRICES

.0000000	.5724790+02
.4876958+02	.2653773+01
.0000000	.6026055+02
.5699222+02	

•2965448•01

RZERO(I) = 7.837928•01

RZERO(J) = 9.394999•01

INPUT DATA FOR SEGMENT COUPLING

REGION NUMBER 5 NUMBER OF SEGMENT JOINTS 3 NUMBER OF KINEMATIC LINKS 0

SEGMENT JOINT(I) JOINT(J)

1 1 2
2 2 3

REGION STIFFNESS MATRIX

	DELTA T1	DELTA Z1	DELTA R1	THETA 1	DELTA T2	DELTA Z2	DELTA R2	THETA 2
FORCT1	.4042656+06	.0000000	.0000000	.0000000	-.2753524+06	.0000000	.0000000	.0000000
FORCZ1	.0000000	.5111760+06	-.2870373+06	-.3694372+05	.0000000	-.5111759+06	.4044125+06	-.2890837+05
FORCR1	.0000000	-.2870373+06	.5742333+06	-.2103623+05	.0000000	.2870374+06	-.6068520+06	-.3392624+05
MOME 1	.0000000	-.3694372+05	-.2103623+05	.9799328+04	.0000000	.3694371+05	.1601049+05	.5282746+04
FORCT2	-.2753524+06	.0000000	.0000000	.0000000	.1875543+06	.0000000	.0000000	.0000000
FORCZ2	.0000000	-.5111759+06	.2870374+06	.3694371+05	.0000000	.5111760+06	-.4044125+06	.2890837+05
FORCR2	.0000000	.4044125+06	-.6068520+06	.1601049+05	.0000000	-.4044125+06	.8575342+06	.4023139+05
MOME 2	.0000000	-.2890837+05	-.3392624+05	.5282746+04	.0000000	.2890837+05	.4023139+05	.1282769+05

REGION SYMMETRY CHECK

.4042656+06	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000
.1000000+01	.5111760+06	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000
.1000000+01	.0000000	.5782333+06	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000
.1000000+01	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000
.1000000+01	.0000000	.0000000	.0000000	.0000000	.1875543+06	.0000000	.0000000	.0000000
.1000000+01	.0000000	.0000000	.0000000	.0000000	.0000000	.5111760+06	.0000000	.0000000
.1000000+01	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000

REGION NUMBER 6

THERE ARE 2 SEGMENTS AND 3 KINEMATIC LINKS WITHIN THIS REGION

SEGMENT NUMBER 1 SEGMENT CODE 11 ELLIPSE SEGMENT

DTAU DIFF STEP DELTA
 .100000-01 .100000-03 .200000-02 .000000

GEOMETRY INPUT VARIABLES

.300000+01 .300000+01 .000000

150Y EPRE SING THIC NOTH T FREE = .000 NUMBER OF TABLE COLUMNS = 3

MATERIAL PROPERTY TABLE USED

.00000	.00000	.00000	.00000	.00000	.00000	.00000	.00000	.00000	.00000
.32500+06	.00000	.00000	.00000	.00000	.00000	.00000	.00000	.00000	.00000
.40000+00	.00000	.00000	.00000	.00000	.00000	.00000	.00000	.00000	.00000
.00000	.00000	.00000	.00000	.00000	.00000	.00000	.00000	.00000	.00000

TABLE ORDER PHI OR S VS. CROSSSECTION PROPERTIES

.780000+00 .830000+00 .880000+00
 .189000+00 .189000+00 .189000+00

PROBLEM 1 TABLE ORDER PHI OR S VS. DISTRIBUTED LOADS (P THETA, F PHI, F ZETA, M THETA, M PHI)

LOAD IDENTIFICATION CLUES 000100

.137000+03 .137000+03 .137000+03

MATRIX X AND Y (TRANPOSED) MAGIC OUTPUT

.843588+00	.000000	.000000	.000000	.119430+01	.000000	.000000	.000000	.000000	.000000
.000000	.651064+04	-7.78756+04	-10.9784+04	.000000	.937357+00	-2.641382-01	.464749+00	.000000	.000000
.000000	-2.644073+04	.779112+04	.108605+04	.000000	.156861+00	.959264+00	-4.959258+00	.000000	.000000
.000000	-1.858449+03	.103843+04	.764243+02	.000000	.210931+01	.260082+00	.914426+00	.000000	.000000
.701189+00	.000000	.000000	.000000	.112774+04	.000000	.000000	.000000	.000000	.000000
.000000	.971353+00	-1.165997+00	-2.297871+01	.000000	.340569+05	.505150+03	.969910+05	.000000	.000000
.000000	.109843+00	.801496+00	.233408+00	.000000	.396866+06	-1.388222-04	-1.492826-03	.000000	.000000
.000000	.348833+00	-4.421971+00	.880739+00	.000000	.860856+05	-1.584713+03	-1.136029-02	.000000	.000000
.000000	-1.179519+01	-3.385880+02	-1.958424+01	.000000	.219167+05	.131648+03	.191254+02	.000000	.000000

STIFFNESS COEFFICIENTS

	DELTA T1	DELTA Z1	DELTA R1	THETA 1	DELTA T2	DELTA Z2	DELTA R2	THETA 2
FORCT1	.6251462+06	.0000000	.0000000	.0000000	-.5234403+06	.0000000	.0000000	.0000000
FORCZ1	.0000000	.1343812+07	-.3773246+06	-.8030808+05	.0000000	-.1343812+07	.5136437+06	-.7454203+05
FORCR1	.0000000	-.3773246+06	.1172500+07	-.7909372+05	.0000000	.3773246+06	-.1235813+07	-.9116118+05
HOME 1	.0000000	-.8030808+05	-.7909372+05	.1956137+05	.0000000	.8030808+05	.7680978+05	.1029794+05
FORCT2	-.5234403+06	.0000000	.0000000	.0000000	.4382860+06	.0000000	.0000000	.0000000
FORCZ2	.0000000	-.1343812+07	.3773246+06	.8030808+05	.0000000	-.1343812+07	-.5136437+06	.7454203+05
FORCR2	.0000000	.5136437+06	-.1235813+07	.7680978+05	.0000000	-.5136437+06	.1419514+07	.9371545+05
HOME 2	.0000000	-.7454203+05	-.9116118+05	.1029794+05	.0000000	.7454203+05	.9371545+05	.2214898+05

SEGMENT SYMMETRY CHECK

.6251462+06	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000
.1000000+01	.1343812+07	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000
.1000000+01	.1000000+01	.1172500+07	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000
.1000000+01	.1000000+01	.1000000+01	.1956137+05	.0000000	.0000000	.0000000	.0000000	.0000000
.1000000+01	.1000000+01	.1000000+01	.1000000+01	.4382860+06	.0000000	.0000000	.0000000	.0000000
.1000000+01	.1000000+01	.1000000+01	.1000000+01	.1000000+01	.1343812+07	.0000000	.0000000	.0000000
.1000000+01	.1000000+01	.1000000+01	.1000000+01	.0000000+01	.1000000+01	.1419514+07	.0000000	.0000000
.1000000+01	.1000000+01	.1000000+01	.1000000+01	.1000000+01	.1000000+01	.1000000+01	.2214898+05	.0000000

SEGMENT LOAD MATRICES

.0000000
.7896926+02
.6295788+02
-.5135244+01
.6000000
.8285487+02
.9476795+02

.5712242+01

RZERO(I) = 9.394999-01

RZERO(J) = 1.121894+00

SEGMENT NUMBER 2 SEGMENT CODE 11 ELLIPSE SEGMENT
 DTAU DIFF STEP DELTA
 .100000-01 .100000-03 .200000-02 .000000

GEOMETRY INPUT VARIABLES
 .300000+01 .300000+01 .000000

NUMBER OF TABLE COLUMNS = 3

ISOT EPRE SING THIC NOTH T FREE = .0000

MATERIAL PROPERTY TABLE USED

.00000	.00000	.00000	.00000	.00000	.00000	.00000	.00000	.00000	.00000
.32500+06	.00000	.00000	.00000	.00000	.00000	.00000	.00000	.00000	.00000
.40000+00	.00000	.00000	.00000	.00000	.00000	.00000	.00000	.00000	.00000
.00000	.00000	.00000	.00000	.00000	.00000	.00000	.00000	.00000	.00000

TABLE ORDER PHI OR S VS. CROSSSECTION PROPERTIES

.880000+00	.930000+00	.780000+00
.189000+00	.189000+00	.189000+00

PROBLEM 1 TABLE ORDER PHI OR S VS. DISTRIBUTED LOADS (F THETA, F PHI, F ZETA, M THETA, M PHI)

LOAD IDENTIFICATION CLUES 000100
 .137000+03 .137000+03 .137000+03

MATRIX X AND Y (TRANSPPOSED) MAGIC OUTPUT

.7104624+00	.0000000	.0000000	.1190251+01	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000
.0000000	.4698222+04	.7000940+04	-.1304902+04	.0000000	.0000000	.9387460+00	-.2937422+01	.7328765+00	.0000000
.0000000	-.8568496+04	.8478044+04	.1578530+04	.0000000	.0000000	.1626845+00	.9077722+00	-.8865345+00	.0000000
.0000000	-.1003057+04	.1495816+04	.1695993+03	.0000000	.0000000	.3022774+01	.3402659+00	.8684113+00	.0000000
.7059893+00	.0000000	.0000000	.0000000	.1491230+04	.0000000	.0000000	.0000000	.0000000	.0000000
.0000000	.9009343+00	-.1605938+00	-.3329475+01	.0000000	.0000000	.4535207+05	.1488131+05	.1860444+04	.0000000
.0000000	.1330442+00	.7614987+00	.3059347+00	.0000000	.0000000	-.1157716+05	-.3200891+04	-.2602076+03	.0000000
.0000000	.5384190+00	-.8027803+00	.8375015+00	.0000000	.0000000	-.1622425+04	-.2759418+03	-.1488162+02	.0000000
.0000000	-.2557481+01	-.4439767+02	-.7990681+01	.0000000	.0000000	.1046211+04	.4013505+03	.44412129+02	.0000000

STIFFNESS COEFFICIENTS

	DELTA T1	DELTA Z1	DELTA R1	THETA 1	DELTA T2	DELTA Z2	DELTA R2	THETA 2
FORCT1	.5626336*06	.0000000	.0000000	.0000000	-.4727016*06	.0000000	.0000000	.0000000
FORCZ1	.0000000	.1174658*07	-.4684738*06	-.5268118*05	.0000000	-.1174658*07	.6160952*06	-.4082701*05
FORCR1	.0000000	-.4684738*06	.7782717*06	-.5795736*05	.0000000	.4684738*06	-.8204083*06	-.6672797*05
MOME 1	.0000000	-.5268118*05	-.5795736*05	.1774718*05	.0000000	.5268118*05	.5439629*05	.9227833*04
FORCT2	-.4727016*06	.0000000	.0000000	.0000000	.3971495*06	.0000000	.0000000	.0000000
FORCZ2	.0000000	-.1174658*07	.4684738*06	.5268118*05	.0000000	.1174658*07	-.6160952*06	.4082701*05
FORCR2	.0000000	.6160953*06	-.8204083*06	.5795736*05	.0000000	-.6160953*06	.9956031*06	.7261042*05
MOME 2	.0000000	-.4082701*05	-.6672797*05	.9227833*04	.0000000	.4082701*05	.7261042*05	.2004832*05

SEGMENT SYMMETRY CHECK

.5626335*06	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000
.1000000*01	.1174658*07	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000
.1000000*01	.1000000*01	.7782717*06	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000
.1000000*01	.1000000*01	.1600000*01	.1774718*05	.0000000	.0000000	.0000000	.0000000	.0000000
.1000000*01	.1000000*01	.1000000*01	.1000000*01	.3971495*06	.0000000	.0000000	.0000000	.0000000
.1000000*01	.1000000*01	.1000000*01	.1000000*01	.1000000*01	.1174658*07	.0000000	.0000000	.0000000
.1000000*01	.1000000*01	.1000000*01	.1000000*01	.1000000*01	.1000000*01	.9956031*06	.0000000	.0000000
.1000000*01	.1000000*01	.1000000*01	.1000000*01	.1000000*01	.1000000*01	.1000000*01	.1000000*01	.2004832*05

SEGMENT LOAD MATRICES

.0000000
.1090866*03
.1433619*03
-.1066479*02
.0000000
.1164436*03
.1597348*03

•1183977+02

RZERO(i) = 1.121894+00

RZERO(j) = 1.335159+00

INPUT DATA FOR SEGMENT COUPLING

REGION NUMBER 6 NUMBER OF SEGMENT JOINTS 3 NUMBER OF KINEMATIC LINKS 0

SEGMENT	JOINT (1)	JOINT (2)
1	1	2
2	2	3

REGION STIFFNESS MATRIX

	DELTA T1	DELTA Z1	DELTA R1	THETA 1	DELTA T2	DELTA Z2	DELTA R2	THETA 2
FORCT1	.3514082+06	.0000000	.0000000	.0000000	-.2472037+06	.0000000	.0000000	.0000000
FORCZ1	.0000000	.5251861+06	-.2922676+06	-.2554949+05	.0000000	-.5251861+06	.4278875+06	-.3385135+04
FORCR1	.0000000	-.2922676+06	.3436244+06	-.1402766+05	.0000000	.2922676+06	-.3292695+06	-.2419607+05
MOME 1	.0000000	-.2554949+05	-.1402766+05	.9303200+04	.0000000	.2554949+05	.3527356+04	.4245816+04
FORCT2	-.2472037+06	.0000000	.0000000	.0000000	.1739090+06	.0000000	.0000000	.0000000
FORCZ2	.0000000	-.5251861+06	.2922676+06	.2554949+05	.0000000	.5251861+06	-.4278875+06	.3385136+04
FORCR2	.0000000	.4278875+06	-.3292695+06	.3527356+04	.0000000	-.4278875+06	.5560002+06	.3647774+05
MOME 2	.0000000	-.3385135+04	-.2419607+05	.4245816+04	.0000000	.3385136+04	.3647774+05	.1192568+05

REGION SYMMETRY CHECK

.3514082+06	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000
.1000000+01	.5251861+06	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000
.1000000+01	.1000000+01	.3436244+06	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000
.1000000+01	.1000000+01	.1000000+01	.9303200+04	.0000000	.0000000	.0000000	.0000000	.0000000
.1000000+01	.1000000+01	.1000000+01	.1000000+01	.1739090+06	.0000000	.0000000	.0000000	.0000000
.1000000+01	.1000000+01	.1000000+01	.1000000+01	.1000000+01	.5251861+06	.0000000	.0000000	.0000000
.1000000+01	.1000000+01	.1000000+01	.1000000+01	.1000000+01	.1000000+01	.5560002+06	.0000000	.0000000

REGION NUMBER 7

THERE ARE 2 SEGMENTS AND 6 KINEMATIC LINKS WITHIN THIS REGION

SEGMENT NUMBER 1 SEGMENT CODE 11 ELLIPSE SEGMENT

DTAU DIFF THIC NOTH T FREE DELTA
 .8000000-02 .1000000-03 .1600000-02 .0000000

GEOMETRY INPUT VARIABLES

.3000000+01 .3000000+01 .0000000

NUMBER OF TABLE COLUMNS = 3

MATERIAL PROPERTY TABLE USED

.00000	.30000	.00000	.00000	.00000	.00000	.00000	.00000	.00000	.00000
.32500+04	.00000	.00000	.00000	.00000	.00000	.00000	.00000	.00000	.00000
.40000+00	.00000	.00000	.00000	.00000	.00000	.00000	.00000	.00000	.00000
.00000	.00000	.00000	.00000	.00000	.00000	.00000	.00000	.00000	.00000

TABLE ORDER PHI OM S VS. CROSSSECTION PROPERTIES

.9800000+00 .1020000+01 .1060000+01
 .1890000+00 .1890000+00 .1890000+00

PROBLEM 1 TABLE ORDER PHI OR S VS. DISTRIBUTED LOADS (F THETA, F PHI, F ZETA, M THETA, M PHI)

LOAD IDENTIFICATION CLUES 000100
 .1370000+03 .1370000+03 .1370000+03

MATRIX X AND Y (TRANSPPOSED) MAGIC OUTPUT

.4547791+00	.0000000	.0000000	.1148765+01	.0000000	.0000000	.0000000
.0000000	.2848361+04	-.5082686+04	-.1003723+04	.9495027+00	-.1973937-01	.5976182+00
.0000000	-.4246787+04	.7578072+04	.1496509+04	.0000000	.9070828+00	-.8910238+00
.0000000	-.7977034+03	-.1423344+04	.1769590+03	.0000000	.2867935-01	.3635400+00
.7578517+00	.0000000	.0000000	.0000000	.1812950-04	.0000000	.0000000
.0000000	.9194286+00	-.1616973+00	-.3156221-01	.0000000	.4899466-05	.1621308-05
.0000000	.1140591+00	.7884187+00	.3341870+00	.0000000	-.1344702-05	-.3911374-04
.0000000	.4586527+00	-.8148624+00	.8476224+00	.0000000	-.1453504+04	-.3151864+03
.0000000	-.2300637+01	-.4791540+02	-.9177740+01	.0000000	.1272391-04	.5381928-02

STIFFNESS COEFFICIENTS

	DELTA T1	DELTA Z1	DELTA X1	THETA 1	DELTA T2	DELTA Z2	DELTA R2	THETA 2
FORCT1	.5974796+06	.0000000	.0000000	.0000000	-.5201062+06	.0000000	.0000000	.0000000
FORCZ1	.0000000	.1378365+07	-.5008092+06	-.4935331+05	.0000000	-.1378365+07	.6573316+06	-.3540053+05
FORCR1	.0000000	-.5008092+06	.7283807+06	-.6502017+05	.0000000	.5008092+06	-.7629487+06	-.7424207+05
MOME 1	.0000000	-.4935331+05	-.6502017+05	.1976418+05	.0000000	.4935331+05	.6140631+05	.1016012+05
FORCT2	-.5201062+06	.0000000	.0000000	.0000000	.4527565+06	.0000000	.0000000	.0000000
FORCZ2	.0000000	-.1378365+07	.5008092+06	.4935331+05	.0000000	.1378365+07	-.6573316+06	.3540053+05
FORCR2	.0000000	.6573316+06	-.7629487+06	.6140631+05	.0000000	-.6573316+06	.9186483+06	.7808755+05
MOME 2	.0000000	-.3540053+05	-.7424207+05	.1016012+05	.0000000	.3540053+05	.7808755+05	.2177891+05

SEGMENT SYMMETRY CHECK

.5974796+06	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000
.1000000+01	.1378365+07	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000
.1000000+01	.1000000+01	.7283807+06	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000
.1000000+01	.1000000+01	.1000000+01	.1976418+05	.0000000	.0000000	.0000000	.0000000	.0000000
.1000000+01	.1000000+01	.1000000+01	.1000000+01	.4527565+06	.0000000	.0000000	.0000000	.0000000
.1000000+01	.1000000+01	.1000000+01	.1000000+01	.1000000+01	.1378365+07	.0000000	.0000000	.0000000
.1000000+01	.1000000+01	.1000000+01	.1000000+01	.1000000+01	.1000000+01	.7186483+06	.0000000	.0000000
.1000000+01	.1000000+01	.1000000+01	.1000000+01	.1000000+01	.1000000+01	.1000000+01	.1000000+01	.2177891+05

SEGMENT LOAD MATRICES

.0000000
.1187409+03
.1917888+03
-.1420998+02
.0000000
.1283194+03
.2074742+03

1544363*02

RZERO(I) 1.335159*00

RZERO(U) 1.533633*00

SEGMENT NUMBER 2 SEGMENT CODE 11 ELLIPSE SEGMENT

DTAU DIFF STEP DELTA

.800000E-02 .100000E-02 .100000E-02 .000000

GEOMETRY INPUT VARIABLES

.300000E+01 .300000E+01 .000000

TSOT EPRE SING THIC NUTH T FREE = .000 NUMBER OF TABLE COLUMNS = 3

MATERIAL PROPERTY TABLE USED

.00000	.00000	.00000	.00000	.00000	.00000	.00000	.00000	.00000	.00000
.32500E+06	.00000	.00000	.00000	.00000	.00000	.00000	.00000	.00000	.00000
.00000E+00	.00000	.00000	.00000	.00000	.00000	.00000	.00000	.00000	.00000
.00000	.00000	.00000	.00000	.00000	.00000	.00000	.00000	.00000	.00000

TABLE ORDER PHI OR S VS. CRUSSESECTION PROPERTIES

.106000E+01 .110000E+01 .114000E+01
 .189000E+00 .189000E+00 .189000E+00

PROBLEM 1 TABLE ORDER PHI OR S VS. DISTRIBUTED LOADS (F THETA, F PHI, F ZETA, H THETA, H PHI)

.137000E+03 .137000E+03 .137000E+03

MATRIX X AND Y (TRANSPPOSED) MAGIC OUTPUT

.339000E+00	.000000	.000000	.114859E+01	.000000	.000000	.000000	.000000
.000000	.268503E+04	-.453077E+04	.000000	.851373E+00	.466353E-01	.466353E-01	.963270E+00
.000000	-.372050E+04	.609552E+04	.000000	.160978E+00	.770982E+00	.770982E+00	-.171888E+01
.758047E+00	.000000	.209731E+04	.350035E+03	.000000	.415419E-01	.468307E+00	.742942E+00
.000000	.000000	.000000	.000000	.213593E-04	.000000	.000000	.000000
.000000	.916714E+00	-.175748E+00	.462516E+01	.000000	.657716E-05	.443890E-05	.364515E+04
.000000	.159194E+00	.671359E+00	.430606E+00	.000000	-.369318E-05	-.962487E-04	-.523353E+03
.000000	.716500E+00	-.155901E+01	.724795E+00	.000000	-.319312E-04	-.548327E-03	-.205962E+02
.000000	-.367922E+01	-.618770E+02	-.159784E+02	.000000	.495370E-04	.159626E-02	.124773E+01

STIFFNESS COEFFICIENTS

	DELTA T1	DELTA Z1	DELTA R1	THETA 1	DELTA T2	DELTA Z2	DELTA R2	THETA 2
FORCT1	.5181809+06	.0000000	.0000000	.0000000	-.4511430+06	.0000000	.0000000	.0000000
FORCZ1	.0000000	.1237023+07	-.4362396+06	-.3392930+05	.0000000	-.1237023+07	.5985083+06	-.1397794+05
FORCR1	.0000000	-.4362396+06	.4397796+06	-.4439948+05	.0000000	.4362396+06	-.4518297+06	-.5147941+05
MOME 1	.0000000	-.3392930+05	-.4439948+05	.1730887+05	.0000000	.3392930+05	.3876854+05	.8456652+04
FORCT2	-.4511430+06	.0000000	.0000000	.0000000	.3927811+06	.0000000	.0000000	.0000000
FORCZ2	.0000000	-.1237023+07	.4362396+06	.3392930+05	.0000000	.1237023+07	-.5985083+06	.1397794+05
FORCR2	.0000000	.5985083+06	-.4518297+06	.3876854+05	.0000000	-.5985083+06	.6026970+06	.5742350+05
MOME 2	.0000000	-.1397794+05	-.5147941+05	.8456652+04	.0000000	.1397794+05	.5742350+05	.1907196+05

SEGMENT SYMMETRY CHECK

.5181809+06	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000
.1000000+01	.1237023+07	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000
.1000000+01	.1000000+01	.4397796+06	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000
.1000000+01	.1000000+01	.1000000+01	.1730887+05	.0000000	.0000000	.0000000	.0000000	.0000000
.1000000+01	.1000000+01	.1000000+01	.1000000+01	.3927811+06	.0000000	.0000000	.0000000	.0000000
.1000000+01	.1000000+01	.1000000+01	.1000000+01	.1000000+01	.1237023+07	.0000000	.0000000	.0000000
.1000000+01	.1000000+01	.1000000+01	.1000000+01	.1000000+01	.1000000+01	.6026970+06	.0000000	.0000000
.1000000+01	.1000000+01	.1000000+01	.1000000+01	.1000000+01	.1000000+01	.1000000+01	.1000000+01	.1907196+05

SEGMENT LOAD MATRICES

.0000000
 .1496465+03
 .3067408+03
 -.2843944+02
 .0000000
 .1731169+03
 .3245239+03

*3091252+02

RZER0(I) = 1+33633+00

RZER0(J) = 1+701367+00

INPUT DATA FOR SEGMENT COUPLING

REGION NUMBER 7 NUMBER OF SEGMENT JOINTS 3 NUMBER OF KINEMATIC LINKS U

JOINT(I)

SEGMENT

1 2 3

REGION STIFFNESS MATRIX

	DELTA T1	DELTA Z1	DELTA R1	THETA 1	DELTA T2	DELTA Z2	DELTA R2	THETA 2
FORCT1	.3186721+06	.0000000	.0000000	.0000000	-.2416657+06	.0000000	.0000000	.0000000
FORCZ1	.0000000	.6070220+06	-.2404701+06	-.2372103+05	.0000000	-.6070220+06	.3795599+06	.8611150+04
FORCR1	.0000000	-.2404701+06	.2168421+06	-.1915910+05	.0000000	.2404701+06	-.1731941+06	-.1718891+05
MOME 1	.0000000	-.2372103+05	-.1415916+05	.1006334+05	.0000000	.2372103+05	-.1496378+04	.3470195+04
FORC12	-.2416657+06	.0000000	.0000000	.0000000	.1831590+06	.0000000	.0000000	.0000000
FORCZ2	.0000000	-.6070220+06	.2404701+06	.2372103+05	.0000000	.6070220+06	-.3795599+06	-.8611149+04
FORCR2	.0000000	.3795599+06	-.1731941+06	-.1915910+05	.0000000	-.3795599+06	.3643826+06	.3456373+05
MOME 2	.0000000	.8611150+04	-.1718891+05	.3470195+04	.0000000	-.8611148+04	.3456373+05	.1223693+05

REGION SYMRETRY CHECK

.3186721+06	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000
.1800000+01	.6070220+06	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000
.1000000+01	.0000000+01	.2168421+06	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000
.1000000+01	.1000000+01	.1000000+01	.1000000+01	.1000000+01	.0000000	.0000000	.0000000	.0000000
.1000000+01	.1000000+01	.1000000+01	.1000000+01	.1000000+01	.0000000	.0000000	.0000000	.0000000
.1000000+01	.1000000+01	.1000000+01	.1000000+01	.1000000+01	.0000000+01	.0000000+01	.3643826+06	.0000000

REGION NUMBER 8

THERE ARE 2 SEGMENTS AND 6 KINEMATIC LINKS WITHIN THIS REGION.

SEGMENT NUMBER 1 SEGMENT CODE 11 ELLIPSE SEGMENT

DTAD DIFF STEP DELTA

.8000000-02 .1000000-03 .1000000-02 .0000000

GEOMETRY INPUT VARIABLES

.3000000+01 .3000000+01 .0000000

ISOT EPRE SING THIC NOTH I FREE .000 NUMBER OF TABLE COLUMNS = 3

MATERIAL PROPERTY TABLE USED

.00000	.00000	.00000	.00000	.00000	.00000	.00000	.00000
.32500+06	.00000	.00000	.00000	.00000	.00000	.00000	.00000
.40000+00	.00000	.00000	.00000	.00000	.00000	.00000	.00000
.00000	.00000	.00000	.00000	.00000	.00000	.00000	.00000

TABLE ORDER PHI OR S VS. CRUSSECTION PROPERTIES

.1140000+01 .1220000+01

.1890000+00 .1890000+00

PROBLEM 1 TABLE ORDER PHI OR S VS. DISTRIBUTED LOADS (F THETA, F PHI, F ZETA, H THETA, H PHI)

LOAD IDENTIFICATION CLUES 000100

.1370000+03 .1370000+03 .1370000+03

MATRIX X AND Y (TRANSPPOSED) MAGIC OUTPUT

.2332075+00	.0000000	.0000000	.1147000+01	.0000000	.0000000	.0000000
.0000000	.1385428+04	-.3780035+04	-.1456701+04	.0000000	.9575738+00	.2029611+00
.0000000	-.3014519+04	.8237940+04	.3169599+04	.0000000	.1652497+00	.3812993+00
.0000000	-.1072249+04	.2984847+04	.7121374+03	.0000000	.6163350-01	.5026974+00
.2600898+00	.0000000	.0000000	.0000000	.2893392-04	.0000000	.0000000
.0000000	.9110431+00	-.1843670+00	-.6937007+01	.0000000	.9209420-05	.1262319-04
.0000000	.2635995+00	.3391243+00	.5346827+00	.0000000	-.1067891-04	-.2230598-03
.0000000	.1173529+01	-.3124983+01	.3740805+00	.0000000	-.8531155-04	-.9806360-03
.0000000	-.6947074+01	-.7750565+02	-.28663133+02	.0000000	.1994335-03	.5356730-02

•6378127+02

RZER011 = 1.761367+00

RZER01J = 2.020236+00

SEGMENT NUMBER 2 SEGMENT CODE 11 ELLIPSE SEGMENT

DTAU DIFF STEP DELTA
 .800000E-02 .100000E-03 .160000E-02 .0000000

GEOMETRY INPUT VARIABLES

.300000E+01 .300000E+01 .0000000

ISOT EPRE SING THIC NOTH T FREE = .000 NUMBER OF TABLE COLUMNS = 5

MATERIAL PROPERTY TABLE USED

.00000	.00000	.00000	.00000	.00000	.00000	.00000	.00000	.00000	.00000
.32500E+06	.00000	.00000	.00000	.00000	.00000	.00000	.00000	.00000	.00000
.40000E-00	.00000	.00000	.00000	.00000	.00000	.00000	.00000	.00000	.00000
.00000	.00000	.00000	.00000	.00000	.00000	.00000	.00000	.00000	.00000

TABLE ORDER PHI OR S VS. CROSSSECTION PROPERTIES

.122000E+01 .124000E+01 .126000E+01 .128000E+01 .130000E+01
 .189000E+00 .189000E+00 .189000E+00 .189000E+00 .189000E+00

PROBLEM 1 TABLE ORDER PHI OR S VS. DISTRIBUTED LOADS (F THETA, F PHI, F ZETA, H THETA, H PHI)

LOAD IDENTIFICATION CLUES 000100
 .137000E+03 .137000E+03 .137000E+03 .137000E+03 .137000E+03

MATRIX X AND Y (TRANSPPOSED) MAGIC OUTPUT

.143845E+00	.0000000	.0000000	.0000000	.114113E+01	.0000000	.0000000	.0000000	.0000000	.0000000
.0000000	.692617E+03	-.249488E+04	-.163656E+04	.0000000	.975774E+00	.557305E+00	.258135E+01	.0000000	.0000000
.0000000	-.189275E+04	.681789E+04	.447287E+04	.0000000	.137376E+00	-.744563E+00	-.705420E+01	.0000000	.0000000
.0000000	-.116673E+04	.428288E+04	.145320E+04	.0000000	.892517E-01	.592537E+00	-.691092E+00	.0000000	.0000000
.767907E+00	.0000000	.0000000	.0000000	.397761E-04	.0000000	.0000000	.0000000	.0000000	.0000000
.0000000	.898839E+00	-.161047E+00	-.101468E+00	.0000000	.137123E-04	.381064E-04	.157911E-03	.0000000	.0000000
.0000000	.484974E+00	-.621078E+00	.551387E+00	.0000000	-.318742E-04	-.559659E-03	-.616317E+02	.0000000	.0000000
.0000000	.176121E+01	-.634067E+01	-.640895E+00	.0000000	-.136886E-03	-.170514E-02	-.264116E-02	.0000000	.0000000
.0000000	-.153878E+02	-.815025E+02	-.500659E+02	.0000000	.833882E-03	.187821E-04	.778538E-01	.0000000	.0000000

STIFFNESS COEFFICIENTS

	DELTA T1	DELTA Z1	DELTA R1	THETA 1	DELTA T2	DELTA Z2	DELTA R2	THETA 2
FORCT1	.3641634+06	.0000000	.0000000	.0000000	-.3191235+06	.0000000	.0000000	.0000000
FORCZ1	.0000000	.9482625+06	-.2072667+06	-.2356803+05	.0000000	-.9482625+06	.3661225+06	.1156128+05
FORCR1	.0000000	-.2072667+06	.1503048+06	-.2182397+05	.0000000	.2072667+06	-.1079097+06	-.1948663+05
MOME 1	.0000000	-.2356803+05	-.2182397+05	.1346905+05	.0000000	.2356803+05	.7651203+04	.5094644+04
FORCT2	-.3191235+06	.0000000	.0000000	.0000000	.2796560+06	.0000000	.0000000	.0000000
FORCZ2	.0000000	-.9482625+06	.2072667+06	.2356803+05	.0000000	.9482625+06	-.3661225+06	-.1156128+05
FORCR2	.0000000	.3661225+06	-.1079097+06	.7651202+04	.0000000	-.3661225+06	.2497715+06	.3429483+05
MOME 2	.0000000	.1156128+05	-.1948663+05	.5094644+04	.0000000	-.1156128+05	.3429483+05	.1477098+05

SEGMENT SYMMETRY CHECK

.3641634+06	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000
.1000000+01	.9482625+06	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000
.1000000+01	.1000000+01	.1503048+06	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000
.1000000+01	.1000000+01	.1000000+01	.1346905+05	.0000000	.0000000	.0000000	.0000000	.0000000
.1000000+01	.1000000+01	.1000000+01	.1000000+01	.2796560+06	.0000000	.0000000	.0000000	.0000000
.1000000+01	.1000000+01	.1000000+01	.1000000+01	.1000000+01	.9482625+06	.0000000	.0000000	.0000000
.1000000+01	.1000000+01	.1000000+01	.1000000+01	.1000000+01	.1000000+01	.2497715+06	.0000000	.0000000
.1000000+01	.1000000+01	.1000000+01	.1000000+01	.1000000+01	.1000000+01	.1000000+01	.1000000+01	.1477098+05

SEGMENT LOAD MATRICES

.0000000
.1254736+03
.7843426+03
-.1194609+03
.0000000
.4050625+03
.7595806+03

129667+03

RZER0(I) = 2+020236+00

RZER0(IJ) = 2+35216+00

INPUT DATA FOR SEGMENT COUPLING

REGION NUMBER 8 NUMBER OF SEGMENT JOINTS 3 NUMBER OF KINEMATIC LINKS 0

SEGMENT JOINT(1) JOINT(IJ)
 1 1 2
 2 2 3

REGION STIFFNESS MATRIX

	DELTA T1	DELTA Z1	DELTA R1	THETA 1	DELTA T2	DELTA Z2	DELTA R2	THETA 2
FORCT1	.2290282*06	.0000000	.0000000	.0000000	-.1749694*06	.0000000	.0000000	.0000000
FORCZ1	.0000000	.4539878*06	-.1147960*06	-.2003896*05	.0000000	-.4539878*06	.1964671*06	.1562452*05
FORCR1	.0000000	-.1147960*06	.1268638*06	-.1616027*05	.0000000	.1147960*06	-.4159830*05	-.3695137*04
MOHE 1	.0000000	-.2003896*05	-.1616027*05	.1053768*05	.0000000	.2003896*05	-.6688809*04	.1728391*03
FORCT2	-.1749694*06	.0000000	.0000000	.0000000	.1336742*06	.0000000	.0000000	.0000000
FORCZ2	.0000000	-.4539878*06	.1147960*06	.2003896*05	.0000000	.4539878*06	-.1964671*06	-.1562452*05
FORCR2	.0000000	.1964671*06	-.4159830*05	-.6688809*04	.0000000	-.1964671*06	.1788653*06	.3080833*05
MOHE 2	.0000000	.1562452*05	-.3695137*04	.1728391*03	.0000000	-.1562452*05	.3080833*05	.1271381*05

REGION SYMMETRY CHECK

.2290282*06	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000
.1000000*01	.4539878*06	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000
.1000000*01	.0000000*01	.1268638*06	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000
.1000000*01	.0000000*01	.0000000*01	.1053768*05	.0000000	.0000000	.0000000	.0000000	.0000000
.1000000*01	.0000000*01	.0000000*01	.0000000*01	.1336742*06	.0000000	.0000000	.0000000	.0000000
.1000000*01	.0000000*01	.0000000*01	.0000000*01	.0000000*01	.1728391*03	.0000000	.0000000	.0000000
.1000000*01	.0000000*01	.0000000*01	.0000000*01	.0000000*01	.0000000*01	.0000000*01	.1788653*06	.0000000

REGION NUMBER 9

THERE ARE 2 SEGMENTS AND 0 KINEMATIC LINKS WITHIN THIS REGION

SEGMENT NUMBER I SEGMENT CODE II ELLIPSE SEGMENT

DTAU DIFF STEP DELTA
 .800000*02 .100000*03 .160000*02 .000000

GEOMETRY INPUT VARIABLES

.300000*01 .300000*01 .000000

NUMBER OF TABLE COLUMNS = 5

ISOT EPRE SING THIC NOTH T FREE = *000

MATERIAL PROPERTY TABLE USED

.00000	.00000	.00000	.00000	.00000	.00000	.00000	.00000	.00000	.00000
.32500*06	.00000	.00000	.00000	.00000	.00000	.00000	.00000	.00000	.00000
.40000*00	.00000	.00000	.00000	.00000	.00000	.00000	.00000	.00000	.00000
.00000	.00000	.00000	.00000	.00000	.00000	.00000	.00000	.00000	.00000

TABLE ORDER PHI OR S VS. CRUSSECTION PROPERTIES

.130000*01 .134000*01 .136000*01 .138000*01
 .189000*00 .189000*00 .189000*00 .189000*00

PROBLEM I TABLE ORDER PHI OR S VS. DISTRIBUTED LOADS (F THETA, F PHI, F ZETA, M THETA, M PHI)

LOAD IDENTIFICATION CLUES 000100

.137000*03 .137000*03 .137000*03 .137000*03

MATRIX X AND Y (TRANSPPOSED) MAGIC OUTPUT

.7660821-01	.0000000	.0000000	.0000000	.1126080*01	.0000000	.0000000	.0000000	.0000000	.0000000
.0000000	.2606622*02	-.1349562*03	-.1447051*04	.0000000	.1019778*01	.1221644*01	.3680084*01	.3680084*01	.3680084*01
.0000000	-.9389320*02	.4861261*03	.5212424*04	.0000000	-.2849151-02	-.3621545*01	-.1325604*02	-.1325604*02	-.1325604*02
.0000000	-.9477400*03	.4908864*04	.2742548*04	.0000000	.1076365*00	.4231372*01	-.3498113*01	-.3498113*01	-.3498113*01
.7886519*00	.0000000	.0000000	.0000000	.5455280*04	.0000000	.0000000	.0000000	.0000000	.0000000
.0000000	.8781324*00	-.2381505*01	-.1243386*00	.0000000	.2228077-04	.1076411*03	.3094634*03	.3094634*03	.3094634*03
.0000000	.8557916*00	-.3178121*01	.5877794*01	.0000000	-.9138635-04	-.1297162-02	-.2348777-02	-.2348777-02	-.2348777-02
.0000000	.2317384*01	-.1199811*02	-.6332774*01	.0000000	-.2697518*03	-.2438991*02	-.2556553*03	-.2556553*03	-.2556553*03
.0000000	-.3494568*02	-.1719788*02	-.2728974*02	-.6000000	.3351049*02	.6261237*01	.1726875*00	.1726875*00	.1726875*00

STIFFNESS COEFFICIENTS

	DELTA T1	DELTA Z1	DELTA R1	THETA 1	DELTA T2	DELTA Z2	DELTA R2	THETA 2
FORCT1	.298989+06	.000000	.000000	.000000	-.265506+06	.000000	.000000	.000000
FORCZ1	.000000	.7994818+06	-.109968+06	-.2321573+05	.000000	-.7994818+06	.2500859+06	.1783998+05
FORCRI	.000000	-.1099680+06	.1025637+06	-.1973817+05	.000000	.1099680+06	-.3511373+05	-.9004940+04
HOME 1	.000000	-.2321572+05	-.1973817+05	.1291497+05	.000000	.2321572+05	-.7043656+03	.2941599+04
FOKCT2	-.265506+06	.000000	.000000	.000000	.2357801+06	.000000	.000000	.000000
FORCZ2	.000000	-.7994818+06	.1099680+06	.2321573+05	.000000	.7994818+06	-.2500859+06	-.1783998+05
FORCR2	.000000	.2500859+06	-.3511373+05	-.7043671+03	.000000	-.2500859+06	.1659584+06	.3022551+05
HOME 2	.000000	.1783998+05	-.9004939+04	.2941598+04	.000000	-.1783998+05	.3022551+05	.1402493+05

SEGMENT SYMMETRY CHECK

.298989+06	.000000	.000000	.000000	.000000	.000000	.000000	.000000	.000000
.100000+01	.7994818+06	.000000	.000000	.000000	.000000	.000000	.000000	.000000
.100000+01	.100000+01	.1025637+06	.000000	.000000	.000000	.000000	.000000	.000000
.100000+01	.100000+01	.100000+01	.1291497+05	.000000	.000000	.000000	.000000	.000000
.100000+01	.100000+01	.100000+01	.100000+01	.2357801+06	.000000	.000000	.000000	.000000
.100000+01	.100000+01	.100000+01	.100000+01	.100000+01	.7994818+06	.000000	.000000	.000000
.100000+01	.100000+01	.100000+01	.100000+01	.100000+01	.100000+01	.1659584+06	.000000	.000000
.100000+01	.100000+01	.100000+01	.100000+01	.100000+01	.100000+01	.100000+01	.100000+01	.1402493+05

SEGMENT LOAD MATRICES

.000000
-.1136338+03
.1149296+04
-.2193775+03
.000000
.7284276+03
.1040864+04

*2372265*03

RZERO(1) = 2.305215+00

RZERO(J) = 2.595727+00

SEGMENT NUMBER 2 SEGMENT CODE 11 ELLIPSE SEGMENT
 DTAU DIFF STEP DELTA

.6500000-02 .1000000-03 .1300000-02 .0000000

GEOMETRY INPUT VARIABLES
 .3000000+01 .3600000+01 .0000000

ISOT EPRE SING THIC NOTH T FREE = .000 NUMBER OF TABLE COLUMNS = 5

MATERIAL PROPERTY TABLE USED

.00000	.00000	.00000	.00000	.00000	.00000	.00000	.00000	.00000
.32500+06	.00000	.00000	.00000	.00000	.00000	.00000	.00000	.00000
.40000+00	.00000	.00000	.00000	.00000	.00000	.00000	.00000	.00000
.00000	.00000	.00000	.00000	.00000	.00000	.00000	.00000	.00000

TABLE ORDER PHI OR S VS. CRUSSECTION PROPERTIES

.1380000+01	.1395000+01	.1410000+01	.1430000+01	.1445000+01
.1890000+00	.1890000+00	.1890000+00	.1890000+00	.1890000+00

PROBLEM 1 TABLE ORDER PHI OR S VS. DISTRIBUTED LOADS (F THETA, F PHI, F ZETA, M THETA, M PHI)

LOAD IDENTIFICATION CLUES 000100

.1370000+03	.1370000+03	.1370000+03	.1370000+03	.1370000+03
.2875496-01	.0000000	.0000000	.1086620+01	.0000000
.0000000	.9952157+01	.7869549+02	.0000000	.0000000
.0000000	.5152667+02	.4074409+03	.0000000	.1010334+01
.0000000	.5880489+03	.4649926+04	.0000000	.5178679-03
.8563811+00	.0000000	.0000000	.5816158-04	.1075534+00
.0000000	.9182108+00	.1855278-01	.0000000	.0000000
.0000000	.5986517+00	.23334988+01	.0000000	.1115812-03
.0000000	.1512312+01	.1195843+02	.0000000	.2322522-04
.0000000	.2599654+02	.1433942+02	.0000000	.1601435-03
				.2813654-03
				.1504284-02
				.2688461-02
				.2491289-03
				.7532039-01
				.2076661+00

MATRIX X AND Y (TRANSPPOSED) MAGIC OUTPUT

STIFFNESS COEFFICIENTS

	DELTA T1	DELTA Z1	DELTA R1	THETA 1	DELTA T2	DELTA Z2	DELTA R2	THETA 2
FORC11	.3030230*06	.0000000	.0000000	.0000000	-.2804160*06	.0000000	.0000000	.0000000
FORC21	.0000000	.8704526*06	-.6214866*05	-.2322134*05	.0000000	-.8704526*06	.2057013*06	.1926101*05
FORC31	.0000000	-.6214866*05	.8724578*05	-.2162012*05	.0000000	.6214866*05	-.1530529*05	-.7910438*04
HOME 1	.0000000	-.2302134*05	-.2162012*05	.1301626*05	.0000000	.2302134*05	.1102811*04	.3149203*04
FORC12	-.2804160*06	.0000000	.0000000	.0000000	.2594960*06	.0000000	.0000000	.0000000
FORC22	.0000000	-.8704526*06	.6214866*05	.2302134*05	.0000000	.8704526*06	-.2057013*06	-.1926101*05
FORC32	.0000000	.2057013*06	-.1530529*05	.1102811*04	.0000000	-.2057013*06	.1316309*06	.2892217*05
HOME 2	.0000000	.1926101*05	-.7910437*04	.3149202*04	.0000000	-.1926101*05	.2892218*05	.1457807*05

SEGMENT SYMMETRY CHECK

.3030230*06	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000
.8704526*06	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000
.1000000*01	.8724578*05	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000
.1000000*01	.1000000*01	.1381626*05	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000
.1000000*01	.1000000*01	.1000000*01	.1000000*01	.2594960*06	.0000000	.0000000	.0000000	.0000000
.1000000*01	.1000000*01	.1000000*01	.1000000*01	.1000000*01	.8704526*06	.0000000	.0000000	.0000000
.1000000*01	.1000000*01	.1000000*01	.1000000*01	.1000000*01	.1000000*01	.1316309*06	.0000000	.0000000
.1000000*01	.1000000*01	.1000000*01	.1000000*01	.1000000*01	.1000000*01	.1000000*01	.1000000*01	.1457807*05

SEGMENT LOAD MATRICES

.0000000
 -.248773*03
 .1326916*04
 -.2674103*03
 .0000000
 .7341218*03
 .1237718*04

•2814330+03

RZERO(I) = 2.595727+00

RZERO(J) = 2.804916+00

INPUT DATA FOR SEGMENT COUPLING

REGION NUMBER 9 NUMBER OF SEGMENT JOINTS 3 NUMBER OF KINEMATIC LINKS 0

SEGMENT JOINT(I) JOINT(J)

1 1 2 3
2 2 3

REGION STIFFNESS MATRIX

	DELTA T1	DELTA Z1	DELTA R1	THETA 1	DELTA T2	DELTA Z2	DELTA R2	THETA 2
FORCT1	.1681475+06	.0000000	.0000000	.0000000	-.1381805+06	.0000000	.0000000	.0000000
FORCZ1	.0000000	.3645961+06	-.5032270+05	-.1368998+05	.0000000	-.3645961+06	.8702083+05	.1174775+05
FORCR1	.0000000	-.5032270+05	.9278326+05	-.2018321+05	.0000000	.5032270+05	-.1041563+05	-.7431694+03
MOME 1	.0000000	-.1368998+05	-.2018321+05	.1207005+05	.0000000	.1368998+05	-.4075313+04	-.6611726+03
FORCT2	-.1381805+06	.0000000	.0000000	.0000000	.1135556+06	.0000000	.0000000	.0000000
FORCZ2	.0000000	-.3645961+06	.5032270+05	.1368998+05	.0000000	.3645961+06	-.8702083+05	-.1174775+05
FORCR2	.0000000	.8702083+05	-.1041563+05	-.4075313+04	.0000000	-.8702083+05	.1021897+06	.2624465+05
MOME 2	.0000000	.1174775+05	-.7431694+03	-.6611726+03	.0000000	-.1174775+05	.2624465+05	.1376639+05

REGION SYMMETRY CHECK

.1681475+06	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000
.1000000+01	.3645961+06	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000
.1000000+01	.1000000+01	.9278326+05	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000
.1000000+01	.1000000+01	.1000000+01	.1207005+05	.0000000	.0000000	.0000000	.0000000	.0000000
.1000000+01	.1000000+01	.1000000+01	.1000000+01	.1135556+06	.0000000	.0000000	.0000000	.0000000
.1000000+01	.1000000+01	.1000000+01	.1000000+01	.1000000+01	.1000000+01	.3645961+06	.0000000	.0000000
.1000000+01	.1000000+01	.1000000+01	.1000000+01	.1000000+01	.1000000+01	.1021897+06	.0000000	.0000000

REGION NUMBER 10

THERE ARE 2 SEGMENTS AND 0 KINEMATIC LINKS WITHIN THIS REGION

SEGMENT NUMBER 1 SEGMENT CODE 11 ELLIPSE SEGMENT

DTAU DIFF STEP DELTA

.6000000-02 .1000000-03 .1200000-02 .0000000

GEOMETRY INPUT VARIABLES

.3000000+01 .3000000+01 .0000000

ISOT EPRE SING THIC NOTH T FREE = .000 NUMBER OF TABLE COLUMNS = 5

MATERIAL PROPERTY TABLE USED

.00000	.00000	.00000	.00000	.00000	.00000	.00000	.00000	.00000	.00000
.32500*06	.00000	.00000	.00000	.00000	.00000	.00000	.00000	.00000	.00000
.40000*00	.00000	.00000	.00000	.00000	.00000	.00000	.00000	.00000	.00000
.00000	.00000	.00000	.00000	.00000	.00000	.00000	.00000	.00000	.00000

TABLE ORDER PHI OR S VS. CROSSSECTION PROPERTIES

.1445000+01	.1475000+01	.1490000+01	.1505000+01
.1870000+00	.1870000+00	.1870000+00	.1870000+00

PROBLEM 1 TABLE ORDER PHI OR S VS. DISTRIBUTED LOADS (F THETA, F PHI, F ZETA, K THETA, K PHI)

LOAD IDENTIFICATION CLUES 000100

.1370000+03	.1370000+03	.1370000+03	.1370000+03
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MATRIX X AND Y (TRANSPUSED) MAGIC OUTPUT

.9724919-02	.0000000	.0000000	.0000000	.1049264+01	.0000000	.0000000	.0000000
.00000000	-.165549+02	.2573246+03	-.6576124+03	.0000000	.1012835+01	.6678027+00	.1794241+01
.00000000	.1340735+03	-.2034763+04	.4555634+04	.0000000	-.5575415-01	-.4756528+01	-.1418774+02
.00000000	-.2923861+03	.4437390+04	.3021424+04	.0000000	.1065474+00	-.2866377+00	-.4449056+01
.9083178+00	.0000000	.0000000	.0000000	.6421503-04	.0000000	.0000000	.0000000
.00000000	.9446968+00	.4360891+01	-.11142016+00	.0000000	.2678198-04	.1408559-03	.3508392-03
.00000000	.4141943+00	-.4467332+01	-.2642472+00	.0000000	-.1316414-03	-.1885824-02	-.2788680+02
.00000000	.8961783+00	.1360083+02	-.4554211+01	.0000000	-.3307859-03	-.2828949+02	.1247499+02
.00000000	-.2658713+02	.3136569+02	-.8491549+02	.0000000	.5493016-02	.1047168+00	.2800698+00

STIFFNESS COEFFICIENTS

	DELTA T1	DELTA Z1	DELTA R1	THETA 1	DELTA T2	DELTA Z2	DELTA R2	THETA 2
FORC1	.2879703+06	.0000000	.0000000	.0000000	-.274499+06	.0000000	.0000000	.0000000
FORC2	.0000000	.8594438+06	-.1064369+05	-.2273069+05	.0000000	-.8594438+06	.1491329+06	.2068052+05
FORC3	.0000000	-.1064369+05	.7954824+05	-.2282146+05	.0000000	.1064369+05	.3058229+03	-.5089819+04
HOME 1	.0000000	-.2273069+05	-.2282146+05	.1422802+05	.0000000	.2273069+05	.9059247+03	.2689838+04
FORC4	-.274499+06	.0000000	.0000000	.0000000	.2615645+06	.0000000	.0000000	.0000000
FORC5	.0000000	-.8594438+06	.1064369+05	.2273069+05	.0000000	.8594438+06	-.1491329+06	-.2068052+05
FORC6	.0000000	.1491329+06	.3058247+03	.9059237+03	.0000000	-.1491329+06	.1052887+06	.2732505+05
HOME 2	.0000000	.2068052+05	-.5089818+04	.2689838+04	.0000000	-.2068052+05	.2732505+05	.1470772+05

SEGMENT SYMMETRY CHECK

.2879703+06	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000
.1000000+01	.8594437+06	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000
.1000000+01	.1000000+01	.7954824+05	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000
.1000000+01	.1000000+01	.1000000+01	.1422802+05	.0000000	.0000000	.0000000	.0000000	.0000000
.1000000+01	.1000000+01	.1000000+01	.1000000+01	.2615645+06	.0000000	.0000000	.0000000	.0000000
.1000000+01	.1000000+01	.1000000+01	.1000000+01	.1000000+01	.8594437+06	.0000000	.0000000	.0000000
.1000000+01	.1000000+01	.1000000+01	.1000000+01	.1000000+01	.1052887+06	.0000000	.0000000	.0000000
.1000000+01	.1000000+01	.1000000+01	.1000000+01	.1000000+01	.1000000+01	.1000000+01	.1000000+01	.1470772+05

SEGMENT LOAD MATRICES

.0000000
-.4773057+03
.1487175+04
-.3241216+03
.0000000
.8190390+03
.1409217+04

•3347950•03

RZERO(I) = 2.804916+00

RZERO(J) = 2.943051+00

STIFFNESS COEFFICIENTS

	DELTA T1	DELTA Z1	DELTA R1	THETA 1	DELTA T2	DELTA Z2	DELTA R2	THETA 2
FORCT1	.2414343*06	.0000000	.0000000	.0000000	-.2368498*06	.0000000	.0000000	.0000000
FORCZ1	.0000000	.7261593*06	.3413332*05	-.2153454*05	.0000000	-.7261593*06	.8040680*05	.2102114*05
FORCR1	.0000000	.3413332*05	.7901071*05	-.2383859*05	.0000000	-.3413332*05	.1009045*05	-.3854152*02
HOME 1	.0000000	-.2153453*05	-.2383859*05	.1428521*05	.0000000	.2153453*05	-.1342843*04	.1115799*04
FORCT2	-.2368498*06	.0000000	.0000000	.0000000	.2323524*06	.0000000	.0000000	.0000000
FORCZ2	.0000000	-.7261593*06	-.3413332*05	.2153454*05	.0000000	.7261593*06	-.8040680*05	-.2102114*05
FORCR2	.0000000	.8040680*05	.1009045*05	-.1342844*04	.0000000	-.8040680*05	.8617471*05	.2536101*05
HOME 2	.0000000	.2102114*05	-.3854028*02	.1115799*04	.0000000	-.2102114*05	.2536101*05	.1447357*05

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SEGMENT SYMMETRY CHECK

.2414343*06	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000
.1000000*01	.7261593*06	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000
.1000000*01	.1000000*01	.7901071*05	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000
.1000000*01	.1000000*01	.1000000*01	.1428521*05	.0000000	.0000000	.0000000	.0000000	.0000000
.1000000*01	.1000000*01	.1000000*01	.1000000*01	.2323524*06	.0000000	.0000000	.0000000	.0000000
.1000000*01	.1000000*01	.1000000*01	.1000000*01	.1000000*01	.7261593*06	.0000000	.0000000	.0000000
.1000000*01	.1000000*01	.1000000*01	.1000000*01	.1000000*01	.1000000*01	.8617471*05	.0000000	.0000000
.1000000*01	.1000000*01	.1000000*01	.1000000*01	.1000000*01	.1000000*01	.1000000*01	.1000000*01	.1447357*05

SEGMENT LOAD MATRICES

.0000000
-.1006596*04
.1594282*04
-.4000729*03
.0000000
.1152265*04
.1546095*04

•H057657+03

RZER0(1) = 2.943051+00

RZER0(IJ) = 3.000000+U0.

INPUT DATA FOR SEGMENT COUPLING

REGION NUMBER JO NUMBER OF SEGMENT JOINTS 3 NUMBER OF KINEMATIC LINKS 0

SEGMENT	JOINT(1)	JOINT(2)	JOINT(3)
1	1	2	
2	2	3	

REGION STIFFNESS MATRIX

	DELTA T1	DELTA Z1	DELTA R1	THETA 1	DELTA T2	DELTA Z2	DELTA R2	THETA 2
FORCT1	.1382229+06	.0000000	.0000000	.0000000	-.1292317+06	.0000000	.0000000	.0000000
FORCZ1	.0000000	.3505733+06	-.5822182+04	-.1138561+05	.0000000	-.3505733+06	.3579423+05	.1080565+05
FORCR1	.0000000	-.5822182+04	.7864032+05	-.2242215+05	.0000000	.5822182+04	-.5062150+03	.1382970+03
MOME 1	.0000000	-.1138561+05	-.2242215+05	.1347694+05	.0000000	.1138561+05	-.1473469+04	-.5202339+03
FORCT2	-.1292317+06	.0000000	.0000000	.0000000	.1208256+06	.0000000	.0000000	.0000000
FORCZ2	.0000000	-.3505733+06	.5822182+04	.1138561+05	.0000000	.3505733+06	-.3579424+05	-.1080565+05
FORCR2	.0000000	.3579423+05	-.5062150+03	-.1473469+04	.0000000	-.3579424+05	.8063578+05	.2411498+05
MOME 2	.0000000	.1080565+05	.1382970+03	-.5202339+03	.0000000	-.1080565+05	.2411498+05	.1408203+05

REGION SYMMETRY CHECK

.1382229+06	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000
.3505733+06	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000
.1080565+05	.0000000	.7864032+05	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000
.1080565+05	.0000000	.1347694+05	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000
.1080565+05	.0000000	.1080565+05	.1080565+05	.1208256+06	.0000000	.0000000	.0000000	.0000000
.1080565+05	.0000000	.1080565+05	.1080565+05	.1080565+05	.1080565+05	.1080565+05	.1080565+05	.1080565+05
.1080565+05	.0000000	.1080565+05	.1080565+05	.1080565+05	.1080565+05	.1080565+05	.1080565+05	.1080565+05
.1080565+05	.0000000	.1080565+05	.1080565+05	.1080565+05	.1080565+05	.1080565+05	.1080565+05	.1080565+05

INPUT DATA FOR REGION COUPLING

NUMBER OF REGION JOINTS 11 NUMBER OF KINEMATIC LINKS 0

REGION	JOINT(I)	JOINT(J)
1	1	2
2	2	3
3	3	4
4	4	5
5	5	6
6	6	7
7	7	8
8	8	9
9	9	10
10	10	11

BOUNDARY CONDITIONS

JOINT	DELTA T	DELTA Z	DELTA R	THETA	ANGLE ALPHA
1	0	1	0	0	.0000000
2	0	1	1	1	.0000000
3	0	1	1	1	.0000000
4	0	1	1	1	.0000000
5	0	1	1	1	.0000000
6	0	1	1	1	.0000000
7	0	1	1	1	.0000000
8	0	1	1	1	.0000000
9	0	1	1	1	.0000000
10	0	1	1	1	.0000000
11	0	0	1	0	.0000000

THE EXPANDED REGION JOINT DISPLACEMENT MATRIX (REGION END DEFLECTIONS)

JOINT	PROBLEM	DELTA T	DELTA Z	DELTA R	OMEGA-THETA
1	1	.000000	-.1259735-02	.0000000	.0000000
2	1	.000000	-.1275537-02	-.8291140-04	.4321750-03
3	1	.000000	-.1335809-02	-.1823169-03	.8410902-03
4	1	.000000	-.1477223-02	-.3548055-03	.1330041-02
5	1	.000000	-.1771644-02	-.7153786-03	.1886134-02
6	1	.000000	-.2250264-02	-.1439088-02	.2332128-02
7	1	.000000	-.2908395-02	-.2892370-02	.2510252-02
8	1	.000000	-.3456444-02	-.5075870-02	.2386273-02
9	1	.000000	-.3592480-02	-.8765408-02	.1941274-02
10	1	.000000	-.435258-02	-.1304375-01	.1090339-02
11	1	.000000	.000000	-.1494369-01	.000000

REGION NUMBER 1

THERE ARE 2 SEGMENTS AND 0 KINEMATIC LINKS WITHIN THIS REGION

SEGMENT NUMBER 1 SEGMENT CODE 11 ELLIPSE SEGMENT

PHI OR S	THETA	NPHI	OMEGATH
3.4091000-02	-4.0778069+01	-1.0194518*02	0.0000000
3.8181900-02	-4.6982562+01	-9.5725761*01	3.0e48921-05
4.2272800-02	-5.1480570+01	-9.1221946*01	5.8280213-05
4.6363700-02	-5.4848217+01	-8.7856613*01	8.3673256-05
5.0454600-02	-5.7437943+01	-8.5276574*01	1.0735630-04
5.4545500-02	-5.9475167+01	-8.3255842*01	1.2970039-04
5.8636400-02	-6.1109491+01	-8.1644361*01	1.5697399-04
6.2727300-02	-6.2443364+01	-8.0333233*01	1.7137635-04
6.6818200-02	-6.3548846+01	-7.9248376*01	1.9106892-04
7.0909100-02	-6.4477816+01	-7.8379400*01	2.1013725-04
7.5000000-02	-6.5268387+01	-7.7634078*01	2.2870424-04

SEGMENT NUMBER 2 SEGMENT CODE 11 ELLIPSE SEGMENT

PHI OR S	NIMETA	NPHI	OMEGATH
7.500000-02	-6.5268328+01	-7.7633936+01	2.2870378-04
8.000000-02	-6.6087631+01	-7.6876817+01	2.5080770-04
8.500000-02	-6.6780976+01	-7.6252998+01	2.7234003-04
9.000000-02	-6.7376542+01	-7.5734086+01	2.9344622-04
9.500000-02	-6.7852844+01	-7.5298944+01	3.1411237-04
1.000000-01	-6.8353045+01	-7.4931578+01	3.3446343-04
1.050000-01	-6.8761978+01	-7.4619703+01	3.5449183-04
1.100000-01	-6.9131541+01	-7.4353757+01	3.7424965-04
1.150000-01	-6.9469172+01	-7.4126204+01	3.9376719-04
1.200000-01	-6.9780790+01	-7.3931044+01	4.1306921-04
1.250000-01	-7.0014587+01	-7.3794982+01	4.3283698-04
1.250000-01	-7.0071157+01	-7.3763448+01	4.5217666-04

REGION NUMBER 2

THERE ARE 2 SEGMENTS AND 0 KINEMATIC LINKS WITHIN THIS REGION

SEGMENT NUMBER 1 SEGMENT CODE 11 ELLIPSE SEGMENT

PHI	OR	S	NTHETA	NPHI	OMEGATH
1.2900000	-01		-7.0071163	-7.3763472	4.3217446
1.3050000	-01		-7.0370603	-7.3606297	4.5298913
1.3600000	-01		-7.0653148	-7.3473514	4.7361047
1.4150000	-01		-7.0922170	-7.3341690	4.9405642
1.4700000	-01		-7.1180424	-7.3268025	5.1434118
1.5250000	-01		-7.1430123	-7.3190213	5.3448010
1.5800000	-01		-7.1673299	-7.3126341	5.5448202
1.6350000	-01		-7.1911349	-7.3074810	5.7435757
1.6900000	-01		-7.2145705	-7.3034281	5.9411536
1.7450000	-01		-7.2377425	-7.3003620	6.1376298
1.7890000	-01		-7.2561560	-7.2985545	6.2940628
1.8000000	-01		-7.2607478	-7.2981865	6.3330714

SEGMENT NUMBER 2 SEGMENT CODE 11 ELLIPSE SEGMENT

PHI OR S	NTHETA	NPHI	OMEGAIN
1.800000-01	-7.2507450+01	-7.2981822+01	6.3330407-04
1.800000-01	-7.2857468+01	-7.2967282+01	6.5451406-04
1.920000-01	-7.3107372+01	-7.2961458+01	6.7561478-04
1.980000-01	-7.3357938+01	-7.2963573+01	6.9661232-04
2.040000-01	-7.3609829+01	-7.2972973+01	7.1751203-04
2.100000-01	-7.3863621+01	-7.2989091+01	7.3831867-04
2.150000-01	-7.4119813+01	-7.3011441+01	7.5903650-04
2.220000-01	-7.4378848+01	-7.3039602+01	7.7966729-04
2.280000-01	-7.4641095+01	-7.3073212+01	8.0022043-04
2.340000-01	-7.4906911+01	-7.3111953+01	8.2069291-04
2.400000-01	-7.5176596+01	-7.3165551+01	8.4108844-04

REGION NUMBER 3

THERE ARE 2 SEGMENTS AND 0 KINEMATIC LINKS WITHIN THIS REGION

SEGMENT NUMBER 1 SEGMENT CODE 11 ELLIPSE SEGMENT

PHI OR S	NTHETA	NPHI	OMEGATH
2.4700000-01	-7.5176543+01	-7.3155416+01	8.4109023-04
2.4700000-01	-7.5496421+01	-7.3212096+01	8.6479450-04
2.5400000-01	-7.5822316+01	-7.3274732+01	8.8840179-04
2.6100000-01	-7.6154572+01	-7.3343038+01	9.1191501-04
2.6800000-01	-7.6493499+01	-7.3416772+01	9.3533673-04
2.7500000-01	-7.6839373+01	-7.3495226+01	9.5866914-04
2.8200000-01	-7.7192449+01	-7.3579720+01	9.8191411-04
2.8900000-01	-7.7553961+01	-7.3668603+01	1.0050732-03
2.9600000-01	-7.7921125+01	-7.3762242+01	1.0281478-03
3.0300000-01	-7.8297141+01	-7.3860524+01	1.0511320-03
3.0860000-01	-7.8603735+01	-7.3942429+01	1.0694724-03
3.1009800-01	-7.8681198+01	-7.3943355+01	1.0740475-03

SEGMENT NUMBER 2 SEGMENT CODE 11 ELLIPSE SEGMENT

PHI OR S	NUTRIA	NPHI	OMEGAIN
3.10000000-01	-7.8681204*01	-7.3963353*01	1.0740467-03
3.18000000-01	-7.9130201*01	-7.4086340*01	1.1001276-03
3.26000000-01	-7.9590186*01	-7.4215063*01	1.1261061-03
3.34000000-01	-8.0061400*01	-7.4349442*01	1.1519703-03
3.42000000-01	-8.0544072*01	-7.4482913*01	1.1777324-03
3.50000000-01	-8.1038425*01	-7.4634931*01	1.2033879-03
3.58000000-01	-8.1544674*01	-7.4785957*01	1.2289365-03
3.66000000-01	-8.2063035*01	-7.4942472*01	1.2543772-03
3.74000000-01	-8.2593710*01	-7.5104362*01	1.2797046-03
3.82000000-01	-8.3136905*01	-7.5271924*01	1.3049305-03
3.90000000-01	-8.3692822*01	-7.5444866*01	1.3300444-03

REGION NUMBER 4

THERE ARE 2 SEGMENTS AND 6 KINEMATIC LINKS WITHIN THIS REGION

SEGMENT NUMBER 1 SEGMENT CODE 11 ELLIPSE SEGMENT

PHI OR S	NTHETA	NPHI	OMEGATH
3.9600000-01	-8.3692903+01	-7.5445007+01	1.3300409-03
3.9900000-01	-8.4333776+01	-7.5646196+01	1.3581552-03
4.0800000-01	-8.4991296+01	-7.5854310+01	1.3861232-03
4.1700000-01	-8.5665749+01	-7.6069452+01	1.4139418-03
4.2600000-01	-8.6357423+01	-7.6291675+01	1.4416072-03
4.3500000-01	-8.7066609+01	-7.6521040+01	1.4691198-03
4.4400000-01	-8.7793602+01	-7.6757617+01	1.4964432-03
4.5300000-01	-8.8538695+01	-7.7001486+01	1.5236450-03
4.6200000-01	-8.9302191+01	-7.7252732+01	1.5506562-03
4.7100000-01	-9.0084392+01	-7.7511451+01	1.5774916-03
4.7820000-01	-9.0723827+01	-7.7723872+01	1.5968277-03
4.8000000-01	-9.10885607+01	-7.7777740+01	1.6041457-03

SEGMENT NUMBER 2 SEGMENT CODE 11 ELLIPSE SEGMENT

PHI OR S	NUTETA	NPHI	OMEGATH
4.800000-01	-9.085592*01	-7.777771*01	1.6041448-03
4.900000-01	-9.1798511*01	-7.8082601*01	1.6335407-03
5.000000-01	-9.2735724*01	-7.8397129*01	1.6626262-03
5.100000-01	-9.3697682*01	-7.8721463*01	1.6916045-03
5.200000-01	-9.4684837*01	-7.9055779*01	1.7202539-03
5.300000-01	-9.5697648*01	-7.9400262*01	1.7486351-03
5.400000-01	-9.6736588*01	-7.9755107*01	1.7767377-03
5.500000-01	-9.7802140*01	-8.0120518*01	1.8045506-03
5.600000-01	-9.8894791*01	-8.0496707*01	1.8320624-03
5.700000-01	-1.0001504*02	-8.0883096*01	1.8592611-03
5.780000-01	-1.0091155*02	-8.1201722*01	1.8807862-03
5.800000-01	-1.0116340*02	-8.1282316*01	1.8861342-03

REGION NUMBER 5

THERE ARE 2 SEGMENTS AND 0 KINEMATIC LINKS WITHIN THIS REGION

SEGMENT NUMBER 1 SEGMENT CODE 11 ELLIPSE SEGMENT

PHI OR S	NTHETA	NPHI	OMEGATH
5.8000000-01	-1.0116339+02	-8.1282289+01	1.8861345-03
5.9000000-01	-1.0234037+02	-8.1692179+01	1.9126687-03
6.0000000-01	-1.0354652+02	-8.2113788+01	1.9388511-03
6.1000000-01	-1.0478235+02	-8.2547373+01	1.9646676-03
6.2000000-01	-1.0604843+02	-8.2993199+01	1.9901040-03
6.3000000-01	-1.0734531+02	-8.3451543+01	2.0151455-03
6.4000000-01	-1.0867357+02	-8.3922688+01	2.0397767-03
6.5000000-01	-1.1003377+02	-8.4406927+01	2.0639821-03
6.6000000-01	-1.1142650+02	-8.4904564+01	2.0877455-03
6.7000000-01	-1.1285238+02	-8.5415911+01	2.1110555-03
6.8000000-01	-1.1431199+02	-8.5941288+01	2.1338803-03

SEGMENT NUMBER 2 SEGMENT CODE 11 ELLIPSE SEGMENT

PHI OR S	THETA	NPXI	OMEGA
6.800000-01	-1.1431198+02	-8.5941270+01	2.1338791-03
6.900000-01	-1.1580595+02	-8.6481008+01	2.1562163-03
7.000000-01	-1.1733490+02	-8.7035448+01	2.1780446-03
7.100000-01	-1.1889948+02	-8.7604941+01	2.1993441-03
7.200000-01	-1.2050032+02	-8.8187646+01	2.2200967-03
7.300000-01	-1.2213808+02	-8.8790531+01	2.2402866-03
7.400000-01	-1.2381342+02	-8.9407378+01	2.2598946-03
7.500000-01	-1.2552700+02	-9.0040775+01	2.2789066-03
7.600000-01	-1.2727951+02	-9.0691122+01	2.2972876-03
7.700000-01	-1.2907164+02	-9.1358827+01	2.3150366-03
7.800000-01	-1.3090408+02	-9.2044311+01	2.3321288-03

REGION NUMBER 6

THERE ARE 2 SEGMENTS AND 0 KINEMATIC LINKS WITHIN THIS REGION

SEGMENT NUMBER 1 SEGMENT CODE 11 ELLIPSE SEGMENT

PHI OR S	NTHETA	NPHI	OMEGATH
7.8000000-01	-1.3070406+02	-9.2044262+01	2.3321280+03
7.9000000-01	-1.3277751+02	-9.2747972+01	2.3485451+03
8.0000000-01	-1.3469268+02	-9.3470309+01	2.3642666+03
8.1000000-01	-1.3665029+02	-9.4211743+01	2.3792805+03
8.2000000-01	-1.3865106+02	-9.4972732+01	2.3935627+03
8.3000000-01	-1.4069523+02	-9.5753745+01	2.4070978+03
8.4000000-01	-1.4278504+02	-9.6555262+01	2.4198666+03
8.5000000-01	-1.4491973+02	-9.7377769+01	2.4318505+03
8.6000000-01	-1.4710056+02	-9.8221761+01	2.4430513+03
8.7000000-01	-1.4932828+02	-9.9087761+01	2.4533315+03
8.8000000-01	-1.5160367+02	-9.9976268+01	2.4629842+03

SEGMENT NUMBER 2 SEGMENT CODE 11 ELLIPSE SEGMENT

PHI OR S	NTHETA	NPHI	OMEGATH
8.8000000-01	-1.5160366+02	-9.9976255+01	2.4629844-03
8.9000000-01	-1.5392749+02	-1.0088780+02	2.4716955-03
9.0000000-01	-1.5630055+02	-1.0182291+02	2.4795514-03
9.1000000-01	-1.5872364+02	-1.0278213+02	2.4865393-03
9.2000000-01	-1.6119748+02	-1.0376661+02	2.4926474-03
9.3000000-01	-1.6372295+02	-1.0477510+02	2.4978466-03
9.4000000-01	-1.6630085+02	-1.0580997+02	2.5021806-03
9.5000000-01	-1.6893198+02	-1.0687116+02	2.5055859-03
9.6000000-01	-1.7161716+02	-1.0795927+02	2.5080217-03
9.7000000-01	-1.7435723+02	-1.0907484+02	2.5096299-03
9.7800000-01	-1.7658936+02	-1.0987475+02	2.5102044-03
9.8000000-01	-1.7715301+02	-1.1021847+02	2.5102529-03

REGION NUMBER 7

THERE ARE 2 SEGMENTS AND 0 KINEMATIC LINKS WITHIN THIS REGION

SEGMENT NUMBER 1 SEGMENT CODE 11 ELLIPSE SEGMENT

PNT OR S	NTHETA	NPHT	OMEGATH
9.8000000*01	-1.7715300*02	-1.1021847*02	2.5102517*03
9.8900000*01	-1.7943030*02	-1.1115395*02	2.5100720*03
9.9600000*01	-1.8174423*02	-1.1210804*02	2.5092857*03
1.0040000*00	-1.8405211*02	-1.1306104*02	2.5078894*03
1.0120000*00	-1.8646368*02	-1.1407323*02	2.5058798*03
1.0200000*00	-1.8891005*02	-1.1508489*02	2.5032533*03
1.0280000*00	-1.9137477*02	-1.1611633*02	2.5000066*03
1.0360000*00	-1.9387824*02	-1.1716780*02	2.4961357*03
1.0440000*00	-1.9642089*02	-1.1823959*02	2.4916365*03
1.0520000*00	-1.9900312*02	-1.1933197*02	2.4865047*03
1.0600000*00	-2.0162535*02	-1.2044517*02	2.4807352*03

SEGMENT NUMBER 2 SEGMENT CODE 11 ELLIPSE SEGMENT

PHI	OR	S	NINEIJA	NPRI	OMEGATH
1.060000	00	00	-2.016253+02	-1.2044519+02	2.4807341-03
1.068000	00	00	-2.0728794+02	-1.2157950+02	2.4743211-03
1.076000	00	00	-2.05699129+02	-1.22273515+02	2.4672582-03
1.084000	00	00	-2.0973574+02	-1.2391235+02	2.4595303-03
1.092000	00	00	-2.1252164+02	-1.2511133+02	2.4511534-03
1.100000	00	00	-2.1534928+02	-1.2633228+02	2.4420940-03
1.108000	00	00	-2.1821895+02	-1.2757538+02	2.4323500-03
1.116000	00	00	-2.2113089+02	-1.2884679+02	2.4219077-03
1.124000	00	00	-2.2408530+02	-1.3012863+02	2.4107801-03
1.132000	00	00	-2.2708232+02	-1.3143902+02	2.3988869-03
1.1384000	00	00	-2.2951049+02	-1.3280363+02	2.3868565-03
1.1400000	00	00	-2.3012206+02	-1.3277204+02	2.3862740-03

REGION NUMBER 8

THERE ARE 2 SEGMENTS AND 6 KINEMATIC LINKS WITHIN THIS REGION

SEGMENT NUMBER 1 SEGMENT CODE 11 ELLIPSE SEGMENT

PHI OR S	NTHETA	NPHI	ONEGATH
1.1700000*00	-2.3012205*02	-1.3277204*02	2.3862734*03
1.1480000*00	-2.3320453*02	-1.3412772*02	2.3729695*03
1.1560000*00	-2.3632971*02	-1.3550608*02	2.3587573*03
1.1640000*00	-2.3949747*02	-1.3690749*02	2.3438142*03
1.1720000*00	-2.4270758*02	-1.3833066*02	2.3280520*03
1.1800000*00	-2.4595974*02	-1.3977666*02	2.3114468*03
1.1860000*00	-2.4925351*02	-1.4124492*02	2.2939732*03
1.1960000*00	-2.5268831*02	-1.4273519*02	2.2756046*03
1.2040000*00	-2.5596347*02	-1.4424715*02	2.2563127*03
1.2120000*00	-2.5937812*02	-1.4578043*02	2.2360681*03
1.2184000*00	-2.6213760*02	-1.4702209*02	2.2191661*03
1.2200000*00	-2.6283124*02	-1.4733455*02	2.2148404*03

SEGMENT NUMBER 2 SEGMENT CODE 11 ELLIPSE SEGMENT

PHI	OR	S	N	M	E	T	A	N	P	H	O	M	E	G	A	I	T
1.220000	00	00	-2.6283123	+02	-1.4733455	+02	2.2148391	-03									
1.228000	00	00	-2.6632162	+02	-1.4890898	+02	2.1925962	-03									
1.236000	00	00	-2.6984788	+02	-1.5050308	+02	2.1693062	-03									
1.244000	00	00	-2.7340840	+02	-1.5211609	+02	2.1449359	-03									
1.252000	00	00	-2.7700134	+02	-1.5374718	+02	2.1194521	-03									
1.260000	00	00	-2.8062461	+02	-1.5539538	+02	2.0928210	-03									
1.268000	00	00	-2.8427588	+02	-1.5705959	+02	2.0650086	-03									
1.276000	00	00	-2.8795252	+02	-1.5873859	+02	2.0359813	-03									
1.284000	00	00	-2.9165162	+02	-1.6043102	+02	2.0057456	-03									
1.292000	00	00	-2.9536995	+02	-1.6213536	+02	1.9741464	-03									
1.298000	00	00	-2.9835609	+02	-1.6380629	+02	1.9479583	-03									
1.300000	00	00	-2.9910396	+02	-1.6384999	+02	1.9412774	-03									

REGION NUMBER 9

THERE ARE 2 SEGMENTS AND 0 KINEMATIC LINKS WITHIN THIS REGION

SEGMENT NUMBER I SEGMENT CODE II ELLIPSE SEGMENT

PHI	OR	S	THETA	OMEGA
1.3000000+00	-2.9910394+02	-1.6384995+02	1.9412742+03	
1.3080000+00	-3.0284974+02	-1.6557294+02	1.9070508+03	
1.3160000+00	-3.0660310+02	-1.6730232+02	1.8714630+03	
1.3240000+00	-3.1035935+02	-1.6903590+02	1.8344634+03	
1.3320000+00	-3.1411364+02	-1.7077132+02	1.7960303+03	
1.3400000+00	-3.1786047+02	-1.7250599+02	1.7561376+03	
1.3480000+00	-3.2159410+02	-1.7423715+02	1.7147611+03	
1.3560000+00	-3.2530837+02	-1.7596184+02	1.6718772+03	
1.3640000+00	-3.2899670+02	-1.7767690+02	1.6274724+03	
1.3720000+00	-3.3265211+02	-1.7937897+02	1.5815247+03	
1.3784000+00	-3.3554779+02	-1.8072886+02	1.5436481+03	
1.3800000+00	-3.3626723+02	-1.8106448+02	1.5340229+03	

SEGMENT NUMBER 2 SEGMENT CODE 11 ELLIPSE SEGMENT

PHI OR S	NINEIA	NPHI	OMEGATH
1.380000+00	-3.3626721+02	-1.8106448+02	1.5340209+03
1.385500+00	-3.3916948+02	-1.8241919+02	1.4542744+03
1.390000+00	-3.4203570+02	-1.8375839+02	1.4534927+03
1.399500+00	-3.4486138+02	-1.8507992+02	1.4116748+03
1.406000+00	-3.4764187+02	-1.8638152+02	1.3088219+03
1.412500+00	-3.5037242+02	-1.8768008+02	1.3249175+03
1.417000+00	-3.5304813+02	-1.8891562+02	1.2800275+03
1.425500+00	-3.5566400+02	-1.9014330+02	1.2341005+03
1.432000+00	-3.5821497+02	-1.9134147+02	1.1871676+03
1.438500+00	-3.6069587+02	-1.9250761+02	1.1392429+03
1.443700+00	-3.6262666+02	-1.9341576+02	1.1002003+03
1.445000+00	-3.6310152+02	-1.9363918+02	1.0903434+03

REGION NUMBER 10

THERE ARE 2 SEGMENTS AND 6 KINEMATIC LINKS WITHIN THIS REGION

SEGMENT NUMBER 1 SEGMENT CODE J1 ELLIPSE SEGMENT

PHI OR S	THETA	NPHI	OMEGA
1.4450000*00	-3.66310149*02	-1.9363919*02	1.0703387*03
1.4510000*00	-3.6525077*02	-1.9465064*02	1.0443507*03
1.4570000*00	-3.6732736*02	-1.9562886*02	9.9756639*04
1.4630000*00	-3.6932718*02	-1.96657127*02	9.5000624*04
1.4690000*00	-3.7124617*02	-1.9747608*02	9.0169301*04
1.4750000*00	-3.7308035*02	-1.9834133*02	8.5265176*04
1.4810000*00	-3.7482578*02	-1.9916512*02	8.0290982*04
1.4870000*00	-3.7647863*02	-1.9994557*02	7.5249680*04
1.4930000*00	-3.7803522*02	-2.0066087*02	7.0144440*04
1.4990000*00	-3.7949195*02	-2.0136928*02	6.4978650*04
1.5050000*00	-3.8084544*02	-2.0200913*02	5.9755898*04

SEGMENT NUMBER 2 SEGMENT CODE 11 ELLIPSE SEGMENT

PHI S OR S	NTHETA	NPHI	OMEGATH
1.5050000*00	-3.8084540*02	-2.0200913*02	5.9755240*04
1.5128952*00	-3.8248360*02	-2.0277445*02	5.2602142*04
1.5207903*00	-3.8388059*02	-2.0344264*02	4.5766135*04
1.5286855*00	-3.8512020*02	-2.0403170*02	3.8657143*04
1.5365806*00	-3.8614702*02	-2.0451801*02	3.1485883*04
1.5444758*00	-3.8696650*02	-2.0490633*02	2.4264022*04
1.5523710*00	-3.8757372*02	-2.0513486*02	1.7004382*04
1.5602661*00	-3.8796981*02	-2.0538227*02	9.7211258-05
1.5681613*00	-3.8814947*02	-2.0546765*02	2.4298270-05
1.5707930*00	-3.8816144*02	-2.0547336*02	4.7766427*09

BOUNDARY CONDITIONS

JOINT	DELTA T	DELTA Z	DELTA R	THETA	ANGLE ALPHA
1	0	0	0	0	.0000000
2	1	1	1	1	.0000000
3	1	1	1	1	.0000000
4	1	1	1	1	.0000000
5	1	1	1	1	.0000000
6	1	1	1	1	.0000000
7	1	1	1	1	.0000000
8	1	1	1	1	.0000000
9	1	1	1	1	.0000000
10	1	1	1	1	.0000000
11	1	0	1	0	.0000000

HARMONIC (N) = 2

ESTIMATE J

EIGENVALUES
 1.552075*00 8.467853*00 1.264438*01 1.737201*01 2.044594*01 2.620516*01 2.748276*01 3.212890*01
 4.000729*01 5.390960*01 7.666406*01 8.669375*01 1.277733*02 1.609571*02 2.683833*02 3.257922*02
 4.695332*02 8.548339*02 1.169398*03 1.426632*03 2.248011*03 4.84957*03 6.497600*03 1.047844*04
 1.157635*04 1.491523*04 2.358282*04 3.718372*04 8.889717*04 -1.834464*04 -3.776914*03 -1.495880*03
 -1.161307*03 -8.797206*02 -7.958641*02 -6.788766*02 -5.436398*02 -4.413334*02

THE CURRENT LOAD MULTIPLICATION FACTOR = 1.552075*00

EIGENVALUE UPPER LIMIT EXCEEDED IN THIS HARMONIC.

HARMONIC (N) = 3

ESTIMATE 1

EIGENVALUES

1.017252+00	3.238099+00	5.726899+00	9.980537+00	1.528874+01	1.926707+01	2.504225+01	3.999709+01
4.732714+01	5.727766+01	9.338487+01	1.105851+02	1.419740+02	2.331106+02	2.970008+02	3.631191+02
6.242476+02	9.487488+02	1.567835+03	1.874531+03	2.561637+03	5.581839+03	9.568030+03	1.315424+04
2.293693+04	2.730799+04	3.665841+04	6.936273+04	1.978222+05	-1.785328+04	-4.386276+03	-2.597765+03
-1.773848+03	-1.269619+03	-9.996363+02	-9.010916+02	-6.985440+02	-5.536098+02		

THE CURRENT LOAD MULTIPLICATION FACTOR = 1.017252+00

HARMONIC (N) = 3

ESTIMATE 2

REGION NUMBER 1

THERE ARE 2 SEGMENTS AND 0 KINERATIC LINKS WITHIN THIS REGION

SEGMENT NUMBER 1 SEGMENT CODE 11 ELLIPSE SEGMENT

PHI OR S	VECTOR 1					VECTOR 2					OMEGA THETA	OMEGA THET	
	U	V	W	M	S	U	V	W	M	S			
3.4091000-02	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
3.8181900-02	1.1066918-09	8.24173213-10	2.8510131-10	2.8510131-10	1.29550-07	1.29550-07	1.29550-07	1.29550-07	1.29550-07	1.29550-07	1.29550-07	1.29550-07	1.29550-07
4.2272800-02	2.0889964-09	-1.6997848-09	1.0200495-09	1.0200495-09	2.22486-07	2.22486-07	2.22486-07	2.22486-07	2.22486-07	2.22486-07	2.22486-07	2.22486-07	2.22486-07
4.6363700-02	3.0269564-09	-2.65732903-09	2.10119397-09	2.10119397-09	2.99086-07	2.99086-07	2.99086-07	2.99086-07	2.99086-07	2.99086-07	2.99086-07	2.99086-07	2.99086-07
5.0454600-02	3.9239915-09	-3.44674637-09	3.4846141-09	3.4846141-09	3.69157-07	3.69157-07	3.69157-07	3.69157-07	3.69157-07	3.69157-07	3.69157-07	3.69157-07	3.69157-07
5.4545500-02	4.9254838-09	-4.3882302-09	5.1591619-09	5.1591619-09	4.37729-07	4.37729-07	4.37729-07	4.37729-07	4.37729-07	4.37729-07	4.37729-07	4.37729-07	4.37729-07
5.8636400-02	5.9273194-09	-5.3406873-09	7.1200537-09	7.1200537-09	5.07508-07	5.07508-07	5.07508-07	5.07508-07	5.07508-07	5.07508-07	5.07508-07	5.07508-07	5.07508-07
6.2727300-02	6.9901081-09	-6.3288018-09	9.3782309-09	9.3782309-09	5.80008-07	5.80008-07	5.80008-07	5.80008-07	5.80008-07	5.80008-07	5.80008-07	5.80008-07	5.80008-07
6.6818200-02	8.0914061-09	-7.3554876-09	1.1947489-08	1.1947489-08	6.56105-07	6.56105-07	6.56105-07	6.56105-07	6.56105-07	6.56105-07	6.56105-07	6.56105-07	6.56105-07
7.0709100-02	9.2669115-09	-8.4227751-09	1.4844510-08	1.4844510-08	7.36321-07	7.36321-07	7.36321-07	7.36321-07	7.36321-07	7.36321-07	7.36321-07	7.36321-07	7.36321-07
7.5000000-02	1.0511233-08	-9.55319819-09	1.8087754-08	1.8087754-08	8.20974-07	8.20974-07	8.20974-07	8.20974-07	8.20974-07	8.20974-07	8.20974-07	8.20974-07	8.20974-07

SEGMENT NUMBER 2 SEGMENT CODE 11 ELLIPSE SEGMENT

PHI OR S	V E C T O R 1			V E C T O R 2			OMEGA THETA	U	V	W	OMEGA THET
	U	V	W	U	V	W					
7.5000000-02	1.0511236-08	-9.5319856-09	1.8087757-08	8.20974-07	-1.4164703-07	1.3078398-07	-6.6594140-08	-2.92721-06			
8.0000000-02	1.2131160-08	-1.0945663-08	2.2550564-08	9.30749-07	-1.6210925-07	1.5127213-07	-8.3022061-08	-3.31598-06			
8.5000000-02	1.3865925-08	-1.2423507-08	2.7597170-08	1.44767-06	-1.8387731-07	1.7281861-07	-1.0152736-07	-3.73017-06			
9.0000000-02	1.5721263-08	-1.3965183-08	3.3265975-08	1.17188-06	-2.0699148-07	1.9544928-07	-1.02246079-07	-4.17026-06			
9.5000000-02	1.7702642-08	-1.5569735-08	3.9526189-08	1.030347-06	-2.3148533-07	2.1918382-07	-1.4525599-07	-4.63684-06			
1.0000000-01	1.9815447-08	-1.7235703-08	4.6627659-08	1.44249-06	-2.45738861-07	2.4403685-07	-1.7162883-07	-5.12919-06			
1.0500000-01	2.2065079-08	-1.8961202-08	5.4460778-08	1.58899-06	-2.68472892-07	2.7001889-07	-2.0022709-07	-5.64817-06			
1.1000000-01	2.4457644-08	-2.0744019-08	6.2954451-08	1.74301-06	-3.01353283-07	2.9713721-07	-2.3170034-07	-6.19418-06			
1.1500000-01	2.6978992-08	-2.2581520-08	7.2338083-08	1.90459-06	-3.43382458-07	3.2533643-07	-2.6619982-07	-6.76673-06			
1.2000000-01	2.9690767-08	-2.4471100-08	8.2581584-08	2.07377-06	-3.7563654-07	3.5479901-07	-3.0387855-07	-7.36613-06			
1.2400000-01	3.1960802-08	-2.6018645-08	9.1429906-08	2.21460-06	-4.06219416-07	3.7914481-07	-3.33681454-07	-7.966504-06			
1.2500000-01	3.2544423-08	-2.6409473-08	9.3735386-08	2.25057-06	-4.0898950-07	3.85344864-07	-3.4448130-07	-7.99247-06			

REGION NUMBER 2

THERE ARE 2 SEGMENTS AND 0 KINEMATIC LINKS WITHIN THIS REGION

SEGMENT NUMBER 1 SEGMENT CODE 11 ELLIPSE SEGMENT

PHI OR S	V E C T O R I			O M E G A T H E T A			V E C T O R 2			O M E G A T H E T		
	U	V	W	U	V	W	U	V	W	U	V	W
1.250000-01	3.254444-08	-2.640950-08	9.373537-08	2.25057-06	-4.089876-07	3.853457-07	-3.448912-07	-7.99246-06				
1.305000-01	3.597578-08	-2.859282-08	1.071048-07	2.45386-06	-4.477461-07	4.202614-07	-3.540424-07	-8.71237-06				
1.360000-01	3.941730-08	-3.082618-08	1.216829-07	2.66548-06	-4.884118-07	4.567738-07	-4.476274-07	-9.46513-06				
1.415000-01	4.317814-08	-3.316585-08	1.375287-07	2.88847-06	-5.310330-07	4.945745-07	-5.058603-07	-1.02509-05				
1.470000-01	4.716764-08	-3.542531-08	1.547020-07	3.11970-06	-5.756583-07	5.337550-07	-5.689561-07	-1.10899-05				
1.525000-01	5.139643-08	-3.777915-08	1.732634-07	3.36382-06	-6.223265-07	5.743064-07	-6.371427-07	-1.19222-05				
1.580000-01	5.587435-08	-4.016164-08	1.932747-07	3.61130-06	-6.710924-07	6.162195-07	-7.166369-07	-1.28081-05				
1.635000-01	6.051254-08	-4.252649-08	2.147985-07	3.87141-06	-7.220017-07	6.594445-07	-7.896680-07	-1.37277-05				
1.690000-01	6.502243-08	-4.498731-08	2.378994-07	4.14121-06	-7.751043-07	7.040910-07	-8.744702-07	-1.46813-05				
1.745000-01	7.031592-08	-4.741276-08	2.626422-07	4.42677-06	-8.304513-07	7.500282-07	-9.652765-07	-1.56691-05				
1.789000-01	7.556325-08	-4.936309-08	2.866413-07	4.65151-06	-8.763040-07	7.872835-07	-1.042406-06	-1.64840-05				
1.800000-01	7.650542-08	-4.984932-08	2.890943-07	4.71018-06	-8.880957-07	7.972645-07	-1.062327-06	-1.66812-05				

SEGMENT NUMBER 2 SEGMENT CODE 11 ELLIPSE SEGMENT

PHI OR S	V E C T O R 1				V E C T O R 2				OMEGA THET
	U	V	W	OMEGA THETA	U	V	W	OMEGA THET	
1.8000000-01	7.6505576-08	-4.9849435-08	2.8009427-07	4.71018-06	-8.8809614-07	7.9728498-07	-1.0623275-06	-1.66912-05	
1.8600000-01	8.2956155-08	-5.2446287-08	3.1997837-07	5.03722-06	-9.5366575-07	8.5032764-07	-1.1756106-06	-1.78458-05	
1.9200000-01	8.9792020-08	-5.5126803-08	3.5206603-07	5.32618-06	-1.0221088-06	9.0490336-07	-1.2969398-06	-1.90420-05	
1.9800000-01	9.7031784-08	-5.7736703-08	3.8844897-07	5.72718-06	-1.0735020-06	9.6101280-07	-1.4266450-06	-2.02800-05	
2.0400000-01	1.0469439-07	-6.0292479-08	4.2622117-07	6.09033-06	-1.1679254-06	1.0186198-06	-1.5650637-06	-2.15603-05	
2.1000000-01	1.1280002-07	-6.2815381-08	4.6647874-07	6.46576-06	-1.2454620-06	1.0777113-06	-1.7185407-06	-2.28832-05	
2.1600000-01	1.2136961-07	-6.5272914-08	5.032012-07	6.85359-06	-1.3261984-06	1.13382675-06	-1.8654286-06	-2.42491-05	
2.2200000-01	1.3042501-07	-6.7657925-08	5.4984615-07	7.25396-06	-1.4102243-06	1.2002676-06	-2.0360861-06	-2.56584-05	
2.2800000-01	1.3998962-07	-6.9957796-08	6.00316025-07	7.66701-06	-1.4976333-06	1.2636900-06	-2.2128884-06	-2.71115-05	
2.3400000-01	1.5008540-07	-7.2159434-08	6.5436844-07	8.09288-06	-1.5885225-06	1.3285122-06	-2.4002082-06	-2.86088-05	
2.4000000-01	1.6073893-07	-7.4232527-08	7.0857950-07	8.553172-06	-1.6824928-06	1.3947109-06	-2.5584343-06	-3.01508-05	

SEGMENT NUMBER 2 SEGMENT CODE 11 ELLIPSE SEGMENT

PHI OR S	V E C T O R 1			V E C T O R 2			OMEGA THETA	U	V	W	OMEGA THET
	U	V	W	U	V	W					
3.1000000-01	3.3589419-07	-8.5146489-08	1.6034234-04	1.46666-05	-J.1028015-06	2.2684686-06	-5.8602674-06	-5.16027-05			
3.1800000-01	3.6323916-07	-8.4096288-08	1.7418795-04	1.54945-05	-J.3058728-06	2.3782371-06	-6.36344738-06	-5.44845-05			
3.2600000-01	3.9241873-07	-8.2425210-08	1.8890294-04	1.63302-05	-J.5186677-06	2.4897423-06	-6.8728852-06	-5.74578-05			
3.3400000-01	4.2354024-07	-8.0019499-08	2.0452712-04	1.72343-05	-J.7416122-06	2.6028621-06	-7.4648844-06	-6.05301-05			
3.4200000-01	4.5671678-07	-7.8883153-08	2.2116128-04	1.81474-05	-3.9751516-06	2.7176306-06	-8.06652175-06	-6.326920-05			
3.5000000-01	4.9206749-07	-7.7993731-08	2.3867080-04	1.90901-05	-4.2197520-06	2.8336390-06	-8.7024767-06	-6.69623-05			
3.5800000-01	5.2921782-07	-6.8121175-08	2.5727876-04	2.00631-05	-4.4759009-06	2.95510846-06	-9.337612230-06	-7.03278-05			
3.6600000-01	5.6979993-07	-6.2370897-08	2.7697299-04	2.10670-05	-4.7441089-06	3.0697610-06	-1.0088480-05	-7.37951-05			
3.7400000-01	6.1245229-07	-5.5619374-08	2.97260275-04	2.21025-05	-5.0249108-06	3.1895578-06	-1.0841237-05	-7.73662-05			
3.8200000-01	6.5782361-07	-4.7749035-08	3.1981946-04	2.31703-05	-5.3188669-06	3.3103602-06	-1.1636156-05	-8.10491-05			
3.9000000-01	7.0606619-07	-3.8835729-08	3.4307692-04	2.42712-05	-5.6265616-06	3.4323493-06	-1.2475074-05	-8.498276-05			

REGION NUMBER 4

THERE ARE 2 SEGMENTS AND 0 KINEMATIC LINKS WITHIN THIS REGION

SEGMENT NUMBER 1 SEGMENT CODE 11 ELLIPSE SEGMENT

PHI OR S	VECTOR 1			VECTOR 2			OMEGA THETA	U	V	W	OMEGA THET
	U	V	W	U	V	W					
3.960000-01	7.0606828-07	-3.8838266-08	3.4307885-06	2.42711-05	-5.6265695-06	3.4320582-06	-1.2475071-05	-1.2475071-05	-1.2475071-05	-1.2475071-05	-8.48275-05
3.990000-01	7.6397537-07	-2.7294364-08	3.7079463-06	2.55501-05	-5.9996354-06	3.5726749-06	-1.3473749-05	-1.3473749-05	-1.3473749-05	-1.3473749-05	-8.92007-05
4.080000-01	8.2596634-07	-1.4076622-08	4.0623796-06	2.68731-05	-6.3912379-06	3.7145575-06	-1.4533265-05	-1.4533265-05	-1.4533265-05	-1.4533265-05	-9.37208-05
4.170000-01	8.97230676-07	8.7274752-10	4.3143521-06	2.82412-05	-6.8025117-06	3.8574634-06	-1.5656666-05	-1.5656666-05	-1.5656666-05	-1.5656666-05	-9.83907-05
4.260000-01	9.46326595-07	1.7737231-08	4.6465949-06	2.96558-05	-7.2234511-06	4.0011516-06	-1.6847143-05	-1.6847143-05	-1.6847143-05	-1.6847143-05	-1.03213-04
4.350000-01	1.00391380-06	3.6626226-08	4.9982885-06	3.11181-05	-7.66884155-06	4.1453815-06	-1.8108045-05	-1.8108045-05	-1.8108045-05	-1.8108045-05	-1.08192-04
4.440000-01	1.1202326-06	5.7675658-08	5.3710667-06	3.26294-05	-6.1654335-06	4.2897101-06	-1.97442862-05	-1.97442862-05	-1.97442862-05	-1.97442862-05	-1.13330-04
4.530000-01	1.2068786-06	8.1027637-08	5.7660196-06	3.43113-05	-6.26668289-06	4.4344912-06	-2.0855341-05	-2.0855341-05	-2.0855341-05	-2.0855341-05	-1.18630-04
4.620000-01	1.2994248-06	1.0683144-07	6.184953-06	3.58052-05	-6.1939240-06	4.5788742-06	-2.2349295-05	-2.2349295-05	-2.2349295-05	-2.2349295-05	-1.24097-04
4.710000-01	1.3982415-06	1.3524352-07	6.6271089-06	3.74726-05	-9.7481062-06	4.7228021-06	-2.3928812-05	-2.3928812-05	-2.3928812-05	-2.3928812-05	-1.29733-04
4.782000-01	1.4820730-06	1.5976113-07	6.9498851-06	3.88461-05	-1.0211930-05	4.8374402-06	-2.5256900-05	-2.5256900-05	-2.5256900-05	-2.5256900-05	-1.34367-04
4.800000-01	1.5637218-06	1.6642774-07	7.0457408-06	3.71951-05	-1.0333631-05	4.8666017-06	-2.55598171-05	-2.55598171-05	-2.55598171-05	-2.55598171-05	-1.35543-04

SEGMENT NUMBER 2 SEGMENT CODE 11 ELLIPSE SEGMENT

PHI OR S	V E C T O R 1				V E C T O R 2				OMEGA THET
	U	V	W	OMEGA THETA	U	V	W	OMEGA THET	
4.8000000-01	1.5037271-06	1.66642167-07	7.0957383-06	3.91950-05	-1.0330850-05	4.8660335-06	-2.5598162-05	-1.355543-04	
4.9000000-01	1.6292510-06	2.0453222-07	7.6483686-06	4.11756-05	-1.1013661-05	5.0239821-06	-2.7563851-05	-1.42207-04	
5.0000000-01	1.7641280-06	2.4652926-07	8.2365133-06	4.32286-05	-1.1735813-05	5.1603243-06	-2.9652524-05	-1.49096-04	
5.1000000-01	1.9096106-06	2.9266554-07	8.8622655-06	4.53567-05	-1.2499650-05	5.3346611-06	-3.1871072-05	-1.56215-04	
5.2000000-01	2.0595973-06	3.4322612-07	9.5278531-06	4.75625-05	-1.3307623-05	5.4865784-06	-3.4226271-05	-1.63520-04	
5.3000000-01	2.2316350-06	3.9849922-07	1.0235648-05	4.98487-05	-1.4162450-05	5.6350452-06	-3.6727405-05	-1.71168-04	
5.4000000-01	2.4102339-06	4.5879266-07	1.09288178-05	5.22182-05	-1.5068830-05	5.7814128-06	-3.9248103-05	-1.79015-04	
5.5000000-01	2.6033262-06	5.2442881-07	1.1788137-05	5.46740-05	-1.6023749-05	5.9234142-06	-4.2196540-05	-1.87116-04	
5.6000000-01	2.8057415-06	5.9575158-07	1.2538397-05	5.72193-05	-1.7026634-05	6.0611626-06	-4.5182912-05	-1.95472-04	
5.7000000-01	3.0311709-06	6.7312151-07	1.3542024-05	5.98574-05	-1.8107951-05	6.1941510-06	-4.8349968-05	-2.04105-04	
5.7800000-01	3.2198256-06	7.3762691-07	1.4305542-05	6.20374-05	-1.9010090-05	6.2967603-06	-5.1020406-05	-2.11204-04	
5.8000000-01	3.2886618-06	7.5641983-07	1.4502270-05	6.25918-05	-1.9242101-05	6.3218511-06	-5.1708009-05	-2.13006-04	

REGION NUMBER 5

THERE ARE 2 SEGMENTS AND 0 KINEMATIC LINKS WITHIN THIS REGION

SEGMENT NUMBER I SEGMENT CODE II ELLIPSE SEGMENT

PHI OR S	VECTOR I			VECTOR U			VECTOR Z			VECTOR V			OMEGA THETA	W	OMEGA	THETA
	U	V	W	U	V	W	U	V	W	U	V	W				
5.8000000-01	3.2566747-06	7.5590488-07	1.4502283-05	6.25918-05	-1.0242146-05	6.371070-06	6.371070-06	5.61707979-05	-2.13005-04							
5.9000000-01	3.5233505-06	8.4753508-07	1.5522680-05	6.254260-05	-2.40482756-05	6.452303-06	6.452303-06	-5.5266896-05	-2.22060-04							
6.0000000-01	3.794297-06	9.4542193-07	1.6626948-05	6.83640-05	-2.1792891-05	6.5783963-06	6.5783963-06	-5.9037799-05	-2.31452-04							
6.1000000-01	4.0692128-06	1.05510143-06	1.7250071-05	7.14098-05	-2.3126565-05	6.8994891-06	6.8994891-06	-6.3033825-05	-2.41189-04							
6.2000000-01	4.4030948-06	1.1647867-06	1.8983327-05	7.45675-05	-2.4638844-05	6.8148885-06	6.8148885-06	-6.7288888-05	-2.51275-04							
6.3000000-01	4.7395749-06	1.2872405-06	2.0284281-05	7.78418-05	-2.6184863-05	6.9238791-06	6.9238791-06	-7.1757728-05	-2.61716-04							
6.4000000-01	5.1102628-06	1.4189055-06	2.1666826-05	8.12366-05	-2.7820049-05	7.0257515-06	7.0257515-06	-7.6515985-05	-2.72519-04							
6.5000000-01	5.4868878-06	1.5603422-06	2.3136201-05	8.47573-05	-2.9554146-05	7.1197695-06	7.1197695-06	-8.1559250-05	-2.83671-04							
6.6000000-01	5.9013103-06	1.7121426-06	2.4698029-05	8.84088-05	-3.1381235-05	7.2051832-06	7.2051832-06	-8.6908137-05	-2.95228-04							
6.7000000-01	6.3455299-06	1.8749332-06	2.6358323-05	9.21965-05	-3.3319763-05	7.2812241-06	7.2812241-06	-9.2578348-05	-3.07167-04							
6.8000000-01	6.8216985-06	2.0493765-06	2.8123547-05	9.61258-05	-3.5372563-05	7.3471034-06	7.3471034-06	-9.8590745-05	-3.19485-04							

SEGMENT NUMBER 2 SEGMENT CODE 11 ELLIPSE SEGMENT

PHI OR S	U	V	W	OMEGA THETA	U	V	W	OMEGA THETA
6.8000000-01	6.8217287-06	2.0493438-06	2.8123526-05	9.61255-05	-3.5372661-05	7.3472143-06	-9.8590667-05	-3.19493-04
6.9000000-01	7.3321594-06	2.2361403-06	3.0000604-05	1.02202-04	-3.7546983-05	7.4021235-06	-1.0496631-04	-3.32195-04
7.0000000-01	7.8793351-06	2.4436016-06	3.1999988-05	1.04433-04	-3.4835052-05	7.4452291-06	-1.1112283-04	-3.45307-04
7.1000000-01	8.4659874-06	2.6498023-06	3.4120675-05	1.08823-04	-4.2291453-05	7.4756764-06	-1.1889838-04	-3.56824-04
7.2000000-01	9.0749635-06	2.8782828-06	3.6380263-05	1.13380-04	-4.4878447-05	7.4925880-06	-1.2660381-04	-3.72275-04
7.3000000-01	9.7693998-06	3.1223520-06	3.8784998-05	1.18111-04	-4.7620700-05	7.4950649-06	-1.3457066-04	-3.87087-04
7.4000000-01	1.0492262-05	3.3823401-06	4.1344826-05	1.23023-04	-5.0528006-05	7.4821878-06	-1.4312727-04	-3.90183-04
7.5000000-01	1.1268381-05	3.6610322-06	4.4070455-05	1.28124-04	-5.3610745-05	7.4530195-06	-1.5220369-04	-4.01699-04
7.6000000-01	1.2100477-05	3.9576716-06	4.6973416-05	1.33422-04	-5.6879948-05	7.4066089-06	-1.6183161-04	-4.13256-04
7.7000000-01	1.2993192-05	4.2739609-06	5.0066136-05	1.38725-04	-6.0347310-05	7.3419956-06	-1.7204453-04	-4.24853-04
7.8000000-01	1.3951069-05	4.6110716-06	5.3362007-05	1.44643-04	-6.4025288-05	7.2582173-06	-1.8287773-04	-4.36488-04

REGION NUMBER 6

THERE ARE 2 SEGMENTS AND 0 KINEMATIC LINKS WITHIN THIS REGION

SEGMENT NUMBER I SEGMENT CODE II ELLIPSE SEGMENT

PNT OR S	VECTOR I			VECTOR 2			OMEGA THETA	W	OMEGA THET
	U	V	W	U	V	W			
7.9000000-01	1.3951130-05	4.6110244-06	5.3361950-05	1.44642-04	7.2584462-06	-1.8287749-04	-4.664886-04		
7.9000000-01	1.4979121-05	4.9701698-06	5.6875402-05	1.50583-04	7.1566062-06	-1.9435135-04	-4.80379-04		
8.0000000-01	1.6082590-05	5.3527074-06	6.0922041-05	1.56758-04	7.0417342-06	-2.0649831-04	-4.96753-04		
8.1000000-01	1.7267284-05	5.7600032-06	6.4618693-05	1.63176-04	6.9126958-06	-2.1936961-04	-5.13993-04		
8.2000000-01	1.8539488-05	6.1935269-06	6.8883525-05	1.69849-04	6.7691111-06	-2.3302191-04	-5.32084-04		
8.3000000-01	1.9935950-05	6.6654834-06	7.3436173-05	1.76786-04	6.6103628-06	-2.4751455-04	-5.51010-04		
8.4000000-01	2.1374031-05	7.1455723-06	7.8297860-05	1.84001-04	6.44358034-06	-2.6291030-04	-5.70756-04		
8.5000000-01	2.2951641-05	7.6674836-06	8.3491536-05	1.9155-04	6.2447635-06	-2.7827537-04	-5.91303-04		
8.6000000-01	2.4647395-05	8.2224124-06	8.9042036-05	1.99311-04	6.0365614-06	-2.9668056-04	-6.12627-04		
8.7000000-01	2.6470625-05	8.8123386-06	9.4976237-05	2.07432-04	5.8105134-06	-3.1519937-04	-6.34703-04		
8.8000000-01	2.8431449-05	9.4392348-06	1.01323324-04	2.15882-04	5.56559467-06	-3.3491008-04	-6.57493-04		

SEGMENT NUMBER 2 SEGMENT CODE 11 ELLIPSE SEGMENT

PHI OR S	V E C T O R 1					V E C T O R 2					OMEGA THET
	U	V	W	X	Y	U	V	W	X	Y	
8.8000000-01	2.8431582-05	9.4370912-06	1.0132305-04	2.15880-04	-1.1727521-04	5.5664023-06	-3.3490940-04	-6.57486-04			
8.9000000-01	3.0540976-05	1.0105222-05	1.0811432-04	2.24673-04	-1.2457417-04	5.3020886-06	-3.5589377-04	-6.800945-04			
9.0000000-01	3.2910857-05	1.0812863-05	1.1538405-04	2.33524-04	-1.3232997-04	5.0152207-06	-3.7823282-04	-7.02017-04			
9.1000000-01	3.5254157-05	1.1564445-05	1.2316929-04	2.43350-04	-1.4057132-04	4.7154803-06	-4.0203092-04	-7.29628-04			
9.2000000-01	3.7884920-05	1.2302531-05	1.3151020-04	2.53266-04	-1.4932826-04	4.3910629-06	-4.2236551-04	-7.54483-04			
9.3000000-01	4.0718400-05	1.3209824-05	1.4045032-04	2.63590-04	-1.5863211-04	4.0457297-06	-4.5433635-04	-7.80062-04			
9.4000000-01	4.3771167-05	1.4189171-05	1.5003693-04	2.74338-04	-1.6851513-04	3.6724772-06	-4.8303344-04	-8.05611-04			
9.5000000-01	4.7061229-05	1.5083568-05	1.6032132-04	2.85529-04	-1.7901198-04	3.2926354-06	-5.1357040-04	-8.31134-04			
9.6000000-01	5.0608159-05	1.6076164-05	1.7135716-04	2.97181-04	-1.9015645-04	2.8886022-06	-5.4602237-04	-8.56385-04			
9.7000000-01	5.4433228-05	1.7150262-05	1.8321092-04	3.09313-04	-2.0198536-04	2.4610316-06	-5.8048301-04	-8.81053-04			
9.7800000-01	5.7709420-05	1.8056145-05	1.9332227-04	3.19378-04	-2.1196559-04	2.1024061-06	-6.10955073-04	-9.00107-04			
9.8000000-01	5.8559562-05	1.8289326-05	1.95994222-04	3.21946-04	-2.1453498-04	2.0200949-06	-6.1703046-04	-9.04746-04			

REGION NUMBER 7

THERE ARE 2 SEGMENTS AND 0 KINEMATIC LINKS WITHIN THIS REGION

SEGMENT NUMBER 1 SEGMENT CODE 11 ELLIPSE SEGMENT

PRT OR S	VECTOR I			VECTOR U			VECTOR V			VECTOR Z			OMEGA THETA
	U	V	W	U	V	W	U	V	W	U	V	W	
9.8000000*01	5.8559869-05	1.8289013-05	1.7594157-04	3.21741-04	2.01453599-04	2.0210391-06	-6.1702826-04	-7.094730-04					
9.8000000*01	6.2094665-05	1.9249435-05	2.0680746-04	3.32421-04	-2.2527989-04	1.5462178-06	-6.4768686-04	-9.15929-04					
9.9600000*01	6.5852199-05	2.0255477-05	2.1832110-04	3.43243-04	-2.3655198-04	1.0807408-06	-6.7957320-04	-9.229663-04					
1.0040000*00	6.9847305-05	2.1307931-05	2.3052446-04	3.54419-04	-2.4837803-04	6.2938511-07	-7.1282636-04	-9.45297-04					
1.0120000*00	7.4095838-05	2.2413652-05	2.4346235-04	3.65958-04	-2.6078517-04	1.9911281-07	-7.4758840-04	-9.64028-04					
1.0200000*00	7.8614750-05	2.3569559-05	2.5718264-04	3.77871-04	-2.7380167-04	-2.0437829-07	-7.8400398-04	-9.84286-04					
1.0280000*00	8.3422159-05	2.4779626-05	2.7173850-04	3.90169-04	-2.8745663-04	-5.759771-07	-8.2221981-04	-1.00633-03					
1.0360000*00	8.8537427-05	2.6046684-05	2.8717851-04	4.02862-04	-3.0177967-04	-9.1026886-07	-8.6238383-04	-1.02993-03					
1.0440000*00	9.3981237-05	2.7371213-05	3.0356699-04	4.15962-04	-3.1680055-04	-1.204862-06	-9.0464392-04	-1.05484-03					
1.0520000*00	9.9775489-05	2.8757338-05	3.2096417-04	4.29478-04	-3.3254870-04	-1.4532897-06	-9.4914624-04	-1.08078-03					
1.0600000*00	1.0594436-04	3.026823-05	3.3943648-04	4.43419-04	-3.4905268-04	-1.6544609-06	-9.9603274-04	-1.10741-03					

SEGMENT NUMBER 2 - SEGMENT CODE 11 ELLIPSE SEGMENT

PHI OR S	V E C T O R 1						V E C T O R 2						OMEGA THET
	U	V	W	OMEGA THETA	U	V	W	OMEGA THETA	U	V	W	OMEGA THET	
1.060000*00	1.059449*04	3.0206347*05	3.3943526*04	4.43411*04	-3.4705431*04	-1.6531631*06	-9.9602921*04	-1.07339*03					
1.068000*00	1.1251302*04	3.1721554*05	3.5905311*04	4.57786*04	-3.6634131*04	-1.8020777*06	-1.0454333*03	-1.13432*03					
1.076000*00	1.1950746*04	3.3304909*05	3.7989235*04	4.72607*04	-3.8443620*04	-1.8961288*06	-1.0274784*03	-1.16110*03					
1.084000*00	1.2595687*04	3.4956824*05	4.0203352*04	4.87883*04	-4.0336095*04	-1.9322176*06	-1.01522694*03	-1.18715*03					
1.092000*00	1.3189180*04	3.6689501*05	4.2556244*04	5.03221*04	-4.2313389*04	-1.9089784*06	-1.0088857*03	-1.21179*03					
1.100000*00	1.4334481*04	3.8487915*05	4.5057044*04	5.19828*04	-4.4376791*04	-1.8165416*06	-1.0703705*03	-1.23417*03					
1.108000*00	1.5235052*04	4.0387795*05	4.7715472*04	5.36512*04	-4.6527106*04	-1.6559774*06	-1.13337174*03	-1.26325*03					
1.116000*00	1.6194578*04	4.2327600*05	5.0541860*04	5.53676*04	-4.8764464*04	-1.4185497*06	-1.13998526*03	-1.26772*03					
1.124000*00	1.7216972*04	4.4367471*05	5.3547179*04	5.71325*04	-5.1089261*04	-1.0946022*06	-1.15686116*03	-1.27599*03					
1.132000*00	1.8306389*04	4.6495503*05	5.6743072*04	5.89460*04	-5.3497148*04	-6.6993275*07	-1.15397099*03	-1.27607*03					
1.1384000*00	1.9229129*04	4.8258144*05	5.9445266*04	6.04318*04	-5.54884154*04	-2.4381108*07	-1.15979816*03	-1.26862*03					
1.1400000*00	1.9767232*04	4.8707508*05	6.0141876*04	6.08081*04	-5.5789057*04	-1.23344433*07	-1.0127045*03	-1.26553*03					

REGION NUMBER 8

THERE ARE 2 SEGMENTS AND 6 KINEMATIC LINKS WITHIN THIS REGION

SEGMENT NUMBER I SEGMENT CODE JJ ELLIPSE SEGMENT

PHI OR S	VECTOR I			VECTOR U			VECTOR V			OMEGA THETA	OMEGA TRET
	U	V	W	U	V	W	U	V	W		
1.140000*00	1.9467346-04	4.8766559-05	6.0141522-04	6.06066-04	-5.5789389*04	-1.2107921-07	-1.6126956-03	-1.26549*03			
1.1480000*00	2.0704373-04	5.1605910-05	6.3750263-04	6.27184-04	-5.8305802-04	-3.2150016-07	-1.5849952-03	-1.18110*03			
1.1560000*00	2.2022420-04	5.334275-05	6.760957-04	6.46784-04	-6.0710122-04	-4.3533841-07	-1.7549644-03	-1.11755*03			
1.1640000*00	2.3426618-04	5.5822788-05	7.168927-04	6.66843-04	-6.3201227-04	-3.5589564-07	-1.8237665-03	-1.07276*03			
1.1720000*00	2.4922655-04	5.8442219-05	7.6038460-04	6.87357-04	-6.5747781-04	4.8744785-09	-1.8723839-03	-1.04468*03			
1.1800000*00	2.6516075-04	6.1102912-05	8.0662820-04	7.06309-04	-6.8447703-04	7.1803803-07	-1.9218014-03	-1.003129*03			
1.1880000*00	2.8212483-04	6.3854714-05	8.5579747-04	7.29280-04	-7.1207571-04	1.8391437-06	-2.0329606-03	-1.03060*03			
1.1960000*00	3.0017688-04	6.6676894-05	9.0506840-04	7.51147-04	-7.4061959-04	3.4091164-06	-2.1067506-03	-1.04066*03			
1.2040000*00	3.1742768-04	6.9628059-05	9.6362441-04	7.73580-04	-7.7012665-04	5.456240-06	-2.1839975-03	-1.05950*03			
1.2120000*00	3.3989055-04	7.2646055-05	1.0226559-03	7.96443-04	-8.0059843-04	7.9955745-06	-2.2654482-03	-1.08506*03			
1.2184000*00	3.5719537-04	7.5120975-05	1.0725156-03	8.14223-04	-8.2585486-04	1.0381548-05	-2.3340732-03	-1.10990*03			
1.220000*00	3.6165618-04	7.5747867-05	1.0853599-03	8.18744-04	-8.3200998-04	1.1029235-05	-2.3517476-03	-1.11517*03			

SEGMENT NUMBER 2 SEGMENT CODE 11 ELLIPSE SEGMENT

PHI OR S	V E C T O R 1				V E C T O R 2				OMEGA THETA	U	V	W	OMEGA THET
	U	V	W	OMEGA THETA	U	V	W	OMEGA THET					
1.2200000*00	3.6165901-04	7.5745847-05	1.0853519-03	8.10785-04	-8.3201699-04	1.1031618-05	-2.3517453-03	-1.11524-03					
1.2280000*00	3.8480072-04	7.8927218-05	1.1517303-03	8.41772-04	-8.6430646-04	1.4547186-05	-2.4434065-03	-1.14742-03					
1.2360000*00	4.0939293-04	8.2183246-05	1.2225918-03	8.64950-04	-8.9273579-04	1.8520861-05	-2.5402416-03	-1.17869-03					
1.2440000*00	4.3551179-04	8.5567597-05	1.2975489-03	8.88254-04	-9.1309879-04	2.2914561-05	-2.6437939-03	-1.20529-03					
1.2520000*00	4.6323435-04	8.8992536-05	1.3770165-03	9.11607-04	-9.4649656-04	2.7677452-05	-2.7522103-03	-1.22232-03					
1.2600000*00	4.9226300-04	9.2329032-05	1.4612101-03	9.34925-04	-9.7989028-04	3.2746503-05	-2.8650616-03	-1.22319-03					
1.2680000*00	5.2379970-04	9.5866111-05	1.5503441-03	9.58112-04	-1.00323685-03	3.8063342-05	-2.9805829-03	-1.19903-03					
1.2760000*00	5.5679511-04	9.9311255-05	1.6446289-03	9.81060-04	-1.0647762-03	4.3567618-05	-3.0958058-03	-1.13782-03					
1.2840000*00	5.9169754-04	1.0282975-04	1.7442683-03	1.00365-03	-1.00954560-03	4.9241785-05	-3.2060486-03	-1.02343-03					
1.2920000*00	6.2857682-04	1.0634508-04	1.8494563-03	1.02574-03	-1.1236576-03	5.5143846-05	-3.3042258-03	-8.34418-04					
1.2984000*00	6.65954738-04	1.0914242-04	1.9372232-03	1.04297-03	-1.14432229-03	6.0160404-05	-3.3672319-03	-6.10998-04					
1.3000000*00	6.6749784-04	1.0983831-04	1.9603728-03	1.04720-03	-1.1486236-03	6.1479716-05	-3.3797366-03	-5.42900-04					

REGION NUMBER 9

THERE ARE 2 SEGMENTS AND 0 KINERATIC LINKS WITHIN THIS REGION

SEGMENT NUMBER I SEGMENT CODE II ELLIPSE SEGMENT

VECTOR I VECTOR II VECTOR III

PHT OR S	U	V	W	OMEGA THETA	U	V	W	OMEGA THETA
1.300000+00	6.675038-04	1.0933435-04	1.9603764-03	1.04734-03	-1.1486366-03	6.1483312-05	-3.2800036-03	-5.43374-04
1.308000+00	7.085388-04	1.1328310-04	2.6772098-03	1.06819-03	-1.1509058-03	6.6949890-05	-3.4135090-03	-7.56950-05
1.316000+00	7.5172326-04	1.1666440-04	2.2000725-03	1.08801-03	-1.1484433-03	7.2374448-05	-3.4021371-03	2.62142-04
1.324000+00	7.9709866-04	1.1995234-04	2.3291302-03	1.10563-03	-1.1408591-03	7.8384760-05	-3.3569408-03	4.94396-04
1.332000+00	8.4469238-04	1.2311828-04	2.4643336-03	1.12382-03	-1.1282892-03	8.5323323-05	-3.2873026-03	6.43014-04
1.340000+00	8.9451699-04	1.2613088-04	2.6059118-03	1.13937-03	-1.1108849-03	9.3316660-05	-3.2008872-03	7.30745-04
1.348000+00	9.4656782-04	1.2895602-04	2.7536645-03	1.15304-03	-1.0890645-03	1.0223605-04	-3.1037041-03	7.72604-04
1.356000+00	1.0008204-03	1.3155695-04	2.9075743-03	1.16456-03	-1.0632004-03	1.1224769-04	-3.0002523-03	7.83676-04
1.364000+00	1.0572280-03	1.3389428-04	3.0674974-03	1.17367-03	-1.0336486-03	1.2285117-04	-2.8937188-03	7.75216-04
1.372000+00	1.1157187-03	1.3572608-04	3.2332153-03	1.18406-03	-1.0006721-03	1.3378559-04	-2.7861903-03	7.55851-04
1.378400+00	1.1639456-03	1.3730182-04	3.3697814-03	1.18302-03	-9.7191222-04	1.4289522-04	-2.7002651-03	7.37840-04
1.380000+00	1.1761936-03	1.3768800-04	3.4944252-03	1.18344-03	-9.6439181-04	1.4514413-04	-2.6788370-03	7.32265-04

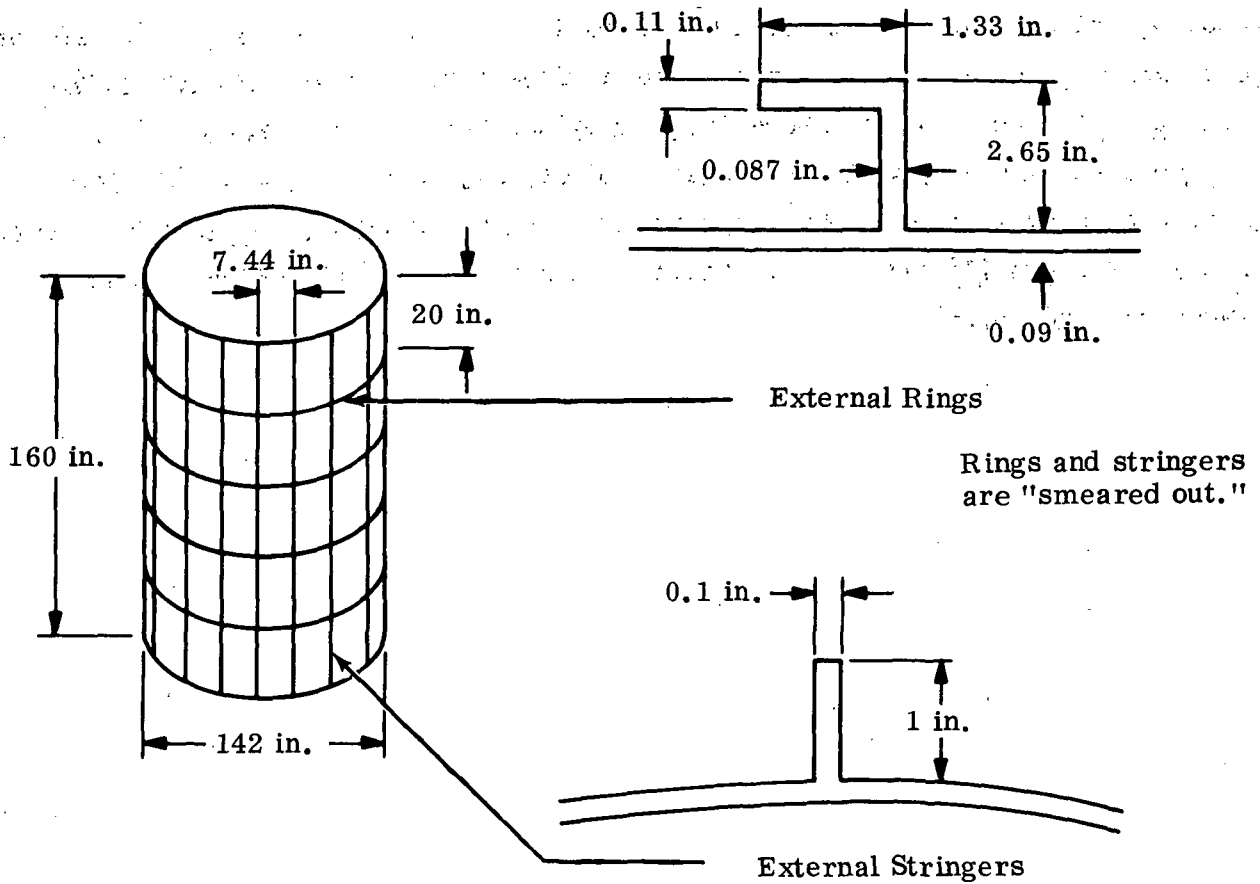
SEGMENT NUMBER 2 SEGMENT CODE 11 ELLIPSE SEGMENT

V E C T O R 1		V E C T O R 2		O M E G A T H E T A		U		V		W		O M E G A I N E T	
PHI	OR S	U	V	U	V	U	V	U	V	U	V	U	V
1.38000000	00000000	1.1762068-03	1.3760082-04	3.4046592-03	3.4046592-03	1.18453-03	-9.66436523-04	1.4509735-04	1.4509735-04	-2.6797510-03	-2.6797510-03	7.29401-04	7.29401-04
1.38650000	00000000	1.2267128-03	1.3869257-04	3.5476983-03	3.5476983-03	1.18525-03	-9.3236861-04	1.5413520-04	1.5413520-04	-2.5933150-03	-2.5933150-03	7.10393-04	7.10393-04
1.39300000	00000000	1.2783552-03	1.3949342-04	3.6932059-03	3.6932059-03	1.18373-03	-8.9802702-04	1.6292330-04	1.6292330-04	-2.5071153-03	-2.5071153-03	6.98579-04	6.98579-04
1.39950000	00000000	1.3110323-03	1.3998672-04	3.8429956-03	3.8429956-03	1.17981-03	-8.6103233-04	1.7127914-04	1.7127914-04	-2.4204580-03	-2.4204580-03	6.89063-04	6.89063-04
1.40600000	00000000	1.3646262-03	1.4014788-04	3.9946341-03	3.9946341-03	1.17334-03	-8.2102574-04	1.7900793-04	1.7900793-04	-2.3319248-03	-2.3319248-03	6.96555-04	6.96555-04
1.41250000	00000000	1.4396026-03	1.3995243-04	4.1484393-03	4.1484393-03	1.16416-03	-7.7751128-04	1.8591030-04	1.8591030-04	-2.2392987-03	-2.2392987-03	7.26281-04	7.26281-04
1.41900000	00000000	1.4940106-03	1.3937649-04	4.3037991-03	4.3037991-03	1.15210-03	-7.2988966-04	1.9179938-04	1.9179938-04	-2.1385805-03	-2.1385805-03	7.90031-04	7.90031-04
1.42550000	00000000	1.5494819-03	1.3839679-04	4.4607705-03	4.4607705-03	1.13703-03	-6.7747106-04	1.9653655-04	1.9653655-04	-2.0238188-03	-2.0238188-03	9.04250-04	9.04250-04
1.43200000	00000000	1.6052320-03	1.3699026-04	4.6182726-03	4.6182726-03	1.11881-03	-6.1959714-04	2.0009498-04	2.0009498-04	-1.8852822-03	-1.8852822-03	1.00105-03	1.00105-03
1.43850000	00000000	1.6610598-03	1.3513779-04	4.7759233-03	4.7759233-03	1.09732-03	-5.5574500-04	2.0266369-04	2.0266369-04	-1.7119931-03	-1.7119931-03	1.37880-03	1.37880-03
1.44370000	00000000	1.7056333-03	1.3331976-04	4.9017134-03	4.9017134-03	1.07772-03	-5.0023822-04	2.0436750-04	2.0436750-04	-1.5334491-03	-1.5334491-03	1.70464-03	1.70464-03
1.44500000	00000000	1.7167492-03	1.3281740-04	4.9330717-03	4.9330717-03	1.07244-03	-4.8576774-04	2.0480754-04	2.0480754-04	-1.4635105-03	-1.4635105-03	1.80189-03	1.80189-03

SEGMENT NUMBER 2 SEGMENT CODE 11 ELLIPSE SEGMENT

PHI OR S	V E C T O R 1						V E C T O R 2						OMEGA THET
	U	V	W	M	OMEGA THETA		U	V	W	M	OMEGA THET		
1.505000+00	2.1704083+03	8.6197763-05	6.2383782-03	6.88423-04	3.9371362-04	1.7820930+04	1.0546353-03	1.65921-03					
1.5120952+00	2.2253411+03	7.9282790-05	6.3707288-03	6.16671-04	5.1392873-04	1.6308624+04	1.3902556-03	1.64996-03					
1.5207903+00	2.2573534+03	6.9763267-05	6.4593767-03	5.40829-04	6.3134976-04	1.44973813+04	1.27285031-03	1.64776-03					
1.5286855+00	2.3070833+03	5.9697446-05	6.5930507-03	4.61196-04	7.4412435-04	1.2414596+04	2.0098161-03	1.64502-03					
1.5365806+00	2.3351353+03	4.9151967-05	6.6565805-03	3.78127-04	8.4978557-04	1.01136085+04	2.4123148-03	1.62780-03					
1.5444756+00	2.3601711+03	3.8198913-05	6.7509239-03	2.92050-04	9.4511323-04	7.7483770+05	2.7490432-03	1.56125-03					
1.5523710+00	2.3789206+03	2.6913338-05	6.8631974-03	2.633500-04	1.0281196-03	5.2353486+05	3.0436280-03	1.38923-03					
1.5602661+00	2.3911926+03	1.5370108-05	6.8367168-03	1.13107-04	1.0803226-03	3.0321560+05	3.3240626-03	1.02167-03					
1.5681613+00	2.3968840+03	3.6416565-06	6.8511538-03	2.21034-05	1.1276455-03	7.2735844+06	3.4749453-03	3.229318-04					
1.5707930+00	2.3973146+03	-2.9817315-07	6.8515429-03	-8.19742-06	1.1350257-03	6.0416073+08	3.4669223-03	-1.52519-06					

The second stability test problem is presented in Figure 4-2. Actually the test problem involves only the panel buckling mode of the cylindrical shell, whereas the full stability analysis is discussed in Reference 1. The reinforced (smeared stringers) panel is loaded with a constant 31 psi. internal pressure, and a variable compressive end load to buckling. The input is set for the program to receive the prestress states from cards. There are two loading conditions: the constant pressure load , and the variable end compression. Since no axisymmetric static analysis is necessary, only one set of boundary conditions is sufficient. The input is set to include full intermediate output. Since it is known [1] that the critical harmonic is $n=10$, the search is set between $n=9$ and $n=11$.



Notes:

Loading

- 1) Compressive end load: N
- 2) Internal stabilizing pressure: 31 psi

Boundary Conditions

- 1) Ends are simply supported

Figure 4-2 Test Problem 2

4 CYLINDER PANEL STABILITY TEST
 4 1 911 1 2 1 1 1
 ALUM STIF

1.0 E 07
 1.0 E 07
 .3

3.85 E 06
 1.0 E 07
 1.0 E 07

1 0
 1 1 SHUTTLE CYLINDER 2 E-04 .05 0.
 31 1.0
 71 ALUM 6.0 BLAN STII NØTH 0.0 LINE 2
 STIF 1.0
 .1 .1
 -.545 -.545
 .0380025 .0380025
 7.44 7.44
 1.0 1.0
 1.09 1.09
 2200. 2200.

-5.471 E 03-5.471 E 03

1 0
 1 2 SHUTTLE CYLINDER 3 E-04 .05 0.
 31 1.0
 71 ALUM 6.0 BLAN STII NØTH 0.0 NPFI 2
 STIF 1.0
 .1 .1
 -.545 -.545
 .0380025 .0380025
 7.44 7.44
 1.0 1.0
 1.09 1.09
 2200. 2200.

-5.471 E 03-5.471 E 03

1	2	3	4	5	6	7	8	9	0
10		3	SHUTTLE CYLINDER	E-04	.05				0.
		71	ALUM	BLAN	ST11	N0TH	0.0	NPHI	2
		1.0	6.0						
		.1	.1						
		-.545	-.545						
		.0380025	.0380025						
		7.44	7.44						
		1.0	1.0						
		209	209						
		2200.	2200.						
		-5.471	E 03-5.471	E 03					
		1	2						

1	2	3	4	5	6	7	8	9	0
10		4	SHUTTLE CYLINDER	E-04	.05				0.
		71	ALUM	BLAN	ST11	N0TH	0.0	NPHI	2
		1.0	6.0						
		.1	.1						
		-.545	-.545						
		.0380025	.0380025						
		7.44	7.44						
		1.0	1.0						
		209	209						
		2200.	2200.						
		-5.471	E 03-5.471	E 03					
		1	2						

5	1	0	1	0	1	1	1	1	1
1	0	1	0	1	1	1	1	1	1
2	1	0	1	1	1	1	1	1	1
3	1	0	1	1	1	1	1	1	1
4	1	0	1	1	1	1	1	1	1
5	0	1	1	0	1	1	1	1	1
FIN									

UNSYMMETRIC, ORTHOTROPIC, REINFORCED SHELL ANALYSIS WITH COUPLING OF AT MOST 29 SHELL REGIONS

STARS-28

AS OF NOVEMBER 1, 1972

NUMBER OF SEGMENTS = 4 NUMBER OF REGIONS = 4 NUMBER OF MATERIAL PROPERTY TABLES USED = 1 NUMBER OF PROBLEMS = 2
NUMBER OF BOUNDARY CONDITION MATRICES = 1

STABILITY HARMONICS (N) = 9 TO 11 INCREMENTED BY 1

THE GIVEN INPUT INDICATES THAT THE PREBUCKLING STATE WILL BE PROVIDED

CYLINDER PANEL STABILITY TEST

FOR INFORMATION CALL V. SVALBOMAS (516) 575-7701
P. OGILVIE

REGION NUMBER 1

THERE ARE 1 SEGMENTS AND 0 KINEMATIC LINKS WITHIN THIS REGION

SEGMENT NUMBER 1 SEGMENT CODE 31 SHUTTLE CYLINDER

DTAU DIFF STEP DELTA

.500000+00 .100000+03 .500000+01 .00000000

GEOMETRY INPUT VARIABLES

.710000+02 .00000000 .00000000

NUMBER OF TABLE COLUMNS = 2

STIF	ALUM	BLAN	STII	NOTH	T FREE =	NUMBER OF TABLE COLUMNS = 2
.00000	.00000	.00000	.00000	.00000	.0000	.00000
.10000+08	.00000	.00000	.00000	.00000	.0000	.00000
.10000+08	.00000	.00000	.00000	.00000	.0000	.00000
.30000+00	.00000	.00000	.00000	.00000	.0000	.00000
.00000	.00000	.00000	.00000	.00000	.0000	.00000
.00000	.00000	.00000	.00000	.00000	.0000	.00000
.38500+07	.00000	.00000	.00000	.00000	.0000	.00000
.10000+08	.00000	.00000	.00000	.00000	.0000	.00000
.10000+08	.00000	.00000	.00000	.00000	.0000	.00000
.00000	.00000	.00000	.00000	.00000	.0000	.00000
.00000	.00000	.00000	.00000	.00000	.0000	.00000

MATERIAL PROPERTY TABLE USED

.00000	.00000	.00000	.00000	.00000	.00000	.00000
.10000+08	.00000	.00000	.00000	.00000	.00000	.00000
.10000+08	.00000	.00000	.00000	.00000	.00000	.00000
.30000+00	.00000	.00000	.00000	.00000	.00000	.00000
.00000	.00000	.00000	.00000	.00000	.00000	.00000
.00000	.00000	.00000	.00000	.00000	.00000	.00000
.38500+07	.00000	.00000	.00000	.00000	.00000	.00000
.10000+08	.00000	.00000	.00000	.00000	.00000	.00000
.10000+08	.00000	.00000	.00000	.00000	.00000	.00000
.00000	.00000	.00000	.00000	.00000	.00000	.00000
.00000	.00000	.00000	.00000	.00000	.00000	.00000

TABLE ORDER PHI OR S VS. CROSSSECTION PROPERTIES

.100000+01	.600000+01
.0000000	.0000000
.0000000	.0000000
.100000+00	.100000+00
.0000000	.0000000
.5450000+00	.5450000+00
.0000000	.0000000
.3800250+01	.3800250+01
.0000000	.0000000
.7440000+01	.7440000+01
.1000000+01	.1000000+01
.9000000+01	.9000000+01

TABLE ORDER PHI OR S VS. INPUT STRESS RESULTANTS

.2200000+04	.2200000+04
.0000000	.0000000
.0000000	.0000000
.5471000+04	.5471000+04

MATRIX X AND Y (TRANSPPOSED) MAGIC OUTPUT

STIFFNESS COEFFICIENTS

	DELTA T1	DELTA Z1	DELTA R1	THETA 1	DELTA T2	DELTA Z2	DELTA R2	THETA 2
FORCT1	.3091516+08	.0000000	.0000000	.0000000	-.3091516+08	.0000000	.0000000	.0000000
FORCZ1	.0000000	.1002040+09	.9287349+06	-.7310779+07	.0000000	-.1002040+09	.9287349+06	.7310779+07
FORCR1	.0000000	.9287349+06	.2111123+07	-.5056305+07	.0000000	.9287349+06	-.1893110+07	-.4874360+07
HOME 1	.0000000	-.7310779+07	-.5056305+07	.1722997+08	.0000000	.7310779+07	.4874360+07	.7816511+07
FORCT2	-.3091516+08	.0000000	.0000000	.0000000	.3091516+08	.0000000	.0000000	.0000000
FORCZ2	.0000000	-.1002040+09	-.9287349+06	.7310779+07	.0000000	.1002040+09	-.9287349+06	-.7310779+07
FORCR2	.0000000	.9287349+06	-.1893110+07	.4874360+07	.0000000	-.9287349+06	.2111123+07	.5056305+07
HOME 2	.0000000	.7310779+07	-.4874360+07	.7816511+07	.0000000	-.7310779+07	.5056305+07	.1722997+08

SEGMENT SYMMETRY CHECK

	DELTA T1	DELTA Z1	DELTA R1	THETA 1	DELTA T2	DELTA Z2	DELTA R2	THETA 2
.3091516+08	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000
.1000000+01	.1002040+09	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000
.1000000+01	.1000000+01	.2111123+07	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000
.1000000+01	.1000000+01	.1000000+01	.1722997+08	.0000000	.0000000	.0000000	.0000000	.0000000
.1000000+01	.1000000+01	.1000000+01	.1000000+01	.3091516+08	.0000000	.0000000	.0000000	.0000000
.1000000+01	.1000000+01	.1000000+01	.1000000+01	.1000000+01	.1002040+09	.0000000	.0000000	.0000000
.1000000+01	.1000000+01	.1000000+01	.1000000+01	.1000000+01	.1000000+01	.2111123+07	.0000000	.0000000
.1000000+01	.1000000+01	.1000000+01	.1000000+01	.1000000+01	.1000000+01	.1000000+01	.1000000+01	.1722997+08

RZERO(I) = 7.100000+01 RZERO(J) = 7.100000+01

REGION NUMBER 2

THERE ARE 1 SEGMENTS AND 0 KINEMATIC LINKS WITHIN THIS REGION

SEGMENT NUMBER 1 SEGMENT CODE J1 SHUTTLE CYLINDER

DTAU DIFF STEP DELTA
 .500000+00 .700000-03 .500000-01 .000000

GEOMETRY INPUT VARIABLES

.710000+02 .000000 .000000

NUMBER OF TABLE COLUMNS = 2

STIFF ALUM BLAN ST11 NOTH Y FREE .000

MATERIAL PROPERTY TABLE USED

.00000	.00000	.00000	.00000	.00000	.00000	.00000	.00000	.00000	.00000
.10000+08	.00000	.00000	.00000	.00000	.00000	.00000	.00000	.00000	.00000
.10000+08	.00000	.00000	.00000	.00000	.00000	.00000	.00000	.00000	.00000
.30000+00	.00000	.00000	.00000	.00000	.00000	.00000	.00000	.00000	.00000
.00000	.00000	.00000	.00000	.00000	.00000	.00000	.00000	.00000	.00000
.38500+07	.00000	.00000	.00000	.00000	.00000	.00000	.00000	.00000	.00000
.10000+08	.00000	.00000	.00000	.00000	.00000	.00000	.00000	.00000	.00000
.10000+08	.00000	.00000	.00000	.00000	.00000	.00000	.00000	.00000	.00000
.00000	.00000	.00000	.00000	.00000	.00000	.00000	.00000	.00000	.00000
.00000	.00000	.00000	.00000	.00000	.00000	.00000	.00000	.00000	.00000

TABLE ORDER PHI OR S VS. CROSSSECTION PROPERTIES

.1000000+01	.6000000+01
.0000000	.0000000
.0000000	.0000000
.1000000+00	.1000000+00
.0000000	.0000000
-.5450000+00	-.5450000+00
.0000000	.0000000
.3800250-01	.3800250-01
.0000000	.0000000
.7440000+01	.7440000+01
.1000000+01	.1000000+01
.9000000+01	.9000000+01

TABLE ORDER PHI OR S VS. INPUT STRESS RESULTANTS

.2200000+04	.2200000+04
.0000000	.0000000
.0000000	.0000000
-.5471000+04	-.5471000+04

MATRIX X AND Y (TRANSPPOSED) - MAGIC OUTPUT

STIFFNESS COEFFICIENTS

	DELTA T1	DELTA Z1	DELTA R1	THETA 1	DELTA T2	DELTA Z2	DELTA R2	THETA 2
FORC1	.3091516+08	.0000000	.0000000	.0000000	-.3091516+08	.0000000	.0000000	.0000000
FORCZ1	.0000000	.1002040+09	.9287349+06	-.7310779+07	.0000000	-.1002040+09	.9287349+06	.7310779+07
FORCR1	.0000000	.9287349+06	.2111123+07	-.5056305+07	.0000000	-.9287349+06	-.1893110+07	-.4874360+07
MOME 1	.0000000	-.7310779+07	-.5056305+07	.1722997+08	.0000000	.7310779+07	.4874360+07	.7816511+07
FORC2	-.3091516+08	.0000000	.0000000	.0000000	.3091516+08	.0000000	.0000000	.0000000
FORCZ2	.0000000	-.1002040+09	-.9287349+06	.7310779+07	.0000000	.1002040+09	-.9287349+06	-.7310779+07
FORCR2	.0000000	.9287349+06	-.1893110+07	.4874360+07	.0000000	-.9287349+06	.2111123+07	.5056305+07
MOME 2	.0000000	.7310779+07	-.4874360+07	.7816511+07	.0000000	-.7310779+07	.5056305+07	-.1722997+08

SEGMENT SYMMETRY CHECK

.3091516+08	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000
.1000000+01	.1002040+09	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000
.1000000+01	.1000000+01	.2111123+07	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000
.1000000+01	.1000000+01	.1000000+01	.1722997+08	.0000000	.0000000	.0000000	.0000000	.0000000
.1000000+01	.1000000+01	.1000000+01	.1000000+01	.3091516+08	.0000000	.0000000	.0000000	.0000000
.1000000+01	.1000000+01	.1000000+01	.1000000+01	.1000000+01	.1002040+09	.0000000	.0000000	.0000000
.1000000+01	.1000000+01	.1000000+01	.1000000+01	.1000000+01	.1000000+01	.2111123+07	.0000000	.0000000
.1000000+01	.1000000+01	.1000000+01	.1000000+01	.1000000+01	.1000000+01	.1000000+01	.1722997+08	.0000000

RZERO(I) = 7.100000+01 RZERO(J) = 7.100000+01

REGION NUMBER 3

THERE ARE 1 SEGMENTS AND 0 KINEMATIC LINKS WITHIN THIS REGION

SEGMENT NUMBER 1 SEGMENT CODE 31 SHUTTLE CYLINDER DELTA

DTAU DIFF STEP .5000000+00 .1000000-03 .5000000-01 .0000000

GEOMETRY INPUT VARIABLES

.7100000+02 .0000000 .0000000

STIFF ALUM BLAN ST11 NOTH Y FREE .0000 NUMBER OF TABLE COLUMNS = 2

MATERIAL PROPERTY TABLE USED

.00000	.00000	.00000	.00000	.00000	.00000	.00000	.00000	.00000	.00000
.10000+08	.00000	.00000	.00000	.00000	.00000	.00000	.00000	.00000	.00000
.10000+08	.00000	.00000	.00000	.00000	.00000	.00000	.00000	.00000	.00000
.30000+00	.00000	.00000	.00000	.00000	.00000	.00000	.00000	.00000	.00000
.00000	.00000	.00000	.00000	.00000	.00000	.00000	.00000	.00000	.00000
.00000	.00000	.00000	.00000	.00000	.00000	.00000	.00000	.00000	.00000
.38500+07	.00000	.00000	.00000	.00000	.00000	.00000	.00000	.00000	.00000
.10000+08	.00000	.00000	.00000	.00000	.00000	.00000	.00000	.00000	.00000
.10000+08	.00000	.00000	.00000	.00000	.00000	.00000	.00000	.00000	.00000
.00000	.00000	.00000	.00000	.00000	.00000	.00000	.00000	.00000	.00000
.00000	.00000	.00000	.00000	.00000	.00000	.00000	.00000	.00000	.00000

TABLE ORDER PHI OR S VS. CROSSSECTION PROPERTIES

.1000000+01	.6000000+01
.0000000	.0000000
.0000000	.0000000
.1000000+00	.1000000+00
.0000000	.0000000
.5450000+00	-.5450000+00
.0000000	.0000000
.380250-01	.380250-01
.0000000	.0000000
.7440000+01	.7440000+01
.1000000+01	.1000000+01
.9000000-01	.9000000-01

TABLE ORDER PHI OR S VS. INPUT STRESS RESULTANTS

.2200000+04	.2200000+04
.0000000	.0000000
.0000000	.0000000
.5471000+04	-.5471000+04

MATRIX X AND Y (TRANSPPOSED) MAGIC OUTPUT

.0000000	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000
.0000000	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000
.0000000	.0000000	.8350032+03	.2169977+04	.2169977+04	.366259+04	.0000000	.0000000	.4781833+01	.8306464+00
.1000000+01	.0000000	.0000000	.0000000	.0000000	.0000000	.1443001-04	.0000000	.0000000	.0000000
.0000000	.1000000+01	-.2468605-01	-.5667599-01	-.5667599-01	.4781833+01	.0000000	.4668953-05	-.1478327-04	-.4651949-05
.0000000	.0000000	.8306464+00	.4781833+01	.4781833+01	.8306464+00	.0000000	.1478327-04	-.4359004-03	-.2579998-03
.0000000	.0000000	-.1057967+00	-.1057967+00	.8306464+00	.8306464+00	.0000000	.4851949-05	-.2579998-03	-.9927783-04

STIFFNESS COEFFICIENTS

	DELTA T1	DELTA Z1	DELTA R1	THETA 1	DELTA T2	DELTA Z2	DELTA R2	THETA 2
FORCT1	.3091516+08	.0000000	.0000000	.0000000	-.3091516+08	.0000000	.0000000	.0000000
FORCZ1	.0000000	.1002040+09	.9287349+06	-.7310779+07	.0000000	-.1002040+09	.9287349+06	.7310779+07
FORCR1	.0000000	.9287349+06	.2111123+07	-.5056305+07	.0000000	-.9287349+06	-.1893110+07	-.4874360+07
MOUE 1	.0000000	-.7310779+07	-.5056305+07	.1722997+08	.0000000	.7310779+07	.4874360+07	.7816511+07
F8RCT2	-.3091516+08	.0000000	.0000000	.0000000	.3091516+08	.0000000	.0000000	.0000000
FORCZ2	.0000000	-.1002040+09	-.9287349+06	.7310779+07	.0000000	.1002040+09	-.9287349+06	-.7310779+07
FORCR2	.0000000	.9287349+06	-.1893110+07	.4874360+07	.0000000	-.9287349+06	.2111123+07	.5056305+07
MOUE 2	.0000000	.7310779+07	-.4874360+07	.7816511+07	.0000000	-.7310779+07	.5056305+07	.1722997+08

SEGMENT SYMMETRY CHECK

.3091516+08	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000
.1000000+01	.1002040+09	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000
.1000000+01	.1000000+01	.2111123+07	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000
.1000000+01	.1000000+01	.1000000+01	.1722997+08	.0000000	.0000000	.0000000	.0000000	.0000000
.1000000+01	.1000000+01	.1000000+01	.1000000+01	.3091516+08	.0000000	.0000000	.0000000	.0000000
.1000000+01	.1000000+01	.1000000+01	.1000000+01	.1000000+01	.1002040+09	.0000000	.0000000	.0000000
.1000000+01	.1000000+01	.1000000+01	.1000000+01	.1000000+01	.1000000+01	.2111123+07	.0000000	.0000000
.1000000+01	.1000000+01	.1000000+01	.1000000+01	.1000000+01	.1000000+01	.1000000+01	.1000000+01	.1722997+08

RZERO(I) = 7.100000+01 RZERO(J) = 7.100000+01

REGION NUMBER 4

THERE ARE 1 SEGMENTS AND 6 KINEMATIC LINKS WITHIN THIS REGION

9

SEGMENT NUMBER 1 SEGMENT CODE 31 SHUTTLE CYLINDER
 DTAU DIFF STEP DELTA
 .5000000+00 .1000000-03 .5000000-01 .0000000

GEOMETRY INPUT VARIABLES
 .7100000+02 .0000000 .0000000

NUMBER OF TABLE COLUMNS = 2

STIF	ALUM	BLAN	STII	NOTH	T FREE	NUMBER OF TABLE COLUMNS
.00000	.00000	.00000	.00000	.00000	.000	2
.10000+08	.00000	.00000	.00000	.00000	.000	2
.10000+08	.00000	.00000	.00000	.00000	.000	2
.30000+00	.00000	.00000	.00000	.00000	.000	2
.00000	.00000	.00000	.00000	.00000	.000	2
.00000	.00000	.00000	.00000	.00000	.000	2
.38500+07	.00000	.00000	.00000	.00000	.000	2
.10000+08	.00000	.00000	.00000	.00000	.000	2
.10000+08	.00000	.00000	.00000	.00000	.000	2
.00000	.00000	.00000	.00000	.00000	.000	2
.00000	.00000	.00000	.00000	.00000	.000	2

MATERIAL PROPERTY TABLE USED

.00000	.00000	.00000	.00000	.00000	.00000	.00000
.00000	.00000	.00000	.00000	.00000	.00000	.00000
.10000+08	.00000	.00000	.00000	.00000	.00000	.00000
.30000+00	.00000	.00000	.00000	.00000	.00000	.00000
.00000	.00000	.00000	.00000	.00000	.00000	.00000
.00000	.00000	.00000	.00000	.00000	.00000	.00000
.38500+07	.00000	.00000	.00000	.00000	.00000	.00000
.10000+08	.00000	.00000	.00000	.00000	.00000	.00000
.10000+08	.00000	.00000	.00000	.00000	.00000	.00000
.00000	.00000	.00000	.00000	.00000	.00000	.00000
.00000	.00000	.00000	.00000	.00000	.00000	.00000

TABLE ORDER PHI OR S VS. CROSSSECTION PROPERTIES

.1000000+01	.6000000+01
.0000000	.0000000
.0000000	.0000000
.1000000+00	.1000000+00
.0000000	.0000000
.5450000+00	.5450000+00
.0000000	.0000000
.3800250-01	.3800250-01
.0000000	.0000000
.7440000+01	.7440000+01
.1000000+01	.1000000+01
.9000000-01	.9000000-01

TABLE ORDER PHI OR S VS. INPUT STRESS RESULTANTS

.2200000+04	.2200000+04
.0000000	.0000000
.0000000	.0000000
.5471000+04	.5471000+04

MATRIX X AND Y (TRANSPPOSED) MAGIC OUTPUT

STIFFNESS COEFFICIENTS

	DELTA T1	DELTA Z1	DELTA R1	THETA 1	DELTA T2	DELTA Z2	DELTA R2	THETA 2
FORCT1	.3091516+08	.0000000	.0000000	.0000000	-.3091516+08	.0000000	.0000000	.0000000
FORCZ1	.0000000	.1002040+09	.9287349+06	-.7310779+07	.0000000	-.1002040+09	.9287349+06	.7310779+07
FORCR1	.0000000	.9287349+06	.2111123+07	-.5056305+07	.0000000	-.9287349+06	-.1893110+07	-.4874360+07
HOME 1	.0000000	-.7310779+07	-.5056305+07	.1722997+08	.0000000	.7310779+07	.4874360+07	.7816511+07
FORCT2	-.3091516+08	.0000000	.0000000	.0000000	.3091516+08	.0000000	.0000000	.0000000
FORCZ2	.0000000	-.1002040+09	-.9287349+06	.7310779+07	.0000000	.1002040+09	-.9287349+06	-.7310779+07
FORCR2	.0000000	.9287349+06	-.1893110+07	.4874360+07	.0000000	-.9287349+06	.2111123+07	.5056305+07
HOME 2	.0000000	.7310779+07	-.4874360+07	.7816511+07	.0000000	-.7310779+07	.5056305+07	.1722997+08

SEGMENT SYMMETRY CHECK

	DELTA T1	DELTA Z1	DELTA R1	THETA 1	DELTA T2	DELTA Z2	DELTA R2	THETA 2
.3091516+08	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000
.1000000+01	.1002040+09	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000
.1000000+01	.1000000+01	.2111123+07	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000
.1000000+01	.1000000+01	.1000000+01	.1722997+08	.0000000	.0000000	.0000000	.0000000	.0000000
.1000000+01	.1000000+01	.1000000+01	.1000000+01	.3091516+08	.0000000	.0000000	.0000000	.0000000
.1000000+01	.1000000+01	.1000000+01	.1000000+01	.1000000+01	.1002040+09	.0000000	.0000000	.0000000
.1000000+01	.1000000+01	.1000000+01	.1000000+01	.1000000+01	.1000000+01	.2111123+07	.0000000	.0000000
.1000000+01	.1000000+01	.1000000+01	.1000000+01	.1000000+01	.1000000+01	.1000000+01	.1000000+01	.1722997+08

RZERO(I) = 7.100000+01

RZERO(J) = 7.100000+01

INPUT DATA FOR REGION COUPLING

NUMBER OF REGION JOINTS 5 NUMBER OF KINEMATIC LINKS 0

REGION JOINT(I) JOINT(J)

1	1	2
2	2	3
3	3	4
4	4	5

BOUNDARY CONDITIONS

JOINT	DELTA T	DELTA Z	DELTA R	THETA	ANGLE ALPHA
1	0	1	0	1	.0000000
2	1	1	1	1	.0000000
3	1	0	1	1	.0000000
4	1	1	1	1	.0000000
5	0	1	0	1	.0000000

THE REDUCED STIFFNESS MATRIX

ROW	COLUMN 1	COLUMN 2	COLUMN 3	COLUMN 4	COLUMN 5	COLUMN 6	COLUMN 7	COLUMN 8
1	.1002040+09	-.7310779+07	.0000000	-.1002040+09	.9287349+06	.7310779+07	.0000000	.0000000
2	-.7310779+07	.1722997+08	.0000000	.7310779+07	.4874360+07	.7816511+07	.0000000	.0000000
3	.0000000	.0000000	.6183032+08	.0000000	.0000000	.0000000	-.3091516+08	.0000000
4	-.1002040+09	.7310779+07	.0000000	.2004081+09	.0000000	.61462156+08	.0000000	.9287349+06
5	.9287349+06	.4874360+07	.0000000	.0000000	.4222246+07	.0000000	.0000000	-.1893110+07
6	.7310779+07	.7816511+07	.0000000	-.1462156+08	.0000000	.3445993+08	.0000000	.4874360+07
7	.0000000	.0000000	-.3091516+08	.0000000	.0000000	.0000000	.6183032+08	.0000000
8	.0000000	.0000000	.0000000	.9287349+06	-.1893110+07	.4874360+07	.0000000	.4222246+07
9	.0000000	.0000000	.0000000	.7310779+07	-.4874360+07	.7816511+07	.0000000	.0000000
10	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000	-.3091516+08	.0000000
11	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000	-.9287349+06
12	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000
13	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000	-.1893110+07
14	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000	-.4874360+07
15	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000
ROW	COLUMN 9	COLUMN 10	COLUMN 11	COLUMN 12	COLUMN 13	COLUMN 14	COLUMN 15	
1	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000	
2	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000	
3	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000	
4	.7310779+07	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000	
5	-.4874360+07	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000	
6	.7816511+07	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000	
7	.0000000	-.3091516+08	.0000000	.0000000	.0000000	.0000000	.0000000	
8	.0000000	.0000000	.9287349+06	-.1893110+07	-.4874360+07	.0000000	.0000000	
9	.3445993+08	.0000000	.7310779+07	.4874360+07	.7816511+07	.0000000	.0000000	
10	.0000000	.6183032+08	.0000000	.0000000	.0000000	.0000000	.0000000	
11	.7310779+07	.0000000	.2004081+09	.0000000	.0000000	-.1002040+09	.7310779+07	
12	.4874360+07	.0000000	.0000000	.4222246+07	.0000000	-.9287349+06	-.4874360+07	
13	.7816511+07	.0000000	-.1462156+08	.0000000	.3445993+08	.7310779+07	.7816511+07	
14	.0000000	.0000000	-.1002040+09	.0000000	.7310779+07	.1002040+09	-.7310779+07	
15	.0000000	.0000000	.7310779+07	-.4874360+07	.7816511+07	-.7310779+07	.1722997+08	

UNIVERSITY OF CALIFORNIA

REGION NUMBER 1

THERE ARE 1 SEGMENTS AND 0 KINEMATIC LINKS WITHIN THIS REGION

HARMONIC (N) = 9

REGION NUMBER 2

THERE ARE 1 SEGMENTS AND 0 KINEMATIC LINKS WITHIN THIS REGION

HARMONIC (N) = 9

STIFFNESS COEFFICIENTS

	DELTA T1	DELTA Z1	DELTA R1	THETA 1	DELTA T2	DELTA Z2	DELTA R2	THETA 2
FORCT1	.4082373+08	-.2819903+07	.7582015+06	.2857693+06	-.2469574+08	-.1640772+08	.1036468+07	.1759771+07
FORCZ1	-.2819903+07	.1011059+09	.8454511+06	-.7345008+07	.1640772+08	-.9496028+08	.6623936+06	.6933264+07
FORCR1	.7582015+06	.8454511+06	.2136387+07	-.5076704+07	.1036468+07	-.6623936+06	-.1898063+07	-.4879049+07
MOME 1	.2857693+06	-.7345008+07	-.5076704+07	.1725646+08	-.1759771+07	.6933264+07	.4879049+07	.7820319+07
FORCT2	-.2469574+08	.1640772+08	.1036468+07	-.1759771+07	.4082373+08	.2819903+07	.7582015+06	-.2857693+06
FORCZ2	-.1640772+08	-.9496028+08	-.6623936+06	.6933264+07	.2819903+07	.1011059+09	-.8454511+06	-.7345008+07
FORCR2	.1036468+07	.6623936+06	-.1898063+07	.4879049+07	.7582015+06	-.8454511+06	.2136387+07	.5076704+07
MOME 2	.1759771+07	.6933264+07	.4879049+07	.7820319+07	-.2857693+06	-.7345008+07	.5076704+07	.1725646+08

SEGMENT SYMMETRY CHECK

.4082373+08	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000
.1000000+01	.1011059+09	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000
.1000000+01	.1000000+01	.2136387+07	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000
.1000000+01	.1000000+01	.1000000+01	.1725646+08	.0000000	.0000000	.0000000	.0000000	.0000000
.1000000+01	.1000000+01	.1000000+01	.1000000+01	.4082373+08	.0000000	.0000000	.0000000	.0000000
.1000000+01	.1000000+01	.1000000+01	.1000000+01	.1000000+01	.1011059+09	.0000000	.0000000	.0000000
.1000000+01	.1000000+01	.1000000+01	.1000000+01	.1000000+01	.1000000+01	.2136387+07	.0000000	.0000000
.1000000+01	.1000000+01	.1000000+01	.1000000+01	.1000000+01	.1000000+01	.1000000+01	.1000000+01	.1725646+08

RZERO(I) = 7.100000+01 RZERO(J) = 7.100000+01

REGION NUMBER 3

THERE ARE 1 SEGMENTS AND 0 KINEMATIC LINKS WITHIN THIS REGION

HARMONIC (N) = 9

STIFFNESS COEFFICIENTS

	DELTA T1	DELTA Z1	DELTA R1	THETA 1	DELTA T2	DELTA Z2	DELTA R2	THETA 2
FORCT1	.4082373+08	-.2819903+07	.7582015+06	.2857693+06	-.2469574+08	-.1640772+08	.1036468+07	.1759771+07
FORCZ1	-.2819903+07	.1011059+09	.8454511+06	-.7345008+07	.1640772+08	-.9496028+08	.6623936+06	.6933264+07
FORCRI	.7582015+06	.8454511+06	.2136387+07	-.5076704+07	.1036468+07	-.6623936+06	-.1898063+07	-.4879049+07
HOME 1	.2857693+06	-.7345008+07	-.5076704+07	.1725646+08	-.1759771+07	.6933264+07	.4879049+07	.7820319+07
FORCT2	-.2469574+08	.1640772+08	.1036468+07	-.1759771+07	.4082373+08	.2819903+07	.7582015+06	-.2857693+06
FORCZ2	-.1640772+08	-.9496028+08	-.6623936+06	.6933264+07	.2819903+07	.1011059+09	-.8454511+06	-.7345008+07
FORCRI2	.1036468+07	.6623936+06	-.1898063+07	.4879049+07	.7582015+06	-.8454511+06	.2136387+07	.5076704+07
HOME 2	.1759771+07	.6933264+07	.4879049+07	.7820319+07	-.2857693+06	-.7345008+07	.5076704+07	.1725646+08

SEGMENT SYMMETRY CHECK

.4082373+08	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000
.1000000+01	.1011059+09	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000
.1000000+01	.1000000+01	.2136387+07	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000
.1000000+01	.1000000+01	.1000000+01	.1725646+08	.0000000	.0000000	.0000000	.0000000	.0000000
.1000000+01	.1000000+01	.1000000+01	.1000000+01	.4082373+08	.0000000	.0000000	.0000000	.0000000
.1000000+01	.1000000+01	.1000000+01	.1000000+01	.1000000+01	.1011059+09	.0000000	.0000000	.0000000
.1000000+01	.1000000+01	.1000000+01	.1000000+01	.1000000+01	.1000000+01	.2136387+07	.0000000	.0000000
.1000000+01	.1000000+01	.1000000+01	.1000000+01	.1000000+01	.1000000+01	.1000000+01	.1000000+01	.1725646+08

RZERO(1) = 7.100000+01 RZERO(2) = 7.100000+01

REGION NUMBER 4

THERE ARE 1 SEGMENTS AND 0 KINEMATIC LINKS WITHIN THIS REGION

HARMONIC (N) = 9

STIFFNESS COEFFICIENTS

	DELTA T1	DELTA Z1	DELTA R1	THETA 1	DELTA T2	DELTA Z2	DELTA R2	THETA 2
FORCT1	.0082373+08	-.2819903+07	.7582015+06	.2857693+06	-.2469574+08	-.1640772+08	.1036468+07	.1759771+07
FORCZ1	-.2819903+07	.1011059+09	.8454511+06	-.7345008+07	.1640772+08	-.9496028+08	.6223936+06	.6933264+07
FORCR1	.7582015+06	.8454511+06	.2136387+07	-.5076704+07	.1036468+07	-.6623936+06	-.1898063+07	-.4879049+07
MONM 1	.2857693+06	-.7345008+07	-.5076704+07	.1725646+08	-.1759771+07	.6933264+07	.4879049+07	.7820319+07
FORCT2	-.2469574+08	.1640772+08	.1036468+07	-.1759771+07	.4062373+08	.2819903+07	.7582015+06	-.2857693+06
FORCZ2	-.1640772+08	-.9496028+08	-.6623936+06	.6933264+07	.2819903+07	.1011059+09	-.8454511+06	-.7345008+07
FORCR2	.1036468+07	.6623936+06	-.1898063+07	.4879049+07	.7582015+06	-.8454511+06	.2136387+07	.5076704+07
MONM 2	.1759771+07	.6933264+07	-.4879049+07	.7820319+07	-.2857693+06	-.7345008+07	.5076704+07	.1725646+08

SEGMENT SYMMETRY CHECK

.4082373+08	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000	
.1000000+01	.1011059+09	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000	
.1000000+01	.1000000+01	.2136387+07	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000	
.1000000+01	.1000000+01	.1000000+01	.1725646+08	.0000000	.0000000	.0000000	.0000000	.0000000	
.1000000+01	.1000000+01	.1000000+01	.1000000+01	.4062373+08	.0000000	.0000000	.0000000	.0000000	
.1000000+01	.1000000+01	.1000000+01	.1000000+01	.1000000+01	.1011059+09	.0000000	.0000000	.0000000	
.1000000+01	.1000000+01	.1000000+01	.1000000+01	.1000000+01	.1000000+01	.2136387+07	.0000000	.0000000	
.1000000+01	.1000000+01	.1000000+01	.1000000+01	.1000000+01	.1000000+01	.1000000+01	.1000000+01	.1725646+08	
RZEROT11	7.100000+01	RZEROT12	7.100000+01	RZEROT13	7.100000+01	RZEROT14	7.100000+01	RZEROT15	7.100000+01

THE REDUCED STIFFNESS MATRIX

ROW	COLUMN 1	COLUMN 2	COLUMN 3	COLUMN 4	COLUMN 5	COLUMN 6	COLUMN 7	COLUMN 8
1	.1011059+09	-.7345008+07	.1640772+08	-.9496028+08	.6623936+06	.6933264+07	.0000000	.0000000
2	-.7345008+07	.1725646+08	-.1759771+07	.6933264+07	.4879049+07	.7820319+07	.0000000	.0000000
3	.1640772+08	-.1759771+07	.8164746+08	.0000000	.1516403+07	.0000000	.1640772+08	.1036468+07
4	-.9496028+08	.6933264+07	.0000000	.2022118+09	.0000000	-.1469002+08	.1640772+08	.6623936+06
5	.6623936+06	.4879049+07	.1516403+07	.0000000	.4272774+07	.0000000	.1036468+07	-.1698063+07
6	.6933264+07	.7820319+07	.0000000	-.1469002+08	.0000000	.3451293+08	-.1759771+07	.4879049+07
7	.0000000	.0000000	-.2469574+08	.1640772+08	.1036468+07	.1759771+07	.8164746+08	.1516403+07
8	.0000000	.0000000	.1036468+07	.6623936+06	-.1898063+07	.4879049+07	.1516403+07	.4272774+07
9	.0000000	.0000000	.1759771+07	.6933264+07	-.4879049+07	.7820319+07	.0000000	.0000000
10	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000	-.2469574+08	.1036468+07
11	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000	-.1640772+08	-.6623936+06
12	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000	.1036468+07	-.1898063+07
13	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000	.1759771+07	-.4879049+07
14	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000
15	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000
ROW	COLUMN 9	COLUMN 10	COLUMN 11	COLUMN 12	COLUMN 13	COLUMN 14	COLUMN 15	
1	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000	
2	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000	
3	.1759771+07	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000	
4	.6933264+07	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000	
5	-.4879049+07	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000	
6	.7820319+07	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000	
7	.0000000	-.2469574+08	-.1640772+08	.1036468+07	.1759771+07	.0000000	.0000000	
8	.0000000	.1036468+07	-.6623936+06	-.1898063+07	.4879049+07	.0000000	.0000000	
9	.3451293+08	-.1759771+07	.6933264+07	.4879049+07	.7820319+07	.0000000	.0000000	
10	-.1759771+07	.8164746+08	.0000000	.1516403+07	.0000000	-.1469002+08	.1759771+07	
11	.6933264+07	.0000000	.2022118+09	.0000000	-.1469002+08	-.9496028+08	.6933264+07	
12	.4879049+07	.1516403+07	.0000000	.4272774+07	.0000000	-.6623936+06	-.4879049+07	
13	.7820319+07	.0000000	-.1469002+08	.0000000	.3451293+08	.6933264+07	.7820319+07	
14	.0000000	-.1640772+08	-.9496028+08	-.6623936+06	.6933264+07	-.7345008+07	-.7345008+07	
15	.0000000	.1759771+07	.6933264+07	-.4879049+07	.7820319+07	-.7345008+07	.1725646+08	

HARMONIC (N) = 9

ESTIMATE 1

REGION NUMBER 1

THERE ARE 1 SEGMENTS AND 0 KINEMATIC LINKS WITHIN THIS REGION

HARMONIC (N) = 9

ESTIMATE 1

STIFFNESS COEFFICIENTS

	DELTA T1	DELTA Z1	DELTA R1	THETA 1	DELTA T2	DELTA Z2	DELTA R2	THETA 2
F0RCT1	.4082121+08	-.2822093+07	.7591715+06	.2390913+06	-.2469821+08	-.1640554+08	.1034846+07	.1799951+07
F0RCZ1	-.2822093+07	.1011040+09	.8452122+06	-.7383312+07	.1640554+08	.9495836+08	.6620606+06	.6971333+07
F0RCR1	.7591715+06	.8452122+06	.1548558+07	-.4832761+07	.1034846+07	-.6620606+06	-.1310319+07	-.4623762+07
MOME 1	.2390913+06	-.7383312+07	-.4832761+07	.1556845+08	-.1799951+07	.6971333+07	.4623762+07	.8257896+07
F0RCT2	-.2469821+08	.1640554+08	.1034846+07	-.1799951+07	.4082121+08	.2822093+07	.7591715+06	-.2390913+06
F0RCZ2	-.1640554+08	-.9495836+08	.6620606+06	.6971333+07	.2822093+07	.1011040+09	-.8452122+06	-.7383312+07
F0RCR2	.1034846+07	.6620606+06	-.1310319+07	.4623762+07	.7591715+06	-.8452122+06	.1548558+07	.4832761+07
MOME 2	.1799951+07	.6971333+07	.4623762+07	.8257896+07	-.2390913+06	-.7383312+07	.4832761+07	.1556845+08

SEGMENT SYMMETRY CHECK

.4082121+08	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000
.1000000+01	.1011040+09	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000
.1000000+01	.1000000+01	.1548558+07	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000
.1000000+01	.1000000+01	.1000000+01	.1556845+08	.0000000	.0000000	.0000000	.0000000	.0000000
.1000000+01	.1000000+01	.1000000+01	.1000000+01	.4082121+08	.0000000	.0000000	.0000000	.0000000
.1000000+01	.1000000+01	.1000000+01	.1000000+01	.1000000+01	.1011040+09	.0000000	.0000000	.0000000
.1000000+01	.1000000+01	.1000000+01	.1000000+01	.1000000+01	.1000000+01	.1548558+07	.0000000	.0000000
.1000000+01	.1000000+01	.1000000+01	.1000000+01	.1000000+01	.1000000+01	.1000000+01	.1000000+01	.1556845+08

RZERO(I) = 7.100000+01 RZERO(J) = 7.100000+01

REGION NUMBER 2

THERE ARE 1 SEGMENTS AND 0 KINEMATIC LINKS WITHIN THIS REGION

HARMONIC (N) = 9

ESTIMATE 1

STIFFNESS COEFFICIENTS

	DELTA T1	DELTA Z1	DELTA R1	THETA 1	DELTA T2	DELTA Z2	DELTA R2	THETA 2
FORCT1	.4082121+08	-.2822093+07	.7591715+06	.2390913+06	-.2469821+08	-.1640554+08	.1034846+07	.1799951+07
FORCZ1	-.2822093+07	.1011040+09	.8452122+06	-.7383312+07	.1640554+08	-.9495836+08	.6620606+06	.6971333+07
FORCR1	.7591715+06	.8452122+06	.1548558+07	-.4832761+07	.1034846+07	-.6620606+06	-.1310319+07	-.4623762+07
HOME 1	.2390913+06	-.7383312+07	-.4832761+07	.1556845+08	-.1799951+07	.6971333+07	.4623762+07	.8257896+07
F0RCT2	-.2469821+08	.1640554+08	.1034846+07	-.1799951+07	.4082121+08	.2822093+07	.7591715+06	-.2390913+06
FORCZ2	-.1640554+08	.9495836+08	-.6620606+06	.6971333+07	.2822093+07	.1011040+09	-.8452122+06	.7383312+07
FORCR2	.1034846+07	.6620606+06	-.1310319+07	.4623762+07	.7591715+06	.8452122+06	.1548558+07	.4832761+07
HOME 2	.1799951+07	.6971333+07	-.4623762+07	.8257896+07	-.2390913+06	-.7383312+07	.4832761+07	.1556845+08

SEGMENT SYMMETRY CHECK

.4082121+08	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000
.1000000+01	.1011040+09	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000
.1000000+01	.1000000+01	.1548558+07	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000
.1000000+01	.1000000+01	.1000000+01	.1556845+08	.0000000	.0000000	.0000000	.0000000	.0000000
.1000000+01	.1000000+01	.1000000+01	.1000000+01	.4082121+08	.0000000	.0000000	.0000000	.0000000
.1000000+01	.1000000+01	.1000000+01	.1000000+01	.1000000+01	.1011040+09	.0000000	.0000000	.0000000
.1000000+01	.1000000+01	.1000000+01	.1000000+01	.1000000+01	.1000000+01	.1000000+01	.1548558+07	.0000000
.1000000+01	.1000000+01	.1000000+01	.1000000+01	.1000000+01	.1000000+01	.1000000+01	.1000000+01	.1556845+08

RZERO(I) = 7.100000+01 RZERO(J) = 7.100000+01

REGION NUMBER 3

THERE ARE 1 SEGMENTS AND 0 KINEMATIC LINKS WITHIN THIS REGION

HARMONIC (N) = 9

ESTIMATE 1

STIFFNESS COEFFICIENTS

	DELTA T1	DELTA Z1	DELTA R1	THETA 1	DELTA T2	DELTA Z2	DELTA R2	THETA 2
FORC1	.4082121+08	-.2822093+07	.7591715+06	.2390913+06	-.2459821+08	-.1640554+08	.1034846+07	.1799951+07
FORC2	-.2822093+07	.1011040+09	.8452122+06	-.7383312+07	.1640554+08	.9495836+08	.6620606+06	.6971333+07
FORC3	.7591715+06	.8452122+06	.1548558+07	-.4832761+07	.1034846+07	-.6620606+06	-.1310319+07	-.4623762+07
MOM1	.2390913+06	-.7383312+07	-.4832761+07	.1556885+08	-.1799951+07	.6971333+07	.4623762+07	.8257896+07
FORC2	-.2459821+08	.1640554+08	.1034846+07	-.1799951+07	.4082121+08	.2822093+07	.7591715+06	-.2390913+06
FORC2	-.1640554+08	-.9495836+08	-.6620606+06	.6971333+07	.2822093+07	.1011040+09	-.8452122+06	-.7383312+07
FORC2	.1034846+07	.6620606+06	-.1310319+07	.4623762+07	.7591715+06	-.8452122+06	.1548558+07	.4832761+07
MOM2	.1799951+07	.6971333+07	-.4623762+07	.8257896+07	-.2390913+06	-.7383312+07	.4832761+07	.1556885+08

SEGMENT SYMMETRY CHECK

.4082121+08	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000
.1000000+01	.1011040+09	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000
.1000000+01	.1000000+01	.1548558+07	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000
.1000000+01	.1000000+01	.1000000+01	.1556885+08	.0000000	.0000000	.0000000	.0000000	.0000000
.1000000+01	.1000000+01	.1000000+01	.1000000+01	.4082121+08	.0000000	.0000000	.0000000	.0000000
.1000000+01	.1000000+01	.1000000+01	.1000000+01	.1000000+01	.1011040+09	.0000000	.0000000	.0000000
.1000000+01	.1000000+01	.1000000+01	.1000000+01	.1000000+01	.1000000+01	.1548558+07	.0000000	.0000000
.1000000+01	.1000000+01	.1000000+01	.1000000+01	.1000000+01	.1000000+01	.1000000+01	.1556885+08	.0000000

RFORC1) = 7.100000+01 RZERO(U) = 7.100000+01

REGION NUMBER 4

THERE ARE 1 SEGMENTS AND 0 KINEMATIC LINKS WITHIN THIS REGION

HARMONIC (N) = 9

ESTIMATE 1

STIFFNESS COEFFICIENTS

	DELTA T1	DELTA Z1	DELTA R1	THETA 1	DELTA T2	DELTA Z2	DELTA R2	THETA 2
FORCT1	.4082121+08	-.2822093+07	.7591715+06	.2390913+06	-.2469821+08	-.1640554+08	.1034846+07	.1799951+07
FORCZ1	-.2822093+07	.1011040+09	.8452122+06	-.7383312+07	.1640554+08	-.9495836+08	.6620606+06	.6971333+07
FORCR1	.7591715+06	.8452122+06	.1548558+07	-.4832761+07	.1034846+07	-.6620606+06	-.1310319+07	-.4623762+07
MOME 1	.2390913+06	-.7383312+07	-.4832761+07	.1556845+08	-.1799951+07	.6971333+07	.4623762+07	.8257896+07
FORCT2	-.2469821+08	.1640554+08	.1034846+07	-.1799951+07	.4082121+08	.2822093+07	.7591715+06	-.2390913+06
FORCZ2	-.1640554+08	-.9495836+08	-.6620606+06	.6971333+07	.2822093+07	.1011040+09	-.8452122+06	-.7383312+07
FORCR2	.1034846+07	.6620606+06	-.1310319+07	.4623762+07	.7591715+06	-.8452122+06	.1548558+07	.4832761+07
MOME 2	.1799951+07	.6971333+07	-.4623762+07	.8257896+07	-.2390913+06	-.7383312+07	.4832761+07	.1556845+08

SEGMENT SYMMETRY CHECK

.4082121+08	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000
.1000000+01	.1011040+09	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000
.1000000+01	.1000000+01	.1548558+07	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000
.1000000+01	.1000000+01	.1000000+01	.1556845+08	.0000000	.0000000	.0000000	.0000000	.0000000
.1000000+01	.1000000+01	.1000000+01	.1000000+01	.4082121+08	.0000000	.0000000	.0000000	.0000000
.1000000+01	.1000000+01	.1000000+01	.1000000+01	.1000000+01	.1011040+09	.0000000	.0000000	.0000000
.1000000+01	.1000000+01	.1000000+01	.1000000+01	.1000000+01	.1000000+01	.1548558+07	.0000000	.0000000
.1000000+01	.1000000+01	.1000000+01	.1000000+01	.1000000+01	.1000000+01	.1000000+01	.1000000+01	.1556845+08

RZERO(I) = 7.100000+01 RZERO(J) = 7.100000+01

THE REDUCED STIFFNESS MATRIX

ROW	COLUMN 1	COLUMN 2	COLUMN 3	COLUMN 4	COLUMN 5	COLUMN 6	COLUMN 7	COLUMN 8
1	.1011040+09	-.7383311+07	.1640554+08	-.9495836+08	.6620606+06	.6971333+07	.0000000	.0000000
2	-.7383311+07	.1556845+08	.1799951+07	.6971333+07	.4623762+07	.8257896+07	.0000000	.0000000
3	.1640554+08	.1799951+07	.8164243+08	.0000000	.1518343+07	.0000000	-.24469821+08	.1034846+07
4	-.9495836+08	.6971333+07	.0000000	.2022080+09	.0000000	-.1476662+08	.1640554+08	.6620606+06
5	.6620606+06	.4623762+07	.1518343+07	.0000000	.3097115+07	.0000000	.1034846+07	-.1310319+07
6	.6971333+07	.8257896+07	.0000000	-.1476662+08	.0000000	.3113690+08	-.1799951+07	.4623762+07
7	.0000000	.0000000	-.24469821+08	.1440554+08	.1034846+07	-.1799951+07	.8164243+08	.1518343+07
8	.0000000	.0000000	.1034846+07	.6620606+06	-.1310319+07	.4623762+07	.1518343+07	.3097115+07
9	.0000000	.0000000	.1799951+07	.6971333+07	-.1623762+07	.8257896+07	.0000000	.0000000
10	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000	-.24469821+08	.1034846+07
11	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000	-.1640554+08	-.6620606+06
12	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000	.1034846+07	-.1310319+07
13	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000	.1799951+07	.0000000
14	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000
15	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000

ROW	COLUMN 9	COLUMN 10	COLUMN 11	COLUMN 12	COLUMN 13	COLUMN 14	COLUMN 15
1	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000
2	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000
3	.1799951+07	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000
4	.6971333+07	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000
5	-.4623762+07	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000
6	.8257896+07	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000
7	.0000000	-.24469821+08	.1640554+08	.1034846+07	.1799951+07	.0000000	.0000000
8	.0000000	.1034846+07	-.6620606+06	-.1310319+07	-.4623762+07	.0000000	.0000000
9	.3113690+08	-.1799951+07	.6971333+07	.4623762+07	.8257896+07	.0000000	.0000000
10	-.1799951+07	.8164243+08	.0000000	.1518343+07	.0000000	-.1640554+08	.1799951+07
11	.6971333+07	.0000000	.2022080+09	.0000000	-.1476662+08	.9495836+08	.6971333+07
12	.4623762+07	.1518343+07	.0000000	.3097115+07	.0000000	-.6620606+06	-.4623762+07
13	.8257896+07	.0000000	-.1476662+08	.0000000	.3113690+08	.6971333+07	.8257896+07
14	.0000000	-.1640554+08	.1440554+08	-.6620606+06	.6971333+07	.1011040+09	-.7383311+07
15	.0000000	.1799951+07	.6971333+07	-.4623762+07	.8257896+07	-.7383311+07	.1556845+08

REGION NUMBER 1

THERE ARE 1 SEGMENTS AND 0 KINEMATIC LINKS WITHIN THIS REGION

SEGMENT NUMBER 1 SEGMENT CODE 31 SHUTTLE CYLINDER

PHI OR S	VECTOR 1			VECTOR 2			OMEGA THETA	W	V	OMEGA THETA
	U	V	W	U	V	W				
0.000000+00	0.000000	6.3079599-07	0.000000	0.000000	-2.02208-04	0.000000	-2.7949664-05	0.000000	1.91715-04	1.88370-04
1.550000+00	-8.0140617-06	6.2709203-07	-1.1107153-04	-2.01433-04	2.4049799+06	2.4049799+06	2.7691998-05	1.0477418-04	1.88370-04	1.88370-04
2.050000+00	-1.5249522-05	6.1805330-07	-2.1132204-04	-1.99399-04	4.5350166+06	4.5350166+06	2.7086768-05	1.9721006-04	1.80641-04	1.80641-04
2.550000+00	-2.2391421-05	6.0379725-07	-3.1026197-04	-1.96113-04	6.5556748+06	6.5556748+06	-2.6142827-05	2.8469853-04	1.86616-04	1.86616-04
3.050000+00	-2.9395952-05	5.8460346-07	-4.0724043-04	-1.91598-04	8.4211038+06	8.4211038+06	-2.4882046-05	3.6515239-04	1.52552-04	1.52552-04
3.550000+00	-3.6220186-05	5.6084601-07	-5.0165960-04	-1.85882-04	1.0081876+05	1.0081876+05	-2.3333427-05	4.3663399-04	1.32790-04	1.32790-04
4.050000+00	-4.2822347-05	5.3298785-07	-5.9292874-04	-1.79005-04	1.1499029+05	1.1499029+05	-2.1532561-05	4.9739574-04	1.07749-04	1.07749-04
4.550000+00	-4.9162070-05	5.0157365-07	-6.8047809-04	-1.71011-04	1.2638644+05	1.2638644+05	-1.9520962-05	5.4591710-04	8.39155-05	8.39155-05
5.050000+00	-5.5200666-05	4.6722153-07	-7.6376255-04	-1.61954-04	1.3474033+05	1.3474033+05	-1.7345292-05	5.8093703-04	5.58388-05	5.58388-05
5.550000+00	-6.0901356-05	4.3061374-07	-8.4426635-04	-1.51895-04	1.3986486+05	1.3986486+05	-1.5056493-05	6.0148145-04	2.61168-05	2.61168-05
6.000000+00	-6.5714399-05	3.9634561-07	-9.0842781-04	-1.42038-04	1.4163009+05	1.4163009+05	-1.2944644-05	6.0703833-04	-1.51604-06	-1.51604-06

REGION NUMBER 2

THERE ARE 4 SEGMENTS AND 0 KINEMATIC LINKS WITHIN THIS REGION

SEGMENT NUMBER 1 SEGMENT CODE J1 SHUTTLE CYLINDER

VECTOR 1		VECTOR 2		VECTOR 3		VECTOR 4		VECTOR 5		VECTOR 6		VECTOR 7		VECTOR 8		VECTOR 9		VECTOR 10		
PHI	OR	PHI	OR	PHI	OR	PHI	OR	PHI	OR	PHI	OR	PHI	OR	PHI	OR	PHI	OR	PHI	OR	
1.0000000+00	-6.5674044+05	4.4604051+07	-9.1025656+04	-1.42982+04	1.4127931+05	-1.2982068+05	6.0859988+04	-7.80539+07												
1.5500000+00	-7.1095879+05	4.0431704+07	-9.8539816+04	-1.30088+04	1.3952587+05	-1.0433925+05	5.9890043+04	-3.43057+05												
2.0500000+00	-7.5585638+05	3.6313124+07	-1.0473301+03	-1.17511+04	1.3438601+05	-8.2361734+04	5.7438955+04	-6.344737+05												
2.5500000+00	-7.9570214+05	3.1919985+07	-1.1027869+03	-1.04201+04	1.2595661+05	-6.2059443+04	5.3574158+04	-9.07541+05												
3.0500000+00	-8.3084430+05	2.7291089+07	-1.1514225+03	-9.02405+05	1.1440738+05	-4.3918925+04	4.8404615+04	-1.15572+04												
3.5500000+00	-8.6086942+05	2.2469192+07	-1.1929336+03	-7.57176+05	9.994818+06	-2.8378084+04	4.2066699+04	-1.37408+04												
4.0500000+00	-8.8559384+05	1.7500552+07	-1.2270615+03	-6.07230+05	8.300650+06	-1.5817706+04	3.4721179+04	-1.055808+04												
4.5500000+00	-9.0486683+05	1.2434424+07	-1.2535937+03	-4.53508+05	6.3828453+06	-6.5552189+07	2.6549720+04	-1.70368+04												
5.0500000+00	-9.1857150+05	7.3225095+08	-1.2723655+03	-2.96976+05	4.2866292+06	-8.3662439+08	1.7750981+04	-1.80855+04												
5.5500000+00	-9.2662555+05	2.2183776+08	-1.2832608+03	-1.38618+05	2.0437925+06	-1.1662488+07	8.5363386+05	-1.86995+04												
6.0000000+00	-9.2900324+05	-2.3233892+08	-1.2862764+03	4.64339+07	-1.3671070+08	-2.8673083+08	6.9151342+07	-1.888722+04												

REGION NUMBER 3

THERE ARE 1 SEGMENTS AND 0 KINEMATIC LINKS WITHIN THIS REGION

SEGMENT NUMBER 1 SEGMENT CODE 31 SHUTTLE CYLINDER

PHI OR S	VECTOR I			VECTOR 2			VECTOR 3			OMEGA THETA	W	V	OMEGA THETA	W	V	OMEGA THETA
	U	V	W	U	V	W	U	V	W							
0.000000+00	-9.2877128-05	0.0000000	-1.2872973-03	-1.95368-11	9.6869493-12	0.0000000	1.4767978-10	1.0356424-04	-1.89215-04							
1.5800000+00	-9.2530699-05	-5.5302406-08	-1.2824920-03	1.74607-05	-2.5247719-06	1.2818391-07	-1.0356424-04	1.0356424-04	-1.84478-04							
2.0500000+00	-9.1816714-05	-1.0450762-07	-1.2498145-03	3.32136-05	-4.7250346-06	-1.5541106-07	-1.9519746-04	-1.9519746-04	-1.79324-04							
2.5500000+00	-9.0137859-05	-1.5238235-07	-1.2393143-03	4.87513-05	-6.7858411-06	-8.0852134-07	-2.821792-04	-2.821792-04	-1.67870-04							
3.0500000+00	-8.8103179-05	-1.9865139-07	-1.2211170-03	6.39783-05	-8.6823642-06	-1.8119652-06	-3.5238990-04	-3.5238990-04	-1.52352-04							
3.5500000+00	-8.5525137-05	-2.4308619-07	-1.1954034-03	7.88011-05	-1.0313590-05	-3.01391407-06	-4.3389339-04	-4.3389339-04	-1.33089-04							
4.0500000+00	-8.2419538-05	-2.8549847-07	-1.1423983-03	9.31293-05	-1.1703447-05	-4.7565389-06	-4.9492087-04	-4.9492087-04	-1.10481-04							
4.5500000+00	-7.8805426-05	-3.2572733-07	-1.0723711-03	1.06875-04	-1.2901981-05	-6.624840-06	-5.3390053-04	-5.3390053-04	-8.50019-05							
5.0500000+00	-7.4704963-05	-3.6366872-07	-1.0356339-03	1.19956-04	-1.3886203-05	-8.6973872-06	-5.7953320-04	-5.7953320-04	-5.71872-05							
5.5500000+00	-7.0143287-05	-3.9924429-07	-9.7253952-04	1.32291-04	-1.4040941-05	-1.00925603-05	-6.0079441-04	-6.0079441-04	-2.76260-05							
6.0000000+00	-6.5666500-05	-4.2720838-07	8.91064171-04	1.42695-04	-1.4162748-05	-1.3019411-05	-6.0704800-04	-6.0704800-04	-4.757944-08							

REGION NUMBER 4

THERE ARE 1 SEGMENTS AND 0 KINEMATIC LINKS WITHIN THIS REGION

SEGMENT NUMBER 1 SEGMENT CODE 31 SHUTTLE CYLINDER

PHI OR S	V E C T O R 1			V E C T O R 2			OMEGA THET
	U	V	W	U	V	W	
1.0000000+00	-6.5674049-05	-4.4604352-07	-9.1025669-04	1.42982-04	-1.4127916-05	-1.2982068-05	-6.0859971-04
1.5500000+00	-5.9762289-05	-4.8252923-07	-8.2831941-04	1.54781-04	-1.3886016-05	-1.5557038-05	-5.9974317-04
2.0500000+00	-5.3999760-05	-5.1093274-07	-7.4846156-04	1.64482-04	-1.3315399-05	-1.7823904-05	-5.7593221-04
2.5500000+00	-4.7903966-05	-5.3470342-07	-6.6401028-04	1.73146-04	-1.2423069-05	-1.9965147-05	-5.3786787-04
3.0500000+00	-4.1512278-05	-5.5384861-07	-5.7549763-04	1.80720-04	-1.1229565-05	-2.1931042-05	-4.8659237-04
3.5500000+00	-3.4863864-05	-5.6846981-07	-4.8347984-04	1.87159-04	-9.7632233-06	-2.3676349-05	-4.2342765-04
4.0500000+00	-2.7999441-05	-5.7875911-07	-3.8853363-04	1.92428-04	-6.0593967-06	-2.5161161-05	-3.4994674-04
4.5500000+00	-2.0961015-05	-5.8499423-07	-2.9125233-04	1.96495-04	-6.1595257-06	-2.6351647-05	-2.6794024-04
5.0500000+00	-1.3791617-05	-5.8753931-07	-1.9242055-04	1.99341-04	-4.1100841-06	-2.7220688-05	-1.7937856-04
5.5500000+00	-6.5350291-06	-5.8680348-07	-9.2117675-05	2.00950-04	-1.9614193-06	-2.7748379-05	-8.6330679-05
6.0000000+00	3.3873441-08	-5.8375768-07	-1.5653674-06	2.01337-04	1.3459544+08	-2.7921107-05	-6.8213213-07

REGION NUMBER 1

THERE ARE 1 SEGMENTS AND 0 KINEMATIC LINKS WITHIN THIS REGION

HARMONIC (N) = 10

STIFFNESS COEFFICIENTS

	DELTA T1	DELTA Z1	DELTA R1	THETA 1	DELTA T2	DELTA Z2	DELTA R2	THETA 2
FORCT1	.4294955+08	-.3445787+07	.8246849+06	.3300370+06	-.2343001+08	-.1782556+08	.1129815+07	.1929293+07
FORCZ1	-.3445787+07	.1013995+09	.8305354+06	-.7357433+07	.1782556+08	-.9393066+08	.6051150+06	.6849929+07
FORCR1	.8246849+06	.8305354+06	.2142602+07	-.5081759+07	.1129815+07	-.6051150+06	-.1898946+07	-.4879876+07
MOME 1	.3300370+06	-.7357433+07	-.5081759+07	.1726297+08	-.1929293+07	.6849929+07	.4879876+07	.7820978+07
FORCT2	-.2343001+08	.1782556+08	.1129815+07	-.1929293+07	.4294955+08	.3445787+07	.8246849+06	-.3300370+06
FORCZ2	-.1782556+08	-.9383066+08	-.6051150+06	.6849929+07	.3445787+07	.1013995+09	-.8305354+06	-.7357433+07
FORCR2	.1129815+07	.6051150+06	-.1898946+07	.4879876+07	.8246849+06	-.8305354+06	.2142602+07	.5081759+07
MOME 2	.1929293+07	.6849929+07	-.4879876+07	.7820978+07	-.3300370+06	-.7357433+07	.5081759+07	.1726297+08

SEGMENT SYMMETRY CHECK

.4294955+08	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000
.1000000+01	.1013995+09	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000
.1000000+01	.1000000+01	.2142602+07	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000
.1000000+01	.1000000+01	.1090000+01	.1726297+08	.0000000	.0000000	.0000000	.0000000	.0000000
.1000000+01	.1000000+01	.1000000+01	.1000000+01	.4294955+08	.0000000	.0000000	.0000000	.0000000
.1000000+01	.1000000+01	.1000000+01	.1000000+01	.1000000+01	.1013995+09	.0000000	.0000000	.0000000
.1000000+01	.1000000+01	.1000000+01	.1000000+01	.1000000+01	.1000000+01	.2142602+07	.0000000	.0000000
.1000000+01	.1000000+01	.1000000+01	.1000000+01	.1000000+01	.1000000+01	.1000000+01	.1000000+01	.1726297+08
RZERO(I) =	.7,100000+01	RZERO(J) =	7,100000+01					

REGION NUMBER 2

THERE ARE 1 SEGMENTS AND 0 KINEMATIC LINKS WITHIN THIS REGION

HARMONIC (N) = 10

STIFFNESS COEFFICIENTS

	DELTA T1	DELTA Z1	DELTA R1	THETA 1	DELTA T2	DELTA Z2	DELTA R2	THETA 2
FORC1	.4294955+08	-.3445787+07	.8246849+06	.3300370+06	-.2343001+08	-.1782556+08	.1129815+07	.1929293+07
FORC2	-.3445787+07	.1013995+09	.8305354+06	-.7357433+07	.1782556+08	-.9383066+08	.6051150+06	.6849929+07
FORC3	.8246849+06	.8305354+06	.2142602+07	-.8081759+07	.1129815+07	-.6051150+06	-.1898946+07	-.4879876+07
MOM1	.3300370+06	-.7357433+07	-.5081759+07	.1726297+08	-.1929293+07	.6849929+07	.4879876+07	.7820978+07
FORC4	-.2343001+08	.1782556+08	.1129815+07	-.1929293+07	.4294955+08	.3445787+07	.8246849+06	-.3300370+06
FORC5	-.1782556+08	-.9383066+08	-.6051150+06	.6849929+07	.3445787+07	.1013995+09	-.8305354+06	-.7357433+07
FORC6	.1129815+07	.6051150+06	-.1898946+07	.4879876+07	.8246849+06	-.8305354+06	.2142602+07	.5081759+07
MOM2	.1929293+07	.6849929+07	-.4879876+07	.7820978+07	-.3300370+06	-.7357433+07	.5081759+07	.1726297+08

SEGMENT SYMMETRY CHECK

.4294955+08	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000
.1000000+01	.1013995+09	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000
.1000000+01	.1000000+01	.2142602+07	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000
.1000000+01	.1000000+01	.1000000+01	.1726297+08	.0000000	.0000000	.0000000	.0000000	.0000000
.1000000+01	.1000000+01	.1000000+01	.1000000+01	.4294955+08	.0000000	.0000000	.0000000	.0000000
.1000000+01	.1000000+01	.1000000+01	.1000000+01	.1000000+01	.1013995+09	.0000000	.0000000	.0000000
.1000000+01	.1000000+01	.1000000+01	.1000000+01	.1000000+01	.1000000+01	.2142602+07	.0000000	.0000000
.1000000+01	.1000000+01	.1000000+01	.1000000+01	.1000000+01	.1000000+01	.1000000+01	.1000000+01	.1726297+08

RZERO(I) = 7.100000+01 RZERO(J) = 7.100000+01

REGION NUMBER 3

THERE ARE 1 SEGMENTS AND 0 KINEMATIC LINKS WITHIN THIS REGION

HARMONIC (N) = 10

STIFFNESS COEFFICIENTS

	DELTA T1	DELTA Z1	DELTA R1	THETA 1	DELTA T2	DELTA Z2	DELTA R2	THETA 2
FORCT1	.4294955+08	-.3445787+07	.8246849+06	.3300370+06	-.2343001+08	-.1782556+08	.1129815+07	.1929293+07
FORCZ1	-.3445787+07	.1013995+09	.8305354+06	-.7357433+07	.1782556+08	-.9383066+08	.6051150+06	.6849929+07
FORCR1	.8246849+06	.8305354+06	.2142602+07	-.5081759+07	.1129815+07	-.6051150+06	-.1898946+07	-.4879876+07
HOME 1	.3300370+06	-.7357433+07	.5081759+07	.1726297+08	-.1929293+07	.6849929+07	.4879876+07	.7820978+07
FORCT2	-.2343001+08	.1782556+08	.1129815+07	.1929293+07	.4294955+08	.3445787+07	.8246849+06	-.3300370+06
FORCZ2	-.1782556+08	-.9383066+08	-.6051150+06	.6849929+07	.3445787+07	.1013995+09	-.8305354+06	-.7357433+07
FORCR2	.1129815+07	.6051150+06	-.1898946+07	.4879876+07	.8246849+06	-.8305354+06	.2142602+07	.5081759+07
HOME 2	.1929293+07	.6849929+07	.4879876+07	.7820978+07	-.3300370+06	-.7357433+07	.5081759+07	.1726297+08

SEGMENT-SYMMETRY CHECK

.4294955+08	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000
.1000000+01	.1013995+09	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000
.1000000+01	.1000000+01	.2142602+07	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000
.1000000+01	.1000000+01	.1000000+01	.1726297+08	.0000000	.0000000	.0000000	.0000000	.0000000
.1000000+01	.1000000+01	.1000000+01	.1000000+01	.4294955+08	.0000000	.0000000	.0000000	.0000000
.1000000+01	.1000000+01	.1000000+01	.1000000+01	.1000000+01	.1013995+09	.0000000	.0000000	.0000000
.1000000+01	.1000000+01	.1000000+01	.1000000+01	.1000000+01	.1000000+01	.1000000+01	.2142602+07	.0000000
.1000000+01	.1000000+01	.1000000+01	.1000000+01	.1000000+01	.1000000+01	.1000000+01	.1000000+01	.1726297+08

MIERO(I) = 7.100000+01 RZERO(J) = 7.100000+01

REGION NUMBER 4

THERE ARE 1 SEGMENTS AND 0 KINEMATIC LINKS WITHIN THIS REGION

HARMONIC (N) = 10

STIFFNESS COEFFICIENTS

	DELTA T1	DELTA Z1	DELTA R1	THETA 1	DELTA T2	DELTA Z2	DELTA R2	THETA 2
FORC1	.4294955+08	-.3445787+07	.8246849+06	.3300370+06	-.2343001+08	-.1782556+08	.1129815+07	.1929293+07
FORC2	-.3445787+07	.1013995+09	.8305354+06	-.7357433+07	.1782556+08	-.9383066+08	.6051150+06	.6849929+07
FORC3	.8246849+06	.8305354+06	.2142602+07	-.5081759+07	.1129815+07	-.6051150+06	-.1898946+07	-.4879876+07
HOME 1	.3300370+06	-.7357433+07	.5081759+07	.1726297+08	-.1929293+07	.6849929+07	.4879876+07	.7820978+07
FORC7	-.2343001+08	.1782556+08	.1129815+07	-.1929293+07	.4294955+08	.3445787+07	.8246849+06	-.3300370+06
FORC22	-.1782556+08	-.9383066+08	-.6051150+06	.6849929+07	.3445787+07	.1013995+09	-.8305354+06	-.7357433+07
FORC2	.1129815+07	.6051150+06	-.1898946+07	.4879876+07	.8246849+06	-.8305354+06	.2142602+07	.9081759+07
HOME 2	.1929293+07	.6849929+07	-.4879876+07	.7820978+07	-.3300370+06	.7357433+07	.5081759+07	.1726297+08

SEGMENT SYMMETRY CHECK

.4294955+08	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000
.1000000+01	.1013995+09	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000
.1000000+01	.1000000+01	.2142602+07	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000
.1000000+01	.1000000+01	.1000000+01	.1726297+08	.0000000	.0000000	.0000000	.0000000	.0000000
.1000000+01	.1000000+01	.1000000+01	.1000000+01	.4294955+08	.0000000	.0000000	.0000000	.0000000
.1000000+01	.1000000+01	.1000000+01	.1000000+01	.1000000+01	.1013995+09	.0000000	.0000000	.0000000
.1000000+01	.1000000+01	.1000000+01	.1000000+01	.1000000+01	.1000000+01	.1000000+01	.2142602+07	.0000000
.1000000+01	.1000000+01	.1000000+01	.1000000+01	.1000000+01	.1000000+01	.1000000+01	.1000000+01	.1726297+08

RZERO(I) = 7.100000+01 RZERO(J) = 7.100000+01

THE REDUCED STIFFNESS MATRIX

ROW	COLUMN 1	COLUMN 2	COLUMN 3	COLUMN 4	COLUMN 5	COLUMN 6	COLUMN 7	COLUMN 8
1	.1013995+09	-.7357433+07	.1782556+08	-.9383065+08	.6051150+06	.6849929+07	.0000000	.0000000
2	-.7357433+07	.1782556+08	-.1929293+07	.6849929+07	.4879876+07	.7820978+07	.0000000	.0000000
3	.1782556+08	-.1929293+07	.8589910+08	.0000000	.1649370+07	.0000000	-.2343001+08	.1129815+07
4	-.9383065+08	.6849929+07	.0000000	.2027990+09	.0000000	-.1471487+08	.1782556+08	.6051150+06
5	.6051150+06	.4879876+07	.1649370+07	.0000000	.4285204+07	.0000000	.1129815+07	-.1898946+07
6	.6849929+07	.7820978+07	.0000000	-.1471487+08	.0000000	.3452594+08	-.1929293+07	.4879876+07
7	.0000000	.0000000	-.2343001+08	.1782556+08	.1129815+07	-.1929293+07	.8589910+08	.1649370+07
8	.0000000	.0000000	.1129815+07	.6849929+07	-.1898946+07	.4879876+07	.1649370+07	.4285204+07
9	.0000000	.0000000	.1929293+07	.6849929+07	-.4879876+07	.7820978+07	.0000000	.0000000
10	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000	-.2343001+08	.1129815+07
11	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000	-.1782556+08	-.6051150+06
12	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000	.1129815+07	-.1898946+07
13	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000	.1929293+07	-.4879876+07
14	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000
15	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000
ROW	COLUMN 9	COLUMN 10	COLUMN 11	COLUMN 12	COLUMN 13	COLUMN 14	COLUMN 15	
1	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000	
2	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000	
3	.1929293+07	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000	
4	.6849929+07	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000	
5	-.4879876+07	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000	
6	.7820978+07	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000	
7	.0000000	-.2343001+08	.1782556+08	.1129815+07	.1929293+07	.0000000	.0000000	
8	.0000000	.1129815+07	-.6051150+06	-.1898946+07	-.4879876+07	.0000000	.0000000	
9	.3452594+08	-.1929293+07	.6849929+07	.4879876+07	.7820978+07	.0000000	.0000000	
10	-.1929293+07	.8589910+08	.0000000	.1649370+07	.0000000	-.1782556+08	.1929293+07	
11	.6849929+07	.0000000	.2027990+09	.0000000	-.1471487+08	-.9383065+08	.6849929+07	
12	.4879876+07	.1649370+07	.0000000	.4285204+07	.0000000	-.6051150+06	-.4879876+07	
13	.7820978+07	.0000000	-.1471487+08	.0000000	.3452594+08	.6849929+07	.7820978+07	
14	.0000000	-.1782556+08	-.9383065+08	-.6051150+06	.6849929+07	.1013995+09	-.7357433+07	
15	.0000000	.1929293+07	.6849929+07	-.4879876+07	.7820978+07	-.1782556+08	.1726297+08	

HARMONIC (N) = 10

ESTIMATE 1

REGION NUMBER 1

THERE ARE 1 SEGMENTS AND 0 KINEMATIC LINKS WITHIN THIS REGION

HARMONIC (N) = 10

ESTIMATE 1

STIFFNESS COEFFICIENTS

	DELTA T1	DELTA Z1	DELTA R1	THETA 1	DELTA T2	DELTA Z2	DELTA R2	THETA 2
FORCT1	.4294642+08	.3448188+07	.8257788+06	.2779775+06	.2343307+08	-.1782316+08	.1127968+07	.1973977+07
FORCZ1	-.3448188+07	.1013977+09	.8303028+06	-.7395172+07	.1782316+08	-.9382879+08	.6047634+06	.6887369+07
FORCR1	.8257788+06	.8303028+06	.1554798+07	.4838068+07	.1127968+07	-.6047634+06	-.1311230+07	-.4624413+07
HOME 1	.2779775+06	-.7395172+07	.4838068+07	.1557558+08	-.1973977+07	.6887369+07	.4624413+07	.8257989+07
FORCT2	-.2343307+08	.1782316+08	.1127968+07	-.1973977+07	.4294642+08	.3448188+07	.8257788+06	-.2779775+06
FORCZ2	-.1782316+08	-.9382879+08	-.6047634+06	.6887369+07	.3448188+07	.1013977+09	-.8303028+06	-.7395172+07
FORCR2	.1127968+07	.6047634+06	-.1311230+07	.4624413+07	.8257788+06	-.8303028+06	.1554795+07	.4838068+07
HOME 2	.1973977+07	.6887369+07	-.4624413+07	.8257989+07	-.2779775+06	.7395172+07	.4838068+07	.1557558+08

SEGMENT SYMMETRY CHECK

.4294642+08	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000
.1000000+01	.1013977+09	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000
.1000000+01	.1000000+01	.1554795+07	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000
.1000000+01	.1000000+01	.1000000+01	.1557558+08	.0000000	.0000000	.0000000	.0000000	.0000000
.1000000+01	.1000000+01	.1000000+01	.1000000+01	.4294642+08	.0000000	.0000000	.0000000	.0000000
.1000000+01	.1000000+01	.1000000+01	.1000000+01	.1000000+01	.1013977+09	.0000000	.0000000	.0000000
.1000000+01	.1000000+01	.1000000+01	.1000000+01	.1000000+01	.1000000+01	.1000000+01	.1554795+07	.0000000
.1000000+01	.1000000+01	.1000000+01	.1000000+01	.1000000+01	.1000000+01	.1000000+01	.1000000+01	.1557558+08

RZERO(I) = 7.100000+01 RZERO(J) = 7.100000+01

REGION NUMBER 2

THERE ARE 1 SEGMENTS AND 0 KINEMATIC LINKS WITHIN THIS REGION

HARMONIC (N) = 10

ESTIMATE 1

STIFFNESS COEFFICIENTS

	DELTA T1	DELTA Z1	DELTA R1	THETA 1	DELTA T2	DELTA Z2	DELTA R2	THETA 2
FORCT1	.4294642+08	-.3448188+07	.8257788+06	.2779775+06	-.2343307+08	-.1782316+08	.1127968+07	.1973977+07
FORCT2	-.3448188+07	.1013977+09	.8303028+06	-.7395172+07	.1782316+08	-.9382879+08	.6047634+06	.6887369+07
FORCR1	.8257788+06	.8303028+06	.1554795+07	-.4838068+07	.1127968+07	-.6047634+06	-.1311230+07	-.4624413+07
MOME 1	.2779775+06	-.7395172+07	-.4838068+07	.1557558+08	-.1973977+07	.6887369+07	.4624413+07	.6257989+07
FORCT2	-.2343307+08	.1782316+08	.1127968+07	-.1973977+07	.4294642+08	.3448188+07	.8257788+06	-.2779775+06
FORCZ2	-.1782316+08	-.9382879+08	-.6047634+06	.6887369+07	.3448188+07	.1013977+09	-.8303028+06	-.7395172+07
FORCR2	.1127968+07	.6047634+06	.1311230+07	.4624413+07	.8257788+06	-.8303028+06	.1554795+07	.4838068+07
MOME 2	.1973977+07	.6887369+07	-.4624413+07	.8257989+07	-.2779775+06	-.7395172+07	.4838068+07	.1557558+08

SEGMENT SYMMETRY CHECK

.4294642+08	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000
.1000000+01	.1013977+09	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000
.1000000+01	.1000000+01	.1554795+07	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000
.1000000+01	.1000000+01	.1000000+01	.1557558+08	.0000000	.0000000	.0000000	.0000000	.0000000
.1000000+01	.1000000+01	.1000000+01	.1000000+01	.4294642+08	.0000000	.0000000	.0000000	.0000000
.1000000+01	.1000000+01	.1000000+01	.1000000+01	.1000000+01	.1013977+09	.0000000	.0000000	.0000000
.1000000+01	.1000000+01	.1000000+01	.1000000+01	.1000000+01	.1000000+01	.1554795+07	.0000000	.0000000
.1000000+01	.1000000+01	.1000000+01	.1000000+01	.1000000+01	.1000000+01	.1000000+01	.1000000+01	.1557558+08

**** = 7.100000+01 **ZERO** = 7.100000+01

REGION NUMBER 3

THERE ARE 1 SEGMENTS AND 0 KINEMATIC LINKS WITHIN THIS REGION

HARMONIC (N) = 10

ESTIMATE 1

STIFFNESS COEFFICIENTS

	DELTA T1	DELTA Z1	DELTA R1	THETA 1	DELTA T2	DELTA Z2	DELTA R2	THETA 2
FORCT1	.4294642+08	-.3448188+07	.825788+06	.2779775+06	-.2343307+08	-.1782316+08	.1127968+07	.1973977+07
FORCZ1	-.3448188+07	.1013977+09	.8303028+06	-.7395172+07	.1782316+08	-.9382879+08	.6047634+06	.6887369+07
FORCR1	.825788+06	.8303028+06	.1554799+07	-.4838068+07	.1127968+07	-.6047634+06	-.1311230+07	-.4624413+07
MOME 1	.2779775+06	-.7395172+07	.4838068+07	.1557558+08	-.1973977+07	.6887369+07	.4624413+07	.8257989+07
FORCT2	-.2343307+08	.1782316+08	.1127968+07	-.1973977+07	.4294642+08	.3448188+07	.8257788+06	-.2779775+06
FORCZ2	.1782316+08	-.9382879+08	-.6047634+06	.6887369+07	.3448188+07	.1013977+09	-.8303028+06	-.7395172+07
FORCR2	.1127968+07	.6047634+06	-.1311230+07	.4624413+07	.8257788+06	-.8303028+06	.1554799+07	.4838068+07
MOME 2	.1973977+07	.6887369+07	-.4624413+07	.8257989+07	-.2779775+06	-.7395172+07	.4838068+07	.1557558+08

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SEGMENT SYMMETRY CHECK

.4294642+08	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000
.1000000+01	.1013977+09	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000
.1000000+01	.1000000+01	.1554795+07	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000
.1000000+01	.1000000+01	.1000000+01	.1557558+08	.0000000	.0000000	.0000000	.0000000	.0000000
.1000000+01	.1000000+01	.1000000+01	.1000000+01	.4294642+08	.0000000	.0000000	.0000000	.0000000
.1000000+01	.1000000+01	.1000000+01	.1000000+01	.1000000+01	.1013977+09	.0000000	.0000000	.0000000
.1000000+01	.1000000+01	.1000000+01	.1000000+01	.1000000+01	.1000000+01	.1554795+07	.0000000	.0000000
.1000000+01	.1000000+01	.1000000+01	.1000000+01	.1000000+01	.1000000+01	.1000000+01	.1000000+01	.1557558+08

***** ZERO(T) = 7.100000+01 *****

REGION NUMBER 4

THERE ARE 1 SEGMENTS AND 0 KINEMATIC LINKS WITHIN THIS REGION

HARMONIC (N) = 10

ESTIMATE 1

STIFFNESS COEFFICIENTS

	DELTA T1	DELTA Z1	DELTA R1	THETA 1	DELTA T2	DELTA Z2	DELTA R2	THETA 2
FORCT1	.4294642+08	-.3448188+07	.8257788+06	.2779775+06	-.2393307+08	-.17882316+08	.1127968+07	.1973977+07
FORCZ1	-.3448188+07	.1013977+09	.8303028+06	-.7395172+07	.1782316+08	-.9382879+08	.6047634+06	.6887369+07
FORCR1	.8257788+06	.8303028+06	.1554798+07	-.4838068+07	.1127968+07	-.6047634+06	-.1311230+07	-.4624413+07
MOME 1	.2779775+06	-.7395172+07	-.4838068+07	.1557558+08	-.1973977+07	.6887369+07	.4624413+07	.8257989+07
FORCT2	-.2393307+08	.1782316+08	.1127968+07	-.1973977+07	.4294642+08	.3448188+07	.8257788+06	-.2779775+06
FORCZ2	.1782316+08	-.9382879+08	-.6047634+06	.6887369+07	.3448188+07	.1013977+09	-.8303028+06	-.7395172+07
FORCR2	.1127968+07	.6047634+06	-.1311230+07	.4624413+07	.8257788+06	-.9382879+08	.1554798+07	.4838068+07
MOME 2	.1973977+07	.6887369+07	.4624413+07	.8257989+07	-.2779775+06	-.7395172+07	.4838068+07	.1557558+08

SEGMENT SYMMETRY CHECK

.4294642+08	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000
.1000000+01	.1013977+09	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000
.1000000+01	.1000000+01	.1554795+07	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000
.1000000+01	.1000000+01	.1000000+01	.1557558+08	.0000000	.0000000	.0000000	.0000000	.0000000
.1000000+01	.1000000+01	.1000000+01	.1000000+01	.4294642+08	.0000000	.0000000	.0000000	.0000000
.1000000+01	.1000000+01	.1000000+01	.1000000+01	.1000000+01	.1013977+09	.0000000	.0000000	.0000000
.1000000+01	.1000000+01	.1000000+01	.1000000+01	.1000000+01	.1000000+01	.1554795+07	.0000000	.0000000
.1000000+01	.1000000+01	.1000000+01	.1000000+01	.1000000+01	.1000000+01	.1000000+01	.1000000+01	.1557558+08

RZERO(T) = 7.100000+01 RZERO(J) = 7.100000+01

THE REDUCED STIFFNESS MATRIX

ROW	COLUMN 1	COLUMN 2	COLUMN 3	COLUMN 4	COLUMN 5	COLUMN 6	COLUMN 7	COLUMN 8
1	.1013977+09	-.7395172+07	.1782316+08	-.9382879+08	.6087634+06	.6887369+07	.0000000	.0000000
2	-.7395172+07	.1557558+08	-.1973977+07	.6887369+07	.4624413+07	.8257989+07	.0000000	.0000000
3	.1782316+08	-.1973977+07	.8589284+08	.0000000	.1651558+07	.0000000	-.2343307+08	.1127968+07
4	-.9382879+08	.6887369+07	.0000000	.2027953+09	.0000000	-.1479034+08	.1782316+08	.6047634+06
5	.6047634+06	.4624413+07	.1651558+07	.0000000	.3109589+07	.0000000	.1127968+07	-.1311230+07
6	.6887369+07	.8257989+07	.0000000	-.1479034+08	.0000000	.3115116+08	-.1973977+07	.4624413+07
7	.0000000	.0000000	-.2343307+08	.1782316+08	.1127968+07	-.1973977+07	.8589284+08	.1651558+07
8	.0000000	.0000000	.1127968+07	.6047634+06	-.1311230+07	.4624413+07	.1651558+07	.3109589+07
9	.0000000	.0000000	.1973977+07	.6887369+07	-.4624413+07	.8257989+07	.0000000	.0000000
10	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000	-.2343307+08	.1127968+07
11	.0000000	.0000000	.0000000	.0000000	.8900000	.0000000	-.1782316+08	-.6047634+06
12	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000
13	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000	.1973977+07	-.4624413+07
14	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000
15	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000

ROW	COLUMN 9	COLUMN 10	COLUMN 11	COLUMN 12	COLUMN 13	COLUMN 14	COLUMN 15
1	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000
2	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000
3	.1973977+07	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000
4	.6887369+07	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000
5	.4624413+07	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000
6	.8257989+07	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000
7	.0000000	-.2343307+08	.1782316+08	.1127968+07	.1973977+07	.0000000	.0000000
8	.0000000	.1127968+07	-.6047634+06	-.1311230+07	-.4624413+07	.0000000	.0000000
9	.3115116+08	-.1973977+07	.6887369+07	.4624413+07	.8257989+07	.0000000	.0000000
10	-.1973977+07	.8589284+08	.0000000	.1651558+07	.0000000	-.1782316+08	.1973977+07
11	.6887369+07	.0000000	.2027953+09	.0000000	-.1479034+08	-.9382879+08	.6047634+06
12	.4624413+07	.1651558+07	.0000000	.3109589+07	.0000000	-.6047634+06	-.4624413+07
13	.8257989+07	.0000000	-.1479034+08	.0000000	.3115116+08	.6887369+07	.8257989+07
14	.0000000	-.1782316+08	-.9382879+08	-.6047634+06	.6887369+07	.1013977+09	-.7395172+07
15	.0000000	.1973977+07	.6887369+07	-.4624413+07	.8257989+07	-.7395172+07	.1557558+08

DIVE LOAD PRESTRESS STIFFNESS MATRIX

1	1.013977+08																				
2	-7.395172+06	1.557558+07																			
3	1.782316+07	-1.973977+06	8.589284+07																		
4	-9.382879+07	6.887369+06	0.000000	2.027953+08																	
5	6.047639+05	4.624413+06	1.651558+06	0.000000	3.109589+06																
6	6.887369+06	8.257989+06	0.000000	-1.479034+07	0.000000	3.115116+07															
7	0.000000	0.000000	-2.343307+07	1.782316+07	1.127968+06	-1.973977+06	8.589284+07														
8	0.000000	0.000000	1.127968+06	6.047639+05	-1.311230+06	4.624413+06	1.651558+06	3.109589+06													
9	0.000000	0.000000	1.973977+06	6.887369+06	-4.624413+06	8.257989+06	0.000000	0.000000	0.000000												
10	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	-2.343307+07	1.127968+06													
11	-1.973977+06	8.589284+07	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000												
12	6.887369+06	0.000000	2.027953+08	0.000000	0.000000	0.000000	-1.782316+07	1.127968+06													
13	4.624413+06	1.651558+06	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000												
14	8.257989+06	0.000000	-1.479034+07	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000												
15	0.000000	0.000000	-9.382879+07	6.887369+06	6.887369+06	6.887369+06	0.000000	0.000000	0.000000	0.000000											
	0.000000	1.973977+06	6.887369+06	-4.624413+06	8.257989+06	-7.395172+06	0.000000	0.000000	0.000000	0.000000											

REGION NUMBER 1

THERE ARE 1 SEGMENTS AND 0 KINEMATIC LINKS WITHIN THIS REGION

SEGMENT NUMBER 1 SEGMENT CODE 31 SHUTTLE CYLINDER

VECTOR 1 VECTOR 2

PHI OR S	U	V	W	OMEGA THETA	U	V	W	OMEGA THETA
1.0000000*00	0.0000000	-2.4962012-06	0.0000000	-2.02741-04	0.0000000	-2.5899078-05	0.0000000	1.90797-04
1.5500000*00	-7.882807-06	-2.4866708-06	1.1136940-04	-2.01988-04	2.5501256-06	-2.5652796-05	1.0426278-04	1.87442-04
2.0500000*00	-1.4999603-05	-2.4616438-06	-2.1191785-04	-2.00000-04	4.808992-06	-2.5083286-05	1.9229744-04	1.79775-04
2.5500000*00	-2.2023766-05	-2.4212111-06	-3.1116426-04	-1.96782-04	6.9532158-06	-2.4198179-05	2.8333131-04	1.67874-04
3.0500000*00	-2.8912021-05	-2.3656537-06	-4.0849853-04	-1.92355-04	8.9297685-06	-2.3017603-05	3.6345622-04	1.51787-04
3.5500000*00	-3.5621852-05	-2.2953568-06	-5.0332219-04	-1.84745-04	1.0590079-05	-2.1568164-05	4.3470820-04	1.32443-04
4.0500000*00	-4.2111837-05	-2.2108066-06	-5.9505402-04	-1.79986-04	1.2191205-05	-1.9882489-05	4.9535650-04	1.09635-04
4.5500000*00	-4.8341899-05	-2.1125871-06	-6.8312362-04	-1.72120-04	1.3396933-05	-1.7998655-05	5.4388924-04	8.40843-05
5.0500000*00	-5.4273356-05	-2.0013756-06	-7.7669948-04	-1.63193-04	1.4278740-05	-1.5959531-05	5.7904492-04	5.62293-05
5.5500000*00	-5.9870152-05	-1.8799378-06	-8.4614923-04	-1.53261-04	1.4816593-05	-1.3812037-05	5.9983925-04	2.67188-05
6.0000000*00	-6.4591765-05	-1.7570901-06	-9.1295135-04	-1.43313-04	1.4997374-05	-1.1828032-05	6.0570230-04	-7.65444-07

REGION NUMBER 2

THERE ARE 1 SEGMENTS AND 0 KINEMATIC LINKS WITHIN THIS REGION

SEGMENT NUMBER 1 SEGMENT CODE 31 SHUTTLE CYLINDER

PRT OR S	U	V	W	OMEGA	THETA	U	V	W	OMEGA	THETA
1.0000000+00	-6.4599343-05	-1.7650807-06	-9.1265319-04	-1.43359-04	-1.43359-04	1.5003739+05	0.1822078-05	6.0549668-04	-8.084703-07	-1.88071-04
1.3500000+00	-6.9932455-05	-1.6059386-06	-9.8799987-04	-1.30459-04	-1.30459-04	1.4823436+05	-9.4327258-06	5.9572157-04	-3.42978-05	-1.86242-04
2.0500000+00	-7.4329006-05	-1.4507333-06	-1.0501177-03	-1.17885-04	-1.17885-04	1.4283619+05	7.2381091-06	5.7124754-04	-6.333301+05	-1.5125-04
2.5500000+00	-7.8267237-05	-1.2865014-06	-1.1057641-03	-1.04586-04	-1.04586-04	1.3395271+05	5.4948133-06	5.3270894-04	-9.04589+05	-1.49626-04
3.0500000+00	-8.1722849-05	-1.1142749-06	-1.154597-03	-9.06439-05	-9.06439-05	1.2174880+05	3.8188794-06	4.8119936-04	-1.15125-04	-1.55114-04
3.5500000+00	-8.4674515-05	-9.3513935-07	-1.1963150-03	-7.61437-05	-7.61437-05	1.0448231+05	2.3393690-06	4.1807882-04	-1.36824-04	-1.86242-04
4.0500000+00	-8.7104008-05	-7.5022698-07	-1.2306623-03	-6.11749-05	-6.11749-05	8.8479920+06	-1.2541989-06	3.4494418-04	-1.55114-04	-1.86242-04
4.5500000+00	-8.8996320-05	-5.6078927-07	-1.2574271-03	-4.58294-05	-4.58294-05	6.8129557+06	-4.2950489-07	2.6389515-04	-1.49626-04	-1.86242-04
5.0500000+00	-9.0339747-05	-3.6778953-07	-1.2764446-03	-3.02015-05	-3.02015-05	4.5868571+06	5.7886280-08	1.7599647-04	-1.80071-04	-1.86242-04
5.5500000+00	-9.1125965-05	-1.7269504-07	-1.2875976-03	-1.43874-05	-1.43874-05	2.2170869+06	1.9237449-07	8.4236974-05	-1.86242-04	-1.86242-04
6.0000000+00	-9.1353030-05	3.7217615-09	-1.2908531-03	-7.57515-08	-7.57515-08	2.4936141+09	4.6104060-09	-1.1180814-07	-1.86242-04	-1.86242-04

REGION NUMBER 3

THERE ARE 1 SEGMENTS AND 0 KINEMATIC LINKS WITHIN THIS REGION

SEGMENT NUMBER 1 SEGMENT CODE 31 SHUTTLE CYLINDER

PHI OR S	V E C T O R 1						V E C T O R 2						OMEGA THET
	U	V	W	OMEGA	THETA	U	V	W	OMEGA	THETA			
1.0000000+00	-9.1357275-05	0.0000000	31.2906866-03	-2.78277-11	1.74916-05	1.2624869-11	0.0000000	2.0709998-10	-1.07945-04				
1.5500000+00	-9.1016553-05	2.1553047+07	-1.2858735-03	1.74916-05	3.32851-05	-2.6985942-06	1.9077994-07	-1.0289198-04	-1.85299-04				
2.0500000+00	-9.0717490-05	4.0999677+07	-1.2731729-03	4.88750-05	6.41653-05	5.0540973+06	-1.3908870-08	-1.9396743-04	-1.78283-04				
2.5500000+00	-8.8662827-05	6.0182275+07	-1.2526224-03	7.90515-05	9.34718-05	-7.2359595+06	5.6882525+07	-2.8046778-04	-1.67028-04				
3.0500000+00	-8.6661546-05	7.8983000+07	-1.2243478-03	1.07307-04	1.20482-04	-9.2274213+06	-1.4570366-06	-3.6032601-04	-1.51758-04				
3.5500000+00	-8.4125999-05	9.7286841+07	-1.1885228-03	1.20482-04	1.32915-04	-1.0775640+05	-2.6547589-06	-4.3160725-04	-1.32778-04				
4.0500000+00	-8.1071836-05	1.1498231+06	-1.1453673-03	1.32915-04	1.43406-04	-1.2442945+05	-4.1317956-06	-4.9254906-04	-1.10771-04				
4.5500000+00	-7.7517905-05	1.3196214+06	-1.0951469-03	1.43406-04	1.5598008-05	1.3598008-05	-8.8520850-06	-5.4159859-04	-8.52999-05				
5.0500000+00	-7.3486140-05	1.4812388+06	-1.0381704-03	1.5598008-05	1.6337054+06	-1.4416866-05	-7.7743435-06	-5.7744457-04	-5.77518-05				
5.5500000+00	-6.9001423-05	1.6337054+06	-9.7478872-04	1.6337054+06	1.7623483+06	1.4683812+05	-9.8529776-06	-5.9905191-04	-2.84243-05				
6.0000000+00	-6.4600727-05	1.7623483+06	-9.1259066-04	1.7623483+06		-1.4997409+05	-1.1816136-05	-6.0570025-04	-1.00296-06				

REGION NUMBER 4

THERE ARE 1 SEGMENTS AND 0 KINEMATIC LINKS WITHIN THIS REGION

SEGMENT NUMBER 1 SEGMENT CODE 31 SHUTTLE CYLINDER

PHI OR S	V E C T O R 1			V E C T O R 2			OMEGA THETA	W	OMEGA THETA
	U	V	W	U	V	W			
1.000000+00	-6.4599352-05	1.7650771-06	-9.1265341-04	-1.5003721-05	-1.1822077-05	-6.0544947-04	1.43359-04	-8.84459-07	
1.550000+00	-5.8784386-05	1.9107405-06	-8.3049296-04	-1.4741603+05	-1.4242024-05	-5.96667617-04	1.55195-04	3.26190-05	
2.050000+00	-5.3116368-05	2.0305516-06	-7.5042075-04	-1.4132823+05	-1.6372317-05	-5.7299478-04	1.64957-04	6.18577-05	
2.550000+00	-4.7120932-05	2.1376024-06	-6.6571150-04	-1.3182923+05	-1.8384903-05	-5.3511729-04	1.73706-04	8.93047-05	
3.050000+00	-4.0835080-05	2.2312582-06	-5.7689263-04	-1.1914953+05	-2.0233538-05	-4.8408390-04	1.81387-04	1.14390-04	
3.550000+00	-3.4297609-05	2.3107782-06	-4.8451000-04	-1.0358320-05	-2.1876176-05	-4.2120743-04	1.89954-04	1.34595-04	
4.050000+00	-2.7548876-05	2.3763180-06	+3.8913167-04	-8.5509456-06	-2.3275700-05	-3.4884549-04	1.93364-04	1.55461-04	
4.550000+00	-2.0630546-05	2.4249317-06	-2.9134437-04	-6.5368847-06	-2.4400567-05	-2.6636813-04	1.97584-04	1.70598-04	
5.050000+00	-1.3585342-05	2.4625741-06	-1.9174996-04	-4.3657022-06	-2.5225349-05	-1.7812146-04	2.00589-04	1.81693-04	
5.550000+00	-6.4567764-06	2.4831007-06	-9.0961750-05	-2.0711496-06	-2.5731179-05	-8.5388043-05	2.02357-04	1.88514-04	
6.000000+00	-6.1864161-09	2.4886129-06	2.5517962-07	-2.4352350+09	-2.5903673-05	1.1029100-07	2.02883-04	1.90877-04	

REGION NUMBER 1

THERE ARE 1 SEGMENTS AND 0 KINEMATIC LINKS WITHIN THIS REGION

HARMONIC (N) = 11

STIFFNESS COEFFICIENTS

	DELTA T1	DELTA Z1	DELTA R1	THETA 1	DELTA T2	DELTA Z2	DELTA R2	THETA 2
FORCT1	.4522340+08	-.4150582+07	.8866210+06	.3772671+06	-.2210441+08	-.1913657+08	.1217389+07	.2091739+07
FORCZ1	-.4150582+07	.1017547+09	.8157920+06	-.7372812+07	.1913657+08	-.9262081+08	.5438035+06	.6759837+07
FORCRI	.8866210+06	.8157920+06	.2149583+07	-.5087451+07	.1217389+07	-.5438035+06	-.1899813+07	-.9880684+07
HOME 1	.3772671+06	-.7372812+07	-.5087451+07	.1727028+08	-.2091739+07	.6759837+07	.9880684+07	.7821616+07
FORCT2	-.2210441+08	.1913657+08	.1217389+07	-.2091739+07	.4522340+08	.4150582+07	.8866210+06	-.3772671+06
FORCZ2	-.1913657+08	-.9262081+08	-.5438035+06	.6759837+07	.4150582+07	.1017547+09	-.8157920+06	-.7372812+07
FORCR2	.1217389+07	.5438035+06	-.1899813+07	.4880684+07	.8866210+06	.8157920+06	.2149583+07	.5087451+07
HOME 2	.2091739+07	.6759837+07	.4880684+07	.7821616+07	-.3772671+06	-.7372812+07	.5087451+07	.1727028+08

SEGMENT SYMMETRY CHECK

.4522340+08	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000
.1000000+01	.1017547+09	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000
.1000000+01	.1000000+01	.2149583+07	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000
.1000000+01	.1000000+01	.1000000+01	.1727028+08	.0000000	.0000000	.0000000	.0000000	.0000000
.1000000+01	.1000000+01	.1000000+01	.1000000+01	.4522340+08	.0000000	.0000000	.0000000	.0000000
.1000000+01	.1000000+01	.1000000+01	.1000000+01	.1000000+01	.1017547+09	.0000000	.0000000	.0000000
.1000000+01	.1000000+01	.1000000+01	.1000000+01	.1000000+01	.1000000+01	.2149583+07	.0000000	.0000000
.1000000+01	.1000000+01	.1000000+01	.1000000+01	.1000000+01	.1000000+01	.1000000+01	.1000000+01	.1727028+08

RZERO(I) = 7.100000+01 RZERO(J) = 7.100000+01

REGION NUMBER 2

THERE ARE 1 SEGMENTS AND 0 KINEMATIC LINKS WITHIN THIS REGION

HARMONIC (N) = 11

STIFFNESS COEFFICIENTS

	DELTA T1	DELTA Z1	DELTA R1	THETA 1	DELTA T2	DELTA Z2	DELTA R2	THETA 2
FORCT1	.4522340+08	-.4150582+07	.8866210+06	.372671+06	-.2210441+08	-.1913657+08	.1217389+07	.2091739+07
FORCZ1	-.4150582+07	.1017547+09	.8157928+06	-.7372812+07	.1913657+08	-.9262081+08	.5438035+06	.6759837+07
FORCR1	.8866210+06	.8157920+06	.2149583+07	-.5087451+07	.1217389+07	-.5438035+06	-.1899813+07	-.4880684+07
MOME 1	.372671+06	-.7372812+07	-.5087451+07	.1727028+08	-.2091739+07	.6759837+07	.4880684+07	.7821616+07
FORCT2	-.2210441+08	.1913657+08	.1217389+07	-.2091739+07	.4522340+08	.4150582+07	.8866210+06	-.372671+06
FORCZ2	-.1913657+08	-.9262081+08	-.5438035+06	.6759837+07	.4150582+07	.1017547+09	-.8157920+06	-.7372812+07
FORCR2	.1217389+07	.5438035+06	-.1899813+07	.4880684+07	.8866210+06	-.8157920+06	.2149583+07	.5087451+07
MOME 2	.2091739+07	.6759837+07	-.4880684+07	.7821616+07	-.372671+06	-.7372812+07	.5087451+07	.1727028+08

SEGMENT SYMMETRY CHECK

.4522340+08	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000
.1000000+01	.1017547+09	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000
.1000000+01	.1000000+01	.2149583+07	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000
.1000000+01	.1000000+01	.1000000+01	.1727028+08	.0000000	.0000000	.0000000	.0000000	.0000000
.1000000+01	.1000000+01	.1000000+01	.1000000+01	.4522340+08	.0000000	.0000000	.0000000	.0000000
.1000000+01	.1000000+01	.1000000+01	.1000000+01	.1000000+01	.1017547+09	.0000000	.0000000	.0000000
.1000000+01	.1000000+01	.1000000+01	.1000000+01	.1000000+01	.1000000+01	.1000000+01	.2149583+07	.0000000
.1000000+01	.1000000+01	.1000000+01	.1000000+01	.1000000+01	.1000000+01	.1000000+01	.1000000+01	.1727028+08
RZERO(I) =	7.100000+01							
RZERO(J) =	7.100000+01							

REGION NUMBER 3

THERE ARE 1 SEGMENTS AND 0 KINEMATIC LINKS WITHIN THIS REGION

HARMONIC (N) = 11

STIFFNESS COEFFICIENTS

	DELTA T1	DELTA Z1	DELTA R1	THETA J	DELTA T2	DELTA Z2	DELTA R2	THETA 2
FORCT1	.4522340+08	-.4150582+07	.8866210+06	.372671+06	-.2210441+08	-.1913657+08	.1217389+07	.2091739+07
FORCZ1	-.4150582+07	.1017547+09	.8153920+06	.7372812+07	.1913657+08	-.9262081+08	.5438035+06	.6759837+07
FORCR1	.8866210+06	.8157920+06	.2149583+07	-.5087451+07	.1217389+07	-.5438035+06	-.1899813+07	-.4880684+07
HOME 1	.3772671+06	-.7372812+07	-.5087451+07	.1727028+08	-.2091739+07	.6759837+07	.4880684+07	.7821616+07
FORCT2	-.2210441+08	.1913657+08	.1217389+07	-.2091739+07	.4522340+08	.4150582+07	.8866210+06	-.3772671+06
FORCZ2	-.1913657+08	-.9262081+08	-.5438035+06	.6759837+07	.4150582+07	.1017547+09	-.8157920+06	-.7372812+07
FORCR2	.1217389+07	.5438035+06	-.1899813+07	.4880684+07	.8866210+06	-.8157920+06	.2149583+07	.5087451+07
HOME 2	.2091739+07	.6759837+07	-.4880684+07	.7821616+07	-.3772671+06	-.7372812+07	.5087451+07	.1727028+08

SEGMENT SYMMETRY CHECK

.4522340+08	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000
.1000000+01	.1017547+09	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000
.1000000+01	.1000000+01	.2149583+07	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000
.1000000+01	.1000000+01	.1000000+01	.1727028+08	.0000000	.0000000	.0000000	.0000000	.0000000
.1000000+01	.1000000+01	.1000000+01	.1000000+01	.4522340+08	.0000000	.0000000	.0000000	.0000000
.1000000+01	.1000000+01	.1000000+01	.1000000+01	.1000000+01	.1017547+09	.0000000	.0000000	.0000000
.1000000+01	.1000000+01	.1000000+01	.1000000+01	.1000000+01	.1000000+01	.2149583+07	.0000000	.0000000
.1000000+01	.1000000+01	.1000000+01	.1000000+01	.1000000+01	.1000000+01	.1000000+01	.1000000+01	.1727028+08

RZEROT(J) = 7.100000+01 RZEROT(J) = 7.100000+01

REGION NUMBER 4

THERE ARE 1 SEGMENTS AND 0 KINEMATIC LINKS WITHIN THIS REGION

HARMONIC (N) = 11

STIFFNESS COEFFICIENTS

	DELTA T1	DELTA Z1	DELTA R1	THETA 1	DELTA T2	DELTA Z2	DELTA R2	THETA 2
FORCT1	.4522340+08	-.4150582+07	.8866210+06	.3772671+06	-.2210441+08	-.1913657+08	.1217389+07	.2091739+07
FORCZ1	-.4150582+07	.1017547+09	.8157920+06	-.7372812+07	.1913657+08	-.9262081+08	.5438035+04	.6759837+07
FORCR1	.8866210+06	.8157920+06	.2149583+07	-.5087451+07	.1217389+07	-.5438035+06	-.1899813+07	-.4880684+07
HOME 1	.3772671+06	-.7372812+07	-.5087451+07	.1727028+08	-.2091739+07	.6759837+07	.4880684+07	.7821616+07
FORCT2	-.2210441+08	.1913657+08	.1217389+07	-.2091739+07	.4522340+08	.4150582+07	.8866210+06	-.3772671+06
FORCZ2	-.1913657+08	-.9262081+08	-.5438035+06	.6759837+07	.4150582+07	.1017547+09	-.8157920+06	-.7372812+07
FORCR2	.1217389+07	.5438035+06	-.1899813+07	.4880684+07	.8866210+06	-.8157920+06	.2149583+07	.5087451+07
HOME 2	.2091739+07	.6759837+07	-.4880684+07	.7821616+07	-.3772671+06	-.7372812+07	.5087451+07	.1727028+08

SEGMENT SYMMETRY CHECK

.4522340+08	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000
.1000000+01	.1017547+09	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000
.1000000+01	.1000000+01	.2149583+07	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000
.1000000+01	.1000000+01	.1000000+01	.1727028+08	.0000000	.0000000	.0000000	.0000000	.0000000
.1000000+01	.1000000+01	.1000000+01	.1000000+01	.4522340+08	.0000000	.0000000	.0000000	.0000000
.1000000+01	.1000000+01	.1000000+01	.1000000+01	.1000000+01	.1017547+09	.0000000	.0000000	.0000000
.1000000+01	.1000000+01	.1000000+01	.1000000+01	.1000000+01	.1000000+01	.2149583+07	.0000000	.0000000
.1000000+01	.1000000+01	.1000000+01	.1000000+01	.1000000+01	.1000000+01	.1000000+01	.1000000+01	.1727028+08

RZERO(I) = 7.100000+01 RZERO(J) = 7.100000+01

THE REDUCED STIFFNESS MATRIX

ROW	COLUMN 1	COLUMN 2	COLUMN 3	COLUMN 4	COLUMN 5	COLUMN 6	COLUMN 7	COLUMN 8
1	.1017547+09	-.7372812+07	.1913657+08	-.9262091+08	.5438035+06	.6759937+07	.0000000	.0000000
2	-.7372812+07	.1727028+08	-.2091738+07	.6759937+07	.4880684+07	.7821616+07	.0000000	.0000000
3	.1913657+08	-.2091738+07	.9046800+08	.0000000	.1773242+07	.0000000	-.2210441+08	.1217389+07
4	-.9262091+08	.6759937+07	.0000000	.2035094+09	.0000000	-.1474562+08	.1913657+08	.5438035+06
5	.5438035+06	.4880684+07	.1773242+07	.0000000	.4299166+07	.0000000	.1217389+07	-.1899813+07
6	.6759937+07	.7821616+07	.0000000	-.1474562+08	.0000000	.3454056+08	-.2091738+07	.4880684+07
7	.0000000	.0000000	-.2210441+08	.1913657+08	.1773242+07	-.2091738+07	.9046800+08	.1773242+07
8	.0000000	.0000000	.1217389+07	.5438035+06	-.1899813+07	.4880684+07	.1773242+07	.4299166+07
9	.0000000	.0000000	-.2091738+07	.6759937+07	-.4880684+07	.7821616+07	.0000000	.0000000
10	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000	-.2210441+08	.1217389+07
11	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000	-.1913657+08	-.5438035+06
12	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000	.1217389+07	-.1899813+07
13	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000	.2091738+07	-.4880684+07
14	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000
15	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000
ROW	COLUMN 9	COLUMN 10	COLUMN 11	COLUMN 12	COLUMN 13	COLUMN 14	COLUMN 15	
1	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000	
2	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000	
3	.2091738+07	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000	
4	.6759937+07	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000	
5	-.4880684+07	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000	
6	.7821616+07	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000	
7	.0000000	-.2210441+08	-.1913657+08	.1217389+07	.2091738+07	.0000000	.0000000	
8	.0000000	.1217389+07	-.5438035+06	-.1899813+07	-.4880684+07	.0000000	.0000000	
9	.3454056+08	-.2091738+07	.6759937+07	.4880684+07	.7821616+07	.0000000	.0000000	
10	-.2091738+07	.9046800+08	.0000000	.1773242+07	.0000000	-.1913657+08	.2091738+07	
11	.6759937+07	.0000000	.2035094+09	.0000000	-.1474562+08	-.9262091+08	.6759937+07	
12	.4880684+07	.1773242+07	.0000000	.4299166+07	.0000000	-.5438035+06	-.4880684+07	
13	.7821616+07	.0000000	-.1474562+08	.0000000	.3454056+08	.6759937+07	.7821616+07	
14	.0000000	.0000000	-.9262091+08	.0000000	.6759937+07	.1017547+09	-.7372812+07	
15	.0000000	.2091738+07	.6759937+07	-.4880684+07	.7821616+07	-.7372812+07	.1727028+08	

HARMONIC (N) = 11

ESTIMATE 1

REGION NUMBER 1

THERE ARE 1 SEGMENTS AND 0 KINEMATIC LINKS WITHIN THIS REGION.

HARMONIC (N) = 11

ESTIMATE 1

STIFFNESS COEFFICIENTS

	DELTA T1	DELTA Z1	DELTA R1	THETA 1	DELTA T2	DELTA Z2	DELTA R2	THETA 2
FØRCT1	.4521959+08	-4153182+07	.8878436+06	.3197796+06	-2210813+08	-1913397+08	.1215302+07	.2140926+07
FØRCZ1	-4153182+07	.1017529+09	.8155677+06	-7409906+07	.1913397+08	-.9261901+08	.5434313+06	.6796560+07
FØRCR1	.8878436+06	.8155677+06	.1561800+07	-.4844036+07	.1215302+07	-.5434313+06	-.1312129+07	-.4625028+07
HØME 1	.3197796+06	-7409906+07	-.4844036+07	.1558358+08	-.2140926+07	.6796560+07	.4625028+07	.8258007+07
FØRCT2	-2210813+08	.1913397+08	.1215302+07	-.2140926+07	.4521959+08	.4153182+07	.8878436+06	-.3197796+06
FØRCZ2	-1913397+08	-.9261901+08	-.5434313+06	.6796560+07	.4153182+07	.1017529+09	-.8155677+06	-.7409906+07
FØRCR2	.1215302+07	.5434313+06	-.1312129+07	.4625028+07	.8878436+06	-.8155677+06	.1561800+07	.4844036+07
HØME 2	.2140926+07	.6796560+07	-.4625028+07	.8258007+07	-.3197796+06	-.7409906+07	.4844036+07	.1558358+08

SEGMENT SYMMETRY CHECK

.4521959+08	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000
.1000000+01	.1017529+09	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000
.1000000+01	.1000000+01	.1561800*07	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000
.1000000+01	.1000000+01	.1000000+01	.1558358+08	.0000000	.0000000	.0000000	.0000000	.0000000
.1000000+01	.1000000+01	.1000000+01	.1000000+01	.4521959+08	.0000000	.0000000	.0000000	.0000000
.1000000+01	.1000000+01	.1000000+01	.1000000+01	.1000000+01	.1017529+09	.0000000	.0000000	.0000000
.1000000+01	.1000000+01	.1000000+01	.1000000+01	.1000000+01	.1000000+01	.1000000+01	.1561800*07	.0000000
.1000000+01	.1000000+01	.1000000+01	.1000000+01	.1000000+01	.1000000+01	.1000000+01	.1000000+01	.1558358+08

RZERO(I) = 7,100000+01

RZERO(J) = 7,100000+01

REGION NUMBER 2

THERE ARE 1 SEGMENTS AND 0 KINEMATIC LINKS WITHIN THIS REGION

HARMONIC (N) = 11

ESTIMATE 1

STIFFNESS COEFFICIENTS

	DELTA T1	DELTA Z1	DELTA R1	THETA 1	DELTA T2	DELTA Z2	DELTA R2	THETA 2
FORCT1	.4521959+08	-.4153182+07	.8878436+06	.3197796+06	-.2210813+08	-.1913397+08	.1215302+07	.2140926+07
FORCZ1	-.4153182+07	.1017529+09	.8155677+06	-.7409906+07	.1913397+08	.92261901+08	.5434313+06	.6796560+07
FORCR1	.8878436+06	.8155677+06	.1561800+07	-.4844036+07	.1215302+07	-.5434313+06	-.1312129+07	-.4625028+07
MOME 1	.3197796+06	-.7409906+07	-.4844036+07	.1558358+08	-.2140926+07	.6796560+07	.4625028+07	.8258007+07
F0RCT2	-.2210813+08	.1913397+08	.1215302+07	-.2140926+07	.4521959+08	.4153182+07	.8878436+06	-.3197796+06
F0RCZ2	-.1913397+08	-.92261901+08	-.5434313+06	.6796560+07	.4153182+07	.1017529+09	-.8155677+06	-.7409906+07
FORCR2	.1215302+07	.5434313+06	-.1312129+07	.4625028+07	.8878436+06	-.8155677+06	.1561800+07	.4844036+07
MOME 2	.2140926+07	.6796560+07	.4625028+07	.8258007+07	-.3197796+06	-.7409906+07	.4844036+07	.1558358+08

SEGMENT SYMMETRY CHECK

.4521959+08	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000
.1000000+01	.1017529+09	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000
.1000000+01	.1000000+01	.1561800+07	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000
.1000000+01	.1000000+01	.1000000+01	.1558358+08	.0000000	.0000000	.0000000	.0000000	.0000000
.1000000+01	.1000000+01	.1000000+01	.1000000+01	.4521959+08	.0000000	.0000000	.0000000	.0000000
.1000000+01	.1000000+01	.1000000+01	.1000000+01	.1000000+01	.1017529+09	.0000000	.0000000	.0000000
.1000000+01	.1000000+01	.1000000+01	.1000000+01	.1000000+01	.1000000+01	.1561800+07	.0000000	.0000000
.1000000+01	.1000000+01	.1000000+01	.1000000+01	.1000000+01	.1000000+01	.1000000+01	.1000000+01	.1558358+08

ZERO(T) = 7.100000+01 ZERO(J) = 7.100000+01

REGION NUMBER 3

THERE ARE 3 SEGMENTS AND 0 KINEMATIC LINKS WITHIN THIS REGION

HARMONIC (N) = 11

ESTIMATE 1

STIFFNESS COEFFICIENTS

	DELTA T1	DELTA Z1	DELTA R1	THETA 1	DELTA T2	DELTA Z2	DELTA R2	THETA 2
FORC1	.4521959+08	-.4153182+07	.8878436+06	.3197796+06	-.2210813+08	-.1913397+08	.1215302+07	.2140926+07
FORC2	-.4153182+07	.1017529+09	.8155677+06	-.7409906+07	.1913397+08	-.9261901+08	.5434313+06	.6796560+07
FORC3	.8878436+06	.8155677+06	.1561800+07	-.4844036+07	.1215302+07	-.5434313+06	-.1312129+07	-.4625028+07
MOME 1	.3197796+06	-.7409906+07	-.4844036+07	.1558358+08	-.2140926+07	.6796560+07	.4625028+07	.8258007+07
FORC2	-.2210813+08	.1913397+08	.1215302+07	-.2140926+07	.4521959+08	.4153182+07	.8878436+06	-.3197796+06
FORC2	-.1913397+08	-.9261901+08	-.5434313+06	.6796560+07	.4153182+07	.1017529+09	-.8155677+06	-.7409906+07
FORC2	.1215302+07	.5434313+06	-.1312129+07	.4625028+07	.8878436+06	-.8155677+06	.1561800+07	.4844036+07
MOME 2	.2140926+07	.6796560+07	.4625028+07	.8258007+07	-.3197796+06	-.7409906+07	.4844036+07	.1558358+08

SEGMENT SYMMETRY CHECK

.4521959+08	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000
.1000000+01	.1017529+09	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000
.1000000+01	.1000000+01	.1561800+07	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000
.1000000+01	.1000000+01	.1000000+01	.1558358+08	.0000000	.0000000	.0000000	.0000000	.0000000
.1000000+01	.1000000+01	.1000000+01	.1000000+01	.4521959+08	.0000000	.0000000	.0000000	.0000000
.1000000+01	.1000000+01	.1000000+01	.1000000+01	.1000000+01	.1017529+09	.0000000	.0000000	.0000000
.1000000+01	.1000000+01	.1000000+01	.1000000+01	.1000000+01	.1000000+01	.1000000+01	.1561800+07	.0000000
.1000000+01	.1000000+01	.1000000+01	.1000000+01	.1000000+01	.1000000+01	.1000000+01	.1000000+01	.1558358+08

-----ZERO(I) = 7.100000+01 -----ZERO(J) = 7.100000+01

REGION NUMBER 4

THERE ARE 1 SEGMENTS AND 0 KINEMATIC LINKS WITHIN THIS REGION

HARMONIC (N) = 11

ESTIMATE 1

STIFFNESS COEFFICIENTS

	DELTA T1	DELTA Z1	DELTA R1	THETA 1	DELTA T2	DELTA Z2	DELTA R2	THETA 2
FORCT1	.4521959+08	-.4153182+07	.8878436+06	.3197796+06	-.2210813+08	-.1913397+08	.1215302+07	.2140926+07
FORCZ1	-.4153182+07	.1017529+09	.8155677+06	-.7409906+07	.1913397+08	-.9261901+08	.5434313+06	.6796560+07
FORCR1	.8878436+06	.8155677+06	.1561800+07	-.4844036+07	.1215302+07	-.5434313+06	-.1312129+07	-.4625028+07
MOHE 1	.3197796+06	-.7409906+07	-.4844036+07	.1558358+08	-.2140926+07	.6796560+07	.4625028+07	.8258007+07
FORCT2	-.2210813+08	.1913397+08	.1215302+07	-.2140926+07	.4521959+08	.4153182+07	.8878436+06	-.3197796+06
FORCZ2	-.1913397+08	-.9261901+08	.5434313+06	.6796560+07	.4153182+07	.1017529+09	-.8155677+06	-.7409906+07
FORCR2	.1215302+07	.5434313+06	-.1312129+07	.4625028+07	.8878436+06	-.8155677+06	.1561800+07	.4844036+07
MOHE 2	.2140926+07	.6796560+07	-.4625028+07	.8258007+07	-.3197796+06	-.7409906+07	.4844036+07	.1558358+08

SEGMENT SYMMETRY CHECK

.4521959+08	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000
.1000000+01	.1017529+09	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000
.1000000+01	.1000000+01	.1561800+07	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000
.1000000+01	.1000000+01	.1000000+01	.1558358+08	.0000000	.0000000	.0000000	.0000000	.0000000
.1000000+01	.1000000+01	.1000000+01	.1000000+01	.4521959+08	.0000000	.0000000	.0000000	.0000000
.1000000+01	.1000000+01	.1000000+01	.1000000+01	.1000000+01	.1017529+09	.0000000	.0000000	.0000000
.1000000+01	.1000000+01	.1000000+01	.1000000+01	.1000000+01	.1000000+01	.1000000+01	.1561800+07	.0000000
.1000000+01	.1000000+01	.1000000+01	.1000000+01	.1000000+01	.1000000+01	.1000000+01	.1000000+01	.1558358+08

RZERO(I) = 7.100000+01 RZERO(J) = 7.100000+01

THE REDUCED STIFFNESS MATRIX

ROW	COLUMN 1	COLUMN 2	COLUMN 3	COLUMN 4	COLUMN 5	COLUMN 6	COLUMN 7	COLUMN 8
1	.1017529+09	-.7409906+07	.1913397+08	-.9261901+08	.5434313+06	.6796560+07	.0000000	.0000000
2	-.7409906+07	.1558358+08	-.2140926+07	.6796560+07	.4625028+07	.8258007+07	.0000000	.0000000
3	.1913397+08	-.2140926+07	.9043919+08	.0000000	.1775687+07	.0000000	-.2210813+08	.1215302+07
4	-.9261901+08	.6796560+07	.0000000	.2035058+09	.0000000	-.1481981+08	.1913397+08	.5434313+06
5	.5434313+06	.4625028+07	.1775687+07	.0000000	.3123600+07	.0000000	.1215302+07	-.1312129+07
6	.6796560+07	.8258007+07	.0000000	-.1481981+08	.0000000	.3116716+08	-.2140926+07	.4625028+07
7	.0000000	.0000000	-.2140926+07	.1913397+08	.1215302+07	-.2140926+07	.9043919+08	.1775687+07
8	.0000000	.0000000	.1215302+07	.5434313+06	-.1312129+07	.4625028+07	.1775687+07	.3123600+07
9	.0000000	.0000000	-.2140926+07	.6796560+07	-.4625028+07	.8258007+07	.0000000	.0000000
10	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000	-.2210813+08	.1215302+07
11	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000	-.1913397+08	-.8434313+06
12	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000	.1215302+07	-.1312129+07
13	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000	.2140926+07	-.4625028+07
14	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000
15	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000
ROW	COLUMN 9	COLUMN 10	COLUMN 11	COLUMN 12	COLUMN 13	COLUMN 14	COLUMN 15	
1	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000	
2	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000	
3	.2140926+07	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000	
4	.6796560+07	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000	
5	-.4625028+07	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000	
6	.8258007+07	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000	
7	.0000000	-.2210813+08	-.1913397+08	.1215302+07	.2140926+07	.0000000	.0000000	
8	.0000000	.1215302+07	-.5434313+06	-.1312129+07	-.4625028+07	.0000000	.0000000	
9	.3116716+08	-.2140926+07	.6796560+07	.4625028+07	.8258007+07	.0000000	.0000000	
10	.2140926+07	.9043919+08	.0000000	.1775687+07	.0000000	.1913397+08	.2140926+07	
11	.6796560+07	.0000000	.2035058+09	.0000000	.1775687+07	-.9261901+08	.6796560+07	
12	.4625028+07	.1775687+07	.0000000	.3123600+07	.0000000	-.5434313+06	-.4625028+07	
13	.8258007+07	.0000000	.1481981+08	.0000000	.3116716+08	.6796560+07	.8258007+07	
14	.0000000	-.1913397+08	.2140926+07	-.5434313+06	.6796560+07	.1017529+09	-.7409906+07	
15	.0000000	.2140926+07	.6796560+07	-.4625028+07	.8258007+07	-.7409906+07	.1558358+08	

DEAD LOAD PRESTRESS OR BASE STIFFNESS MATRIX

1	1.017547+08																			
2	-7.372812+06	1.727028+07																		
3	1.913657+07	-2.091738+06	9.044680+07																	
4	-9.262081+07	6.759837+06	0.000000	2.035094+08																
5	5.938035+05	4.880684+06	1.773242+06	0.000000	4.299166+06															
6	6.759837+06	7.821616+06	0.000000	-1.474562+07	0.000000	3.454056+07														
7	0.000000	0.000000	-2.210941+07	1.913657+07	1.217389+06	-2.091738+06	9.044680+07													
8	0.000000	0.000000	1.217389+06	5.438035+05	-1.899813+06	4.880684+06	1.773242+06	4.299166+06												
9	0.000000	0.000000	2.091738+06	6.759837+06	-4.880684+06	7.821616+06	0.000000	0.000000	0.000000											
10	3.454056+07	0.000000	0.000000	0.000000	0.000000	0.000000	-2.210941+07	1.217389+06												
11	-2.091738+06	9.044680+07	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000											
12	6.759837+06	0.000000	0.000000	2.035094+08	0.000000	0.000000	-1.913657+07	-5.438035+05	-1.899813+06											
13	4.880684+06	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000											
14	7.821616+06	0.000000	0.000000	-1.474562+07	0.000000	3.454056+07	0.000000	0.000000	0.000000											
15	0.000000	0.000000	-1.913657+07	-9.262081+07	-5.438035+05	6.759837+06	0.000000	0.000000	0.000000											
	0.000000	0.000000	2.091738+06	6.759837+06	-4.880684+06	7.821616+06	0.000000	0.000000	0.000000											

EIGENVALUES.

1	1.010260+00	1.161189+00	2.051401+00	3.8965191+00	6.352846+00	1.062635+01	1.646995+01	2.9006210+01													
5	3.315220+03	1.994711+04	7.792924+04	1.8991455+05	2.190419+06	1.086539+07	4.423419+07														

THE CURRENT LOAD MULTIPLICATION FACTOR = 1.010260+00

HARMONIC (N) = 11

ESTIMATE 2

REGION NUMBER 1

THERE ARE 1 SEGMENTS AND 0 KINEMATIC LINKS WITHIN THIS REGION

HARMONIC (N) = 11

ESTIMATE 2

STIFFNESS COEFFICIENTS

	DELTA T1	DELTA Z1	DELTA R1	THETA 1	DELTA T2	DELTA Z2	DELTA R2	THETA 2
FORC1	.4521955+08	-.4153211+07	.8878563+06	.3191469+06	-.2210818+08	-.1913394+08	.1215280+07	.2141471+07
FORC2	-.4153211+07	.1017529+09	.8155652+06	-.7410315+07	.1913394+08	-.9261899+08	.5434273+06	.6796966+07
FORC3	.8878563+06	.8155652+06	.1555747+07	-.4841487+07	.1215280+07	.5434273+06	-.1306077+07	-.4622344+07
MOME 1	.3191469+06	-.7410315+07	-.4841487+07	.1556555+08	-.2141471+07	.6796966+07	.4622344+07	.6262927+07
FORC2	-.2210818+08	.1913394+08	.1215280+07	-.2141471+07	.4521955+08	.4153211+07	.8878563+06	-.3191469+06
FORC2	-.1913394+08	-.9261899+08	.5434273+06	.6796966+07	.4153211+07	.1017529+09	-.8155652+06	-.7410315+07
FORC2	.1215280+07	.5434273+06	-.1306077+07	.4622344+07	.8878563+06	-.8155652+06	.1555747+07	.4841487+07
MOME 2	.2141471+07	.6796966+07	-.4622344+07	.8262927+07	-.3191489+06	-.7410315+07	.4841487+07	.1556555+08

SEGMENT SYMMETRY CHECK

	DELTA T1	DELTA Z1	DELTA R1	THETA 1	DELTA T2	DELTA Z2	DELTA R2	THETA 2
.4521955+08	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000
.1000000+01	.1017529+09	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000
.1000000+01	.1000000+01	.1555747+07	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000
.1000000+01	.1000000+01	.1000000+01	.1556555+08	.0000000	.0000000	.0000000	.0000000	.0000000
.1000000+01	.1000000+01	.1000000+01	.1000000+01	.4521955+08	.0000000	.0000000	.0000000	.0000000
.1000000+01	.1000000+01	.1000000+01	.1000000+01	.1000000+01	.1017529+09	.0000000	.0000000	.0000000
.1000000+01	.1000000+01	.1000000+01	.1000000+01	.1000000+01	.1000000+01	.1555747+07	.0000000	.0000000
.1000000+01	.1000000+01	.1000000+01	.1000000+01	.1000000+01	.1000000+01	.1000000+01	.1000000+01	.1556555+08
RZERO(I) =	7.100000+01							
RZERO(J) =								7.100000+01

REGION NUMBER 2

THERE ARE 1 SEGMENTS AND 0 KINEMATIC LINKS WITHIN THIS REGION

HARMONIC (N) = 11

ESTIMATE 2

STIFFNESS COEFFICIENTS

	DELTA T1	DELTA Z1	DELTA R1	THETA 1	DELTA T2	DELTA R2	THETA 2
FORC1	.4521955+08	-.4153211+07	.8878563+06	.3191469+06	-.2210818+08	.1215280+07	.2141471+07
FORCZ1	-.4153211+07	.1017529+09	.8155652+06	-.77410315+07	.1913394+08	.5434273+06	.6796966+07
FORCR1	.8878563+06	.8155652+06	.1555742+07	-.4841487+07	.1215280+07	-.5434273+06	-.4622344+07
MOME 1	.3191469+06	-.77410315+07	.4841487+07	.1556555+08	-.2141471+07	.6796966+07	.8262927+07
FORC2	-.2210818+08	.1913394+08	.1215280+07	-.2141471+07	.4521955+08	.4153211+07	.8878563+06
FORCZ2	-.1913394+08	-.9261899+08	-.5434273+06	.6796966+07	.4153211+07	.1017529+09	-.77410315+07
FORCR2	.1215280+07	.5434273+06	-.1306077+07	.4622344+07	.8878563+06	-.8155652+06	.4841487+07
MOME 2	.2141471+07	.6796966+07	.4622344+07	.8262927+07	-.3191469+06	-.77410315+07	.1556555+08

SEGMENT SYMMETRY CHECK

.4521955+08	.000000	.000000	.000000	.000000	.000000	.000000	.000000
.100000+01	.1017529+09	.000000	.000000	.000000	.000000	.000000	.000000
.100000+01	.100000+01	.1555747+07	.000000	.000000	.000000	.000000	.000000
.100000+01	.100000+01	.100000+01	.1556555+08	.000000	.000000	.000000	.000000
.100000+01	.100000+01	.100000+01	.100000+01	.4521955+08	.000000	.000000	.000000
.100000+01	.100000+01	.100000+01	.100000+01	.100000+01	.1017529+09	.000000	.000000
.100000+01	.100000+01	.100000+01	.100000+01	.100000+01	.100000+01	.1555747+07	.000000
.100000+01	.100000+01	.100000+01	.100000+01	.100000+01	.100000+01	.100000+01	.1556555+08

RZER0(1) = 7.100000+01 RZER0(J) = 7.100000+01

REGION NUMBER 3

THERE ARE 1 SEGMENTS AND 0 KINEMATIC LINKS WITHIN THIS REGION

HARMONIC (N) = 11

ESTIMATE 2

STIFFNESS COEFFICIENTS

	DELTA T1	DELTA Z1	DELTA R1	THETA 1	DELTA T2	DELTA Z2	DELTA R2	THETA 2
FORCT1	.4521955+08	-.4153211+07	.8878563+06	.3191469+06	-.2210818+08	-.1913394+08	.1215280+07	.2141471+07
FORCZ1	-.4153211+07	.1017529+09	.8155652+06	-.7410315+07	.1913394+08	-.9261899+08	.5434273+06	.6796966+07
FORCR1	.8878563+06	.8155652+06	.1558747+07	-.4841487+07	.1215280+07	.5434273+06	-.1306077+07	-.4622344+07
MOME 1	.3191469+06	-.7410315+07	-.4841487+07	.1556555+08	-.2191471+07	.6796966+07	.4622344+07	.8262927+07
FORCT2	-.2210818+08	.1913394+08	.1215280+07	-.2141471+07	.4521955+08	.4153211+07	.8878563+06	-.3191469+06
FORCZ2	-.1913394+08	-.9261899+08	-.5434273+06	.6796966+07	.4153211+07	.1017529+09	-.8155652+06	-.7410315+07
FORCR2	.1215280+07	.5434273+06	-.1306077+07	.4622344+07	.8878563+06	-.8155652+06	.1555747+07	.4841487+07
MOME 2	.2141471+07	.6796966+07	.54622344+07	.8262927+07	-.3191469+06	-.7410315+07	.4841487+07	.1556555+08

SEGMENT SYMMETRY CHECK

.4521955+08	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000
.1000000+01	.1017529+09	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000
.1000000+01	.1000000+01	.1555747+07	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000
.1000000+01	.1000000+01	.1000000+01	.1556555+08	.0000000	.0000000	.0000000	.0000000	.0000000
.1000000+01	.1000000+01	.1000000+01	.1000000+01	.4521955+08	.0000000	.0000000	.0000000	.0000000
.1000000+01	.1000000+01	.1000000+01	.1000000+01	.1000000+01	.1017529+09	.0000000	.0000000	.0000000
.1000000+01	.1000000+01	.1000000+01	.1000000+01	.1000000+01	.1000000+01	.1000000+01	.1555747+07	.0000000
.1000000+01	.1000000+01	.1000000+01	.1000000+01	.1000000+01	.1000000+01	.1000000+01	.1000000+01	.1556555+08
RZERO(I) =	7.100000+01							
RZERO(J) =	7.100000+01							

REGION NUMBER 4

THERE ARE 1 SEGMENTS AND 0 KINEMATIC LINKS WITHIN THIS REGION

HARMONIC (N) = 11

ESTIMATE 2

STIFFNESS COEFFICIENTS

	DELTA T1	DELTA Z1	DELTA R1	THETA 1	DELTA T2	DELTA Z2	DELTA R2	THETA 2
FORCT1	.4521955+08	-.4153211+07	.8878563+06	.3191469+06	-.2210818+08	.1913394+08	.1215280+07	.2141471+07
FORCZ1	-.4153211+07	.1017529+09	.8155452+06	-.7410315+07	.1913394+08	-.9261899+08	.5434273+06	.6796966+07
FORCR1	.8878563+06	.8155652+06	.1555747+07	-.4841487+07	.1215280+07	-.5434273+06	-.1306077+07	-.4622344+07
HOME 1	.3191469+06	-.7410315+07	-.4841487+07	.1556555+08	-.2141471+07	.6796966+07	.4622344+07	.8262927+07
FORCT2	-.2210818+08	.1913394+08	.1215280+07	-.2141471+07	.4521955+08	.4153211+07	.8878563+06	-.3191469+06
FORCZ2	-.1913394+08	-.9261899+08	-.5434273+06	.6796966+07	.4153211+07	.1017529+09	-.8155652+06	-.7410315+07
FORCR2	.1215280+07	.5434273+06	-.1306077+07	.4622344+07	.8878563+06	.8155652+06	.1555747+07	.4841487+07
HOME 2	.2141471+07	.6796966+07	-.4622344+07	.8262927+07	-.3191469+06	-.7410315+07	.4841487+07	.1556555+08

SEGMENT SYMMETRY CHECK

.4521955+08	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000
.1000000+01	.1017529+09	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000
.1000000+01	.1000000+01	.1555747+07	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000
.1000000+01	.1000000+01	.1000000+01	.1556555+08	.0000000	.0000000	.0000000	.0000000	.0000000
.1000000+01	.1000000+01	.1000000+01	.1000000+01	.4521955+08	.0000000	.0000000	.0000000	.0000000
.1000000+01	.1000000+01	.1000000+01	.1000000+01	.1000000+01	.1017529+09	.0000000	.0000000	.0000000
.1000000+01	.1000000+01	.1000000+01	.1000000+01	.1000000+01	.1000000+01	.1000000+01	.1555747+07	.0000000
.1000000+01	.1000000+01	.1000000+01	.1000000+01	.1000000+01	.1000000+01	.1000000+01	.1000000+01	.1556555+08

RZERUT1 = 7.1000000+01 RZERUT2 = 7.1000000+01

THE REDUCED STIFFNESS MATRIX

ROW	COLUMN 1	COLUMN 2	COLUMN 3	COLUMN 4	COLUMN 5	COLUMN 6	COLUMN 7	COLUMN 8
1	.1017529+09	-.7410315+07	.1913399+08	-.9261899+08	.5934273+06	.6796965+07	.0000000	.0000000
2	-.7410315+07	.1555655+08	-.2141471+07	.6796965+07	.4622344+07	.8262927+07	.0000000	.0000000
3	.1913399+08	-.2141471+07	.9043910+08	.0000000	.1775713+07	.0000000	-.2210817+08	.1215280+07
4	-.9261899+08	.6796965+07	.0000000	.2035057+09	.0000000	-.1462063+08	.1913399+08	.5934273+06
5	.5434273+06	.4622344+07	.1775713+07	.0000000	.3111493+07	.0000000	.1215280+07	-.1306077+07
6	.6796965+07	.8262927+07	.0000000	-.1462063+08	.0000000	.3113103+08	-.2141471+07	.4622344+07
7	.0000000	.0000000	-.2210817+08	.1913399+08	.1215280+07	-.2141471+07	.9043910+08	.1775713+07
8	.0000000	.0000000	.1215280+07	.5434273+06	-.1306077+07	.4622344+07	.1775713+07	.3111493+07
9	.0000000	.0000000	.2141471+07	.6796965+07	-.4622344+07	.8262927+07	.0000000	.0000000
10	.0800000	.0000000	.0000000	.0000000	.0000000	.0000000	.2210817+08	.1215280+07
11	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000	-.1913399+08	-.5434273+06
12	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000	.1215280+07	-.1306077+07
13	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000	.2141471+07	-.4622344+07
14	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000
15	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000
ROW	COLUMN 9	COLUMN 10	COLUMN 11	COLUMN 12	COLUMN 13	COLUMN 14	COLUMN 15	
1	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000	
2	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000	
3	.2141471+07	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000	
4	.6796965+07	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000	
5	-.4622344+07	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000	
6	.8262927+07	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000	
7	.0800000	-.2210817+08	-.1913399+08	.1215280+07	.2141471+07	.0000000	.0000000	
8	.0000000	.1215280+07	.5434273+06	-.1306077+07	-.4622344+07	.0000000	.0000000	
9	.3113103+08	-.2141471+07	.6796965+07	.4622344+07	.8262927+07	.0000000	.0000000	
10	-.2141471+07	.9043910+08	.0000000	.2035057+09	.0000000	.0000000	.0000000	
11	.6796965+07	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000	
12	.4622344+07	.1775713+07	.0000000	.3111493+07	.0000000	.0000000	.0000000	
13	.8262927+07	.0000000	-.1462063+08	.0000000	.3113109+08	.6796965+07	.8262927+07	
14	.0000000	-.1913399+08	.1913399+08	-.5434273+06	.6796965+07	.1017529+09	-.7410315+07	
15	.0000000	.2141471+07	.6796965+07	-.4622344+07	.8262927+07	-.7410315+07	.1555655+08	

REGION NUMBER 1

THERE ARE 1 SEGMENTS AND 0 KINEMATIC LINKS WITHIN THIS REGION

SEGMENT NUMBER 1 SEGMENT CODE 31 SHUTTLE CYLINDER

V E C T O R Z

V E C T O R 1

PHI OR S	U	V	W	OMEGA THETA	U	V	W	OMEGA THETA
1.000000*00	0.000000	4.8841205-06	0.000000	-2.01639-04	0.000000	-2.3895882-05	0.000000	1.68773-04
1.550000*00	-7.6241216-06	4.8658966-06	-1.1076356-04	-2.00887-04	2.6664545-06	52.3661592-05	1.00369873-04	1.86420-04
2.050000*00	-1.450278-05	-4.8178152-06	-2.1076248-04	-1.88903-04	5.0288190-06	-2.3124847-05	1.9517741-04	1.78777-04
2.550000*00	-2.1300990-05	-4.7400226-06	-3.0946213-04	-1.95693-04	7.2717892-06	-2.2372635-05	2.8177294-04	1.66921-04
3.050000*00	-2.7963369-05	-4.6329996-06	24.0625407-04	-1.91276-04	9.3400197-06	22.1183946-05	3.6143753-04	1.51101-04
3.550000*00	-3.4453338-05	-4.4974074-06	-5.0054158-04	-1.85680-04	1.1182806-05	21.9823831-05	4.3226684-04	1.31641-04
4.050000*00	-4.0730882-05	-4.3340839-06	-5.8174342-04	-1.78940-04	1.2755342-05	-1.8442980-05	4.9253878-04	1.08944-04
4.550000*00	-4.6757296-05	-4.1940383-06	26.7929731-04	-1.71096-04	1.4919864-05	-1.6477212-05	5.4078993-04	8.34772-05
5.050000*00	-5.2495422-05	-3.9284449-06	-7.6266351-04	-1.62197-04	1.4946650-05	-1.4566876-05	5.97564180-04	5.57670-05
5.550000*00	-5.7909879-05	-3.6886358-06	-8.4132803-04	-1.52299-04	1.5514868-05	61.2554175-05	5.9623766-04	2.63888-05
6.000000*00	-6.2478516-05	-3.4533249-06	-9.0770469-04	-1.42586-04	1.5710161-05	41.0699788-05	6.0197955-04	-9.77332-07

REGION NUMBER 2

THERE ARE 1 SEGMENTS AND 0 KINEMATIC LINKS WITHIN THIS REGION

SEGMENT NUMBER 1 SEGMENT CODE 31 SHUTTLE CYLINDER

VECTOR 1 VECTOR 2

PHI OR S	VECTOR 1			VECTOR 2			OMEGA THETA			OMEGA TREY		
	U	V	W	U	V	W	U	V	W	U	V	W
0.000000+00	-6.2478796-05	-3.4535928-06	-9.0769450-04	-1.42580-04	1.5710402+05	+1.0699590+05	6.0197094-04	-9.777178-07				
1.550000+00	-1.7636848-05	-3.1427051-06	-9.8263084-04	-1.29746-04	1.5527613+05	-8.4462330-06	5.9223810-04	-3.42196-05				
2.050000+00	-7.1899110-05	-2.8396696-06	-1.0444081-03	-1.17236-04	1.4948947+05	-6.5621941-06	5.6784458-04	-6.30848+05				
3.550000+00	-7.5698154-05	-2.8519129-06	-1.0997463-03	-1.04003-04	1.4034831+05	-6.8174599-06	5.2947187-04	-9.00400+05				
3.050000+00	-7.9040492-05	-2.1830449-06	-1.1483043-03	-9.01292-05	1.2772793+05	-3.2771285-06	4.7821366-04	-1.19531-04				
3.550000+00	-6.1895515-05	-1.8335054-06	-1.199789-03	-7.56996-05	1.1178745+05	-1.9997990-06	4.15443562-04	-1.36057-04				
4.050000+00	-8.4245619-05	-1.4726616-06	-1.239261-03	-6.08033-05	9.260078-06	-9.5491897-07	3.4272576-04	-1.54183-04				
4.550000+00	-8.6076317-05	-1.1027392-06	-1.2505236-03	-4.55321-05	7.1841745-06	-2.321213-07	2.6188037-04	-1.68545-04				
5.050000+00	-8.7376317-05	-7.2602023-07	-1.284114-03	-2.99803-05	4.8478535-06	1.6860526-07	1.7485529-04	-1.78857-04				
5.550000+00	-8.8137604-05	-3.4482867-07	-1.280471-03	-1.42436-05	2.3353099-06	2.3421015-07	8.3732052-05	-1.84919-04				
6.000000+00	-8.8358212-05	1.2449662-10	-1.2836798-03	-2.63712-09	1.1745193-10	1.5551575-10	-3.4706667-09	-1.86646-04				

REGION NUMBER 3

THERE ARE 1 SEGMENTS AND 0 KINEMATIC LINKS WITHIN THIS REGION

SEGMENT NUMBER 1 SEGMENT CODE 31 SHUTTLE CYLINDER

V E C T O R 2

V E C T O R 1

PHI OR S	U	V	W	OMEGA THETA	U	V	W	OMEGA THETA
1.000000+00	-8.8358373-05	0.000000	-1.2836741-03	-5.52802-11	2.2362108+11	0.000000	3.4226661-10	-1.866443-04
1.550000+00	-8.8028830-05	4.2143737-07	-1.2788865-03	1.73986-05	-2.8438048-06	2.4630101-07	-1.0218399-04	-1.84052-04
2.050000+00	-8.7152286-05	8.0191255-07	-1.2662538-03	3.31064-05	-5.3091186-06	1.1503004-07	-1.9265809-04	-1.77128-04
2.550000+00	-8.5752375-05	1.1774398-06	-1.2458142-03	4.86101-05	-7.6083181-06	4.3516060-07	-2.7860903-04	-1.65988-04
3.050000+00	-8.3816773-05	1.5457039-06	2.1217693-03	6.38142-05	9.6937619-06	-1.1363450-06	-3.5797924-04	-1.50849-04
3.550000+00	-8.1364414-05	1.9044348-06	-1.1820656-03	7.86249-05	-1.1521738-05	-2.2173953-06	-4.2884121-04	-1.32012-04
4.050000+00	-7.8410418-05	2.2514212-06	-1.1371496-03	9.29509-05	-1.3053811-05	-3.5668505-06	-4.6943776-04	-1.09857-04
4.550000+00	-7.4973998-05	2.5845245-06	-1.0892103-03	1.06704-04	-1.4258056-05	-5.1511869-06	-5.3821917-04	-8.48318-05
5.050000+00	-7.1073347-05	2.9016919-06	-1.0325555-03	1.19799-04	-1.5110161-05	-6.9318540-06	-5.7387628-04	-5.74443-05
5.550000+00	-6.6735512-05	3.2009488-06	-9.6953443-04	1.32156-04	-1.5594379-05	8.8659408-06	-5.9534928-04	-2.82731-05
6.000000+00	-6.2478861-05	3.4534950-06	-9.0789274-04	1.42582-04	-1.5710133-05	9.10699391-05	-6.0197904-04	-9.81295-07

The third test problem involves the investigation of vibration frequency characteristics of a prestressed spherical cap as shown in Figure 4-3. In this problem five harmonics are searched ($n = 0-4$) and thus three sets of boundary conditions are utilized. The input is set so that the two lowest eigenvectors are investigated in each harmonic. No intermediate print is required. The prestress load is a uniform external pressure of $p = 1466$ psi. It is interesting to note in this problem that the prestress pressure is rather close to the buckling load for the $n=2$ harmonic. The buckling load of a shell can be found using a vibrations analysis, by finding the loading which will cause a zero frequency. Further analytical discussions and comparisons for this problem are available in Reference 1.

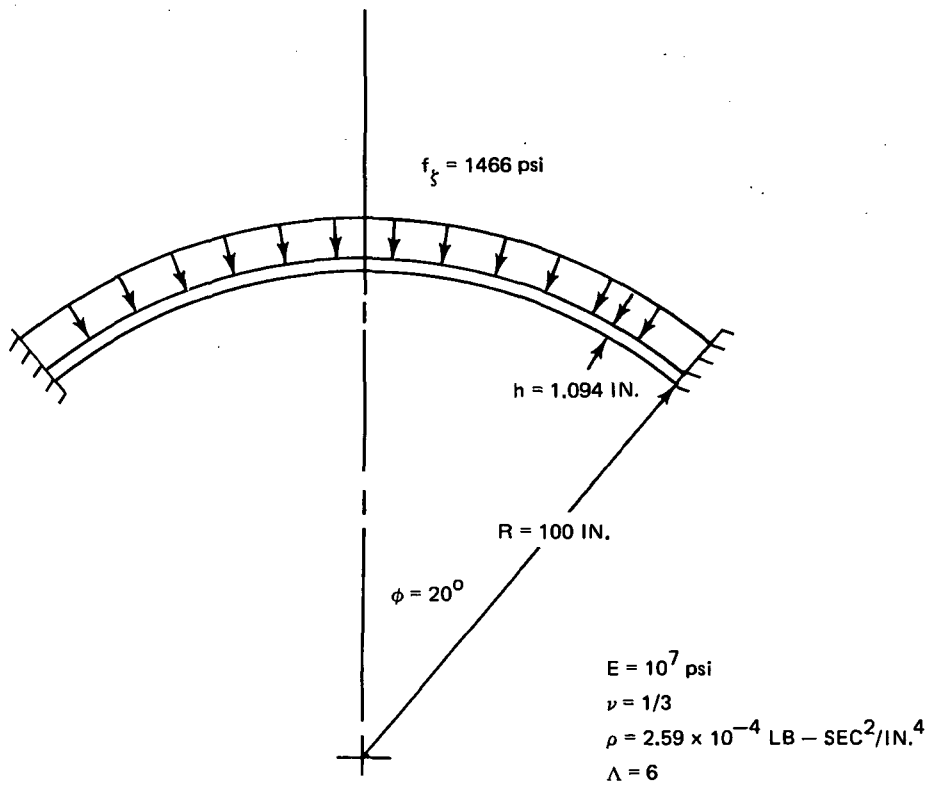


Figure 4-3 Test Problem 3

PRESTRESSED VIBRATIONS SPHERICAL CAP

2785.976

8 8 1 0 4 1 1 3 0 0

VPRE ALUM ISBT

1.0 E 07

.333333

1 0 0 REGION 1

1 1 2
 11 SPHERE
 .001 1.0 E-04 .0001 0.
 100.
 ISBT ALUM SING THIC NØTH 0.0 2
 .01
 1.094 1.094
 2.59 E-04 2.59 E-04
 000100
 1466. 1466.
 1 1 2

1 0 0 REGION 2

1 2 3
 11 SPHERE
 .002 1.0 E-04 .0002 2
 100.
 ISBT ALUM SING THIC NØTH 0.0 2
 .02
 1.094 1.094
 2.59 E-04 2.59 E-04
 000100
 1466. 1466.
 1 1 2

1 0 0 REGION 3

1 3 4
 11 SPHERE
 .002 1.0 E-04 .0002 2
 100.
 ISBT ALUM SING THIC NØTH 0.0 2
 .04
 1.094 1.094
 2.59 E-04 2.59 E-04
 000100
 1466. 1466.
 1 1 2

1 0 0 REGION 4

4 4 5
 11 SPHERE 1.0 E-04 .0003 2
 .003 1.0 THIC
 100. 1.0 SING NØTH 0.0
 ISØT .09 ALUM NØTH 0.0
 .06 1.094
 1.094 1.094
 2.59 E-04 2.59 E-04
 000100
 1466. 1466.
 1 1 2

1 0 0 REGION 5
 5 5 6
 11 SPHERE 1.0 E-04 .0003907 2
 .003907 1.0 THIC
 100. 1.0 SING NØTH 0.0
 ISØT .09 ALUM NØTH 0.0
 .09 1.094
 1.094 1.094
 2.59 E-04 2.59 E-04
 000100
 1466. 1466.
 1 1 2

1 0 0 REGION 6
 6 6 7
 11 SPHERE 1.0 E-04 .0005 2
 .005 1.0 THIC
 100. 1.0 SING NØTH 0.0
 ISØT .17907 ALUM NØTH 0.0
 .12907 1.094
 1.094 1.094
 2.59 E-04 2.59 E-04
 000100
 1466. 1466.
 1 1 2

1 0 0 REGION 7
 7 7 8
 11 SPHERE 1.0 E-04 .0007 2
 .007 1.0 THIC
 100. 1.0 SING NØTH 0.0
 ISØT .24907 ALUM NØTH 0.0
 .17907 1.094
 1.094 1.094
 2.59 E-04 2.59 E-04
 000100
 1466. 1466.
 1 1 2

1 0 0 REGION 8
 8 8 9
 11 SPHERE 1.0 E-04 .001 2
 .01 1.0 THIC
 100. 1.0 SING NØTH 0.0
 ISØT .34907 ALUM NØTH 0.0
 .24907 1.094
 1.094 1.094
 2.59 E-04 2.59 E-04
 000100

1466. 1 2 1466.

1 1 0 0
9 0 0
1 0 1 0 0
2 0 1 1 1
3 0 1 1 1
4 0 1 1 1
5 0 1 1 1
6 0 1 1 1
7 0 1 1 1
8 0 1 1 1
9 0 0 0 0

1 1 2 0 1 .01
2 1 1 1 1
3 1 1 1 1
4 1 1 1 1
5 1 1 1 1
6 1 1 1 1
7 1 1 1 1
8 1 1 1 1
9 0 0 0 0

1 0 0 0 0
2 1 1 1 1
3 1 1 1 1
4 1 1 1 1
5 1 1 1 1
6 1 1 1 1
7 1 1 1 1
8 1 1 1 1
9 0 0 0 0

FIN

UNSYMMETRIC, ORTHOTROPIC, REINFORCED SHELL ANALYSIS WITH COUPLING OF AT MOST 29 SHELL REGIONS

STARS-24

AS OF NOVEMBER 1, 1972

NUMBER OF SEGMENTS = 8 NUMBER OF REGIONS = 8 NUMBER OF MATERIAL PROPERTY TABLES USED = 1 NUMBER OF PROBLEMS = 1

NUMBER OF BOUNDARY CONDITION MATRICES = 3

VIBRATION HARMONICS (N) = 0 TO 4 INCREMENTED BY 1

PRESTRESSED VIBRATION PROBLEM

PRESTRESSED VIBRATIONS SPHERICAL CAP

FOR INFORMATION CALL V. SVALBONAS

(516) 575-7701

P. OGILVIE

REGION NUMBER 1

THERE ARE 1 SEGMENTS AND 0 KINEMATIC LINKS WITHIN THIS REGION

STIFFNESS COEFFICIENTS

	DELTA T1	DELTA Z1	DELTA R1	THETA 1	DELTA T2	DELTA Z2	DELTA R2	THETA 2
FORCT1	.6873469+J8	.0000000	.0000000	.0000000	-.3436906+J8	.0000000	.0000000	.0000000
FORCZ1	.0000000	.1409920+J9	.5530093+J6	-.5980605+J8	.0000000	-.1409920+J9	-.1824608+J6	-.7583162+J8
FORCR1	.0000000	.5530093+J6	.1031116+J9	-.7839270+J6	.0000000	.5530093+J6	-.1031085+J9	-.1182675+J7
MOHE 1	.0000000	-.5980605+J8	-.7839270+J6	.3565500+J8	.0000000	.5980605+J8	.7387132+J6	.2188869+J8
FORCT2	-.3436906+J8	.0000000	.0000000	.0000000	.1718539+J8	.0000000	.0000000	.0000000
FORCZ2	.0000000	-.1409920+J9	-.5530093+J6	.5980605+J8	.0000000	-.1409920+J9	.1824608+J6	.7583162+J8
FORCR2	.0000000	-.1824608+J6	-.1031085+J9	.7387132+J6	.0000000	.1824608+J6	.1546609+J9	.1314014+J7
MOHE 2	.0000000	-.7583162+J8	-.1182675+J7	.2188869+J8	.0000000	.7583162+J8	.1314014+J7	.5621963+J8

SEGMENT-SYMMETRY-CHECK

.6873469+J8	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000
.1000000+J1	.1409920+J9	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000
.1000000+J1	.1031116+J9	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000
.1000000+J1	.1030000+J1	.1030000+J1	.3565500+J8	.0000000	.0000000	.0000000	.0000000	.0000000
.1000000+J1	.1030000+J1	.1030000+J1	.1000000+J1	.1718539+J8	.0000000	.0000000	.0000000	.0000000
.1000000+J1	.1030000+J1	.1030000+J1	.1000000+J1	.1000000+J1	.1409920+J9	.0000000	.0000000	.0000000
.1000000+J1	.1030000+J1	.1030000+J1	.1000000+J1	.1000000+J1	.1000000+J1	.1546609+J9	.0000000	.0000000
.1000000+J1	.1030000+J1	.1030000+J1	.1000000+J1	.1000000+J1	.1000000+J1	.1000000+J1	.1000000+J1	.5621962+J8

SEGMENT LOAD MATRICES

.0000000
.5681129+J4
.6762359+J2
-.9096147+J3
.0000000
.8133293+J4
.1455094+J3

•1374748+04

RZERO(I) = 9.999833-01

RZERO(J) = 1.999867+00

REGION NUMBER 2

THERE ARE 1 SEGMENTS AND 0 KINEMATIC LINKS WITHIN THIS REGION

SEGMENT NUMBER 1 SEGMENT CODE 11 SPHERE
 DIAU DIFF STEP DELTA
 +2000000-02 +1000000-03 +2000000-03 +0000000

GEOMETRY INPUT VARIABLES
 +1000000+03 +1000000+01 +0000000

1507 ALUM SING THIC NOTH T FASE M 000 NUMBER OF TABLE COLUMNS = 2

MATERIAL PROPERTY TABLE USED

.00000	.00000	.00000	.00000	.00000	.00000	.00000	.00000	.00000	.00000
.10000+08	.00000	.00000	.00000	.00000	.00000	.00000	.00000	.00000	.00000
.33333+00	.00000	.00000	.00000	.00000	.00000	.00000	.00000	.00000	.00000
.00000	.00000	.00000	.00000	.00000	.00000	.00000	.00000	.00000	.00000

TABLE ORDER PHI ON S VS. CRUSSESECTION PROPERTIES

.7000000+01	.4000000+01
.1094000+01	.1094000+01
.7257000+03	.7257000+03

PROBLEM 1 TABLE ORDER PHI ON S VS. DISTRIBUTED LOADS (F THEIA, F PHI, F ZETA, M THETA, M BHI)
 LOAD IDENTIFICATION CODES 000100
 +1466000+04

MATRIX X AND Y (TRANPOSED) MAGIC OUTPUT

.4430200+04	.0000000	.0000000	.1777000+01	.0000000	.0000000	.0000000	.0000000
.0000000	.2049674+07	-.8203070+05	-.7934916+05	.0000000	.9999355+00	.3558527-02	.4355145-01
.0000000	.4099879+03	.1740833+04	.1507195+04	.0000000	.1099796+01	.9993268+08	.0711451+03
.0000000	-.4369241+05	.1748627+04	-.2033728+06	.0000000	.2131174-01	.1923858+01	.9995249+00
.2501000+00	.0000000	.0000000	.3650159+06	.0000000	.0000000	.0000000	.0000000
.0000000	.7497823+00	-.1997960+01	-.1934423-01	.0000000	.1218907-06	.4246923+08	.1061724-07
.0000000	.2100200+01	.4995357+00	.1174001+01	.0000000	-.3755076+08	-.7500432+08	.1030743+05
.0000000	.2176901-01	-.8711451-03	.7495842+00	.0000000	-.1061724-07	-.1314567-05	-.1221920-05
.0000000	.3275603+02	-.8219077+04	.2120099+04	.0000000	.1997743+05	.0711105+03	.1107366-02

STIFFNESS COEFFICIENTS

	DELTA T1	DELTA Z1	DELTA R1	THETA I	DELTA T2	DELTA Z2	DELTA R2	THETA Z
FORC1	.687251+08	.000000	.000000	.000000	-.3436813+08	.000000	.000000	.000000
FORCZ1	.000000	.3531561+08	-.1904431+07	-.2990268+08	.000000	-.3531561+08	.2725545+07	-.3788163+08
FORCR1	.000000	-.1904431+07	.1030380+09	-.583342+06	.000000	.1904431+07	-.1030216+09	-.1489849+07
HOME 1	.000000	-.2990268+08	-.5803432+06	.3565421+08	.000000	.2990268+08	.3314775+06	.2188259+08
FORC2	-.3436813+08	.000000	.000000	.000000	.1718750+08	.000000	.000000	.000000
FORCZ2	.000000	-.3531561+08	.1904431+07	.2990268+08	.000000	.3531561+08	-.2725545+07	.3788163+08
FORCR2	.000000	.2725545+07	-.1030216+09	.3314775+06	.000000	-.2725545+07	.1545653+09	.1928929+07
HOME 2	.000000	-.3788163+08	-.1489849+07	.2188259+08	.000000	.3788163+08	.1928929+07	.5621424+08

SEGMENT STABILITY CHECK

.687250+08	.000000	.000000	.000000	.000000	.000000	.000000	.000000	.000000
.100000+01	.3531561+08	.000000	.000000	.000000	.000000	.000000	.000000	.000000
.100000+01	.1904431+07	.1030380+09	.000000	.000000	.000000	.000000	.000000	.000000
.100000+01	.100000+01	.100000+01	.3565421+08	.000000	.000000	.000000	.000000	.000000
.100000+01	.100000+01	.100000+01	.100000+01	.1718750+08	.000000	.000000	.000000	.000000
.100000+01	.100000+01	.100000+01	.100000+01	.100000+01	.3531561+08	.000000	.000000	.000000
.100000+01	.100000+01	.100000+01	.100000+01	.100000+01	.100000+01	.1545653+09	.000000	.000000
.100000+01	.100000+01	.100000+01	.100000+01	.100000+01	.100000+01	.100000+01	.100000+01	.5621424+08

SEGMENT LOAD MATRICES

.000000
.2271594+05
.5820002+03
-.7276020+04
.000000
.3251413+05
.1681478+04

•1099563+05

RZERO(I) = 1.999867+U0

RZERO(J) = 3.998933+U0

REGION NUMBER 3

THERE ARE 1 SEGMENTS AND 0 KINEMATIC LINKS WITHIN THIS REGION

SEGMENT NUMBER 1 SEGMENT CODE 11 SPHERE
 DIAU DIFF STEP DELTA
 +2000000-02 +1000000-03 +2000000-03 +0000000
 GEOMETRY INPUT VARIABLES
 *1000000*03 *1000000*01 *0000000
 ISOT ALUM SING THIC NUTH T FREE = 600 NUMBER OF TABLE COLUMNS = 2

MATERIAL PROPERTY TABLE USED

.00000	.00000	.00000	.00000	.00000	.00000	.00000	.00000	.00000	.00000
+1000000-08	.00000	.00000	.00000	.00000	.00000	.00000	.00000	.00000	.00000
.33333*00	.00000	.00000	.00000	.00000	.00000	.00000	.00000	.00000	.00000
.00000	.00000	.00000	.00000	.00000	.00000	.00000	.00000	.00000	.00000

TABLE ORDER PHI OR S VS. CRUSSECTION PROPERTIES

+000000-01	+000000-01
.1094000*01	.1094000*01
.2590000*03	.2590000*03

PROBLEM 1 TABLE ORDER PHI OR S VS. DISTRIBUTED LOADS (F THETA, F PHI, F ZETA, M THETA, M PHI)
 LOAD IDENTIFICATION CLUES 000100
 +1000000-04

MATRIX X AND Y (TRANPOSED) MAGIC OUTPUT

+1347620-34	.0000000	.0000000	+149500+01	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000
.0000000	.7593761*06	-.455725*05	-.24466473*05	.0000000	.9442625*00	-.6470694*02	.2454704*01	.0000000	.0000000
.0000000	.305123*05	+1022262*04	+1702543*04	.0000000	.2222135*01	.0022504*00	.0024064*03	.0000000	.0000000
.0000000	-.3125133*05	.1877333*04	-.7443007*05	.0000000	.2288035*01	.1914242*01	.9439508*00	.0000000	.0000000
+447409*00	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000
.0000000	.8146522*00	-.2222135*01	-.2178601*01	.0000000	.1354434*06	.4754800*08	.1197325*07	.0000000	.0000000
.0000000	.2229499*01	.6642175*00	+1451621*01	.0000000	-.4448639*08	.0023139*08	.1240394*05	.0000000	.0000000
.0000000	.1635377*01	-.9824056*03	.8144117*00	.0000000	-.1197325*07	-.1430773*05	-.1357775*05	.0000000	.0000000
.0000000	.2073302*02	.2442238*04	-.2395372*04	.0000000	.2105410*05	.6766952*03	.1316458*02	.0000000	.0000000

STIFFNESS COEFFICIENTS

	DELTA T1	DELTA Z1	DELTA R1	THETA 1	DELTA T2	DELTA Z2	DELTA R2	THETA 2
FORCT1	.9273845+08	.0000000	.0000000	.0000000	-.6181625+08	.0000000	.0000000	.0000000
FORCZ1	.0000000	.5846802+08	-.5979072+07	-.5342174+08	.0000000	-.5846802+08	.7296397+07	-.6113468+08
FORCR1	.0000000	-.5979072+07	.1749112+09	-.2026779+07	.0000000	.5979072+07	-.1851821+09	-.3778863+07
HOME 1	.0000000	-.5342174+08	-.2026779+07	.6662047+08	.0000000	.5342174+08	.1739762+07	.3781012+08
FORCT2	-.6181625+08	.0000000	.0000000	.0000000	.4124458+08	.0000000	.0000000	.0000000
FORCZ2	.0000000	-.5846802+08	.5979072+07	.5342174+08	.0000000	.5846802+08	-.7296397+07	.6113468+08
FORCR2	.0000000	.7296397+07	-.1851821+09	.1739762+07	.0000000	-.7296397+07	.2263973+09	.4179407+07
HOME 2	.0000000	-.6113468+08	-.3778863+07	.3781012+08	.0000000	.6113468+08	.4179407+07	.8716404+08

SEGMENT-SYMMETRY CHECK

.9273845+08	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000
.1000000+01	.5846801+08	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000
.1000000+01	.1000000+01	.1749112+09	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000
.1000000+01	.1000000+01	.1000000+01	.6662047+08	.0000000	.0000000	.0000000	.0000000	.0000000
.1000000+01	.1000000+01	.1000000+01	.1000000+01	.4124458+08	.0000000	.0000000	.0000000	.0000000
.1000000+01	.1000000+01	.1000000+01	.1000000+01	.1000000+01	.5846801+08	.0000000	.0000000	.0000000
.1000000+01	.1000000+01	.1000000+01	.1000000+01	.1000000+01	.1000000+01	.2263973+09	.0000000	.0000000
.1000000+01	.1000000+01	.1000000+01	.1000000+01	.1000000+01	.1000000+01	.1000000+01	.1000000+01	.8716404+08

SEGMENT LOAD MATRICES

.0000000
.4106620+05
.1888593+04
-.1345622+05
.0000000
.5086572+05
.2719307+04

•1714872•05

RZERO(I) = 3.998933+00

RZERO(J) = 5.998401+00

REGION NUMBER 4

THERE ARE 1 SEGMENTS AND 0 KINEMATIC LINKS WITHIN THIS REGION

SEGMENT NUMBER 1 SEGMENT CODE 11 SPHERE
 DIAU DEF STEP OELIA
 .3000000-02 .1000000-03 .3000000-03 .0000000

GEOMETRY INPUT VARIABLES
 .1000000+03 .1000000+01 .0000000

ISOT ALUM SING THIC NOHM T FIVE NUMBER OF TABLE COLUMNS 2
 .00000 .00000 .00000 .00000 .00000 .00000 .00000 .00000
 .10000+08 .00000 .00000 .00000 .00000 .00000 .00000 .00000
 .33333+00 .00000 .00000 .00000 .00000 .00000 .00000 .00000
 .00000 .00000 .00000 .00000 .00000 .00000 .00000 .00000

MATERIAL PROPERTY TABLE USED
 .00000 .00000 .00000 .00000 .00000 .00000 .00000 .00000
 .1094000+01 .1094000+01
 .2570000+03 .2570000+03

TABLE ORDER PHI OR S VS. CROSSSECTION PROPERTIES
 .00000000-01 .00000000-01
 .1094000+01 .1094000+01
 .2570000+03 .2570000+03

PROBLEM 1 TABLE ORDER PHI OR S VS. DISTRIBUTED LOADS (F THETA, F PHI, F ZETA, M THETA, M PHI)
 LOAD IDENTIFICATION CLUES 000100
 .1466000+04 .1466000+04

MATRIX X AND Y (TRANSPOSED) MAGIC OUTPUT
 .1295905-34 .0000000 .0000000 .1498075+01 .0000000 .0000000 .0000000
 .0000000 .5042961+06 .0000000 .0000000 .9442184+00 .1403418+01 .5519895-01
 .0000000 .0000000 .2752657+04 .0000000 .0000000 .0000000 .0000000
 .0000000 .0000000 .4223799+04 .0000000 .0000000 .0000000 .0000000
 .4451119+00 .0000000 .0000000 .0000000 .0000000 .0000000 .0000000
 .0000000 .8143272+00 .0000000 .0000000 .0000000 .0000000 .0000000
 .0000000 .0000000 .0000000 .0000000 .0000000 .0000000 .0000000
 .0000000 .0000000 .0000000 .0000000 .0000000 .0000000 .0000000
 .0000000 .0000000 .0000000 .0000000 .0000000 .0000000 .0000000
 .0000000 .0000000 .0000000 .0000000 .0000000 .0000000 .0000000

STIFFNESS COEFFICIENTS

	DELTA T1	DELTA Z1	DELTA M1	THETA 1	DELTA T2	DELTA Z2	DELTA M2	THETA 2
FORCT1	.9266490*08	.0000000	.0000000	.0000000	-.6182297*08	.0000000	.0000000	.0000000
FORCZ1	.0000000	.2675168*08	-.1131534*08	-.3564887*08	.0000000	-.2675168*08	.1330252*08	-.4054341*08
FORCR1	.0000000	-.1131534*08	.1742598*09	-.1276193*07	.0000000	.1131534*08	-.1844732*09	-.4729030*07
MOME 1	.0000000	-.3564887*08	-.1276193*07	.0661267*08	.0000000	.3564887*08	.6125131*06	.3776580*08
FORCT2	-.6182297*08	.0000000	.0000000	.0000000	.4124625*08	.0000000	.0000000	.0000000
FORCZ2	.0000000	-.2675168*08	.1131534*08	.3564887*08	.0000000	.2675168*08	-.1330252*08	.4054341*08
FORCR2	.0000000	.1330252*08	-.1844732*09	.6125131*06	.0000000	-.1330252*08	.2256426*09	.5609349*07
MOME 2	.0000000	-.4054341*08	-.4729030*07	.3776580*08	.0000000	.4054341*08	.5609349*07	.8713521*08

SEGMENT SYMMETRY CHECK

.9266490*08	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000
.1000000*01	.2675168*08	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000
.1000000*01	.1000000*01	.1742598*09	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000
.1000000*01	.1000000*01	.1000000*01	.6661267*08	.0000000	.0000000	.0000000	.0000000	.0000000
.1000000*01	.1000000*01	.1000000*01	.1000000*01	.4124625*08	.0000000	.0000000	.0000000	.0000000
.1000000*01	.1000000*01	.1000000*01	.1000000*01	.1000000*01	.2675168*08	.0000000	.0000000	.0000000
.1000000*01	.1000000*01	.1000000*01	.1000000*01	.1000000*01	.1000000*01	.2256426*09	.0000000	.0000000
.1000000*01	.1000000*01	.1000000*01	.1000000*01	.1000000*01	.1000000*01	.1000000*01	.1000000*01	.8713521*08

SEGMENT LOAD MATRICES

.0000000
.9233511*05
.6828065*04
-.4538510*05
.0000000
.1142085*06
.0075157*04

*5782475+05

RZERO(I) = 5.996401+J0

RZERO(J) = 8.987855+U0

REGION NUMBER 5

THERE ARE 1 SEGMENTS AND 0 KINEMATIC LINKS WITHIN THIS REGION

SEGMENT NUMBER 1 SEGMENT CODE 11 SPHERE
 DIAU 0.156 STEP DELTA
 .390700E+02 .100000E-03 .390700E+01 .4000000

GEOMETRY INPUT VARIABLES
 .100000E+03 .100000E+01 .0000000

1507 ALUM SING THIC NOTH T FREE M .000 NUMBER OF TABLE COLUMNS = 2

MATERIAL PROPERTY TABLE USED

.00000	.00000	.00000	.00000	.00000	.00000	.00000	.00000	.00000	.00000
.1000E+08	.00000	.00000	.00000	.00000	.00000	.00000	.00000	.00000	.00000
.3333E+00	.00000	.00000	.00000	.00000	.00000	.00000	.00000	.00000	.00000
.00000	.00000	.00000	.00000	.00000	.00000	.00000	.00000	.00000	.00000

TABLE ORDER PHI ON S VS. CRUSSECTION PROPERTIES
 .1094000E+01 .1590700E+00
 .2590000E+03 .1094000E+01
 .2590000E+03

PROBLEM 1 TABLE ORDER PHI ON S VS. DISTRIBUTED LOADS (F THETA, F PHI, F ZETA, M THETA, M PHI)

LOAD IDENTIFICATION ELVES=000100 .1446000E+04

MATRIX X AND Y (TRANPOSED) MAGIC OUTPUT

.774214E-35	.00000000	.00000000	.142266E+01	.00000000	.00000000	.00000000	.00000000	.00000000	.00000000
.00000000	.3092736E+06	-.4014110E+05	-.7713092E+05	.00000000	.9428379E+00	.4580579E-01	.8280111E-01	.00000000	.00000000
.00000000	.1797100E+05	.3522485E+04	.6905067E+04	.00000000	.4414771E-01	.9915702E+00	.7747280E-02	.00000000	.00000000
.00000000	-.5597020E+05	.7264458E+04	-.2165265E+05	.00000000	.8853694E-01	.3741495E+01	.9355569E+00	.00000000	.00000000
.1676121E+00	.00000000	.00000000	.00000000	.00000000	.00000000	.00000000	.00000000	.00000000	.00000000
.00000000	.8277737E+00	-.4414971E-01	-.8483346E-01	.00000000	.2702920E-06	.8607387E-07	.9106989E-07	.00000000	.00000000
.00000000	.6320332E+01	.6905067E+00	.2930397E+01	.00000000	.6827995E-07	.6741000E-05	.4704993E-05	.00000000	.00000000
.00000000	.5757144E-01	-.7472286E-02	.8219230E+00	.00000000	-.9106989E-07	.5534121E-05	.2697964E-05	.00000000	.00000000
.00000000	.1590700E+03	.1446000E+04	.1590700E+04	.00000000	.1007104E-01	.1007104E-01	.1007104E-01	.00000000	.00000000

STIFFNESS COEFFICIENTS

	DELTA T1	DELTA Z1	DELTA R1	THETA 1	DELTA T2	DELTA Z2	DELTA R2	THETA 2
FORCT1	.1000438+J9	.0000000	.0000000	.0000000	-.6785982+08	.0000000	.0000000	.0000000
FORCZ1	.0000000	.1939430+08	-.1994608+08	-.3112794+08	.0000000	-.1939430+08	.2283033+08	-.3427173+08
FORCR1	.0000000	-.1994608+08	.1952750+09	-.6776401+06	.0000000	.1994608+08	-.2070447+04	-.7072369+07
MOME 1	.0000000	-.3112794+08	-.6776401+06	.7598372+08	.0000000	.3112794+08	-.4769750+06	.4241267+08
FORCT2	-.6785982+08	.0000000	.0000000	.0000000	.4878257+08	.0000000	.0000000	.0000000
FORCZ2	.0000000	-.1939430+08	.1994608+08	.3112794+08	.0000000	.1939430+08	-.2283033+08	.3427173+08
FORCR2	.0000000	.2283033+08	-.2070447+09	-.4769751+06	.0000000	-.2283033+08	.2464384+09	.8534512+07
MOME 2	.0000000	-.3427173+08	-.7072369+07	.4241267+08	.0000000	.3427173+08	.8534512+07	.9646722+08

SEGMENT-SYMMETRY CHECK

.1000438+09	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000
.1000000+01	.1939430+08	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000
.1000000+01	.1000000+01	.1952750+09	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000
.1000000+01	.1000000+01	.1000000+01	.7598372+08	.0000000	.0000000	.0000000	.0000000	.0000000
.1000000+01	.1000000+01	.1000000+01	.1000000+01	.4878257+08	.0000000	.0000000	.0000000	.0000000
.1000000+01	.1000000+01	.1000000+01	.1000000+01	.1000000+01	.1939430+08	.0000000	.0000000	.0000000
.1000000+01	.1000000+01	.1000000+01	.1000000+01	.1000000+01	.1000000+01	.1000000+01	.2464384+09	.0000000
.1000000+01	.1000000+01	.1000000+01	.1000000+01	.1000000+01	.1000000+01	.1000000+01	.1000000+01	.9646722+08

SEGMENT LOAD MATRICES

.0000000	.1767619+06
.2069206+05	.1140086+06
.0000000	.2141873+06
.2120272+05	

•1413626*06

RZERO(1) = 8*987855*00

RZERO(1) = 1*287119*01

REGION NUMBER 6

THERE ARE 1 SEGMENTS AND 0 KINEMATIC LINKS WITHIN THIS REGION

SEGMENT NUMBER 1 SEGMENT CODE 11 SPHERE
 DIAU DIFF STEP DELTA
 .500000-02 .100000-03 .500000-03 .000000

GEOMETRY INPUT VARIABLES
 .100000+03 .100000+01 .000000

ISOT ALUM SING THIC NOTH T-FREE NUMBER OF TABLE COLUMNS 2
 .00000 .00000 .00000 .00000 .00000 .00000 .00000 .00000
 .00000 .00000 .00000 .00000 .00000 .00000 .00000 .00000
 .33333+00 .00000 .00000 .00000 .00000 .00000 .00000 .00000
 .00000 .00000 .00000 .00000 .00000 .00000 .00000 .00000

MATERIAL PROPERTY TABLE USED
 .170070+00
 .1094000+01
 .2590000+03

TABLE ORDER PHI OR S VS. CROSSSECTION PROPERTIES
 .1466000+04

PROBLEM 1 TABLE ORDER PHI OR S VS. DISTRIBUTED LOADS (IF THETA, F PHI, F ZETA, M THETA, M PHI)
 IDENTIFICATION CLEYS 000100
 .1466000+04

MATRIX X AND Y (TRANSPPOSED) MAGIC OUTPUT
 .6497644-05
 .0000000
 .0000000
 .0000000
 .5222025+00
 .0000000
 .0000000
 .0000000
 .0000000
 .0000000
 .0000000

STIFFNESS COEFFICIENTS

	DELTA T1	DELTA Z1	DELTA R1	THETA 1	DELTA T2	DELTA Z2	DELTA R2	THETA 2
FORCT1	.106764*09	.000000	.000000	.000000	-.770818*08	.000000	.000000	.000000
FORCZ1	.000000	.1667243*08	-.3186495*08	-.2733917*08	.000000	.1667243*08	.3588915*08	-.2836397*08
FORCR1	.000000	-.3186495*08	.2127581*09	.8312495*06	.000000	.3186495*08	-.2255376*09	-.1047402*08
HOME 1	.000000	-.2733917*08	.8312495*06	.8458655*08	.000000	.2733917*08	-.2750954*07	.4647276*08
FORCT2	-.770818*08	.000000	.000000	.000000	.5570668*08	.000000	.000000	.000000
FORCZ2	.000000	-.1667243*08	.3186495*08	.2733917*08	.000000	.1667243*08	-.3588915*08	.2836397*08
FORCR2	.000000	.3588915*08	-.2255376*09	-.2750954*07	.000000	-.3588915*08	.2634761*09	.1283353*08
HOME 2	.000000	-.2836397*08	-.1047402*08	.4647276*08	.000000	.2836397*08	.1283353*08	.1050178*09

SEGMENT SYMMETRY CHECK

.106764*09	.000000	.000000	.000000	.000000	.000000	.000000	.000000	.000000
.100000*01	.1667243*08	.000000	.000000	.000000	.000000	.000000	.000000	.000000
.100000*01	.100000*01	.2127581*09	.000000	.000000	.000000	.000000	.000000	.000000
.100000*01	.100000*01	.100000*01	.8458655*08	.000000	.000000	.000000	.000000	.000000
.100000*01	.100000*01	.100000*01	.100000*01	.5570668*08	.000000	.000000	.000000	.000000
.100000*01	.100000*01	.100000*01	.100000*01	.100000*01	.1667243*08	.000000	.000000	.000000
.100000*01	.100000*01	.100000*01	.100000*01	.100000*01	.100000*01	.100000*01	.2634761*09	.000000
.100000*01	.100000*01	.100000*01	.100000*01	.100000*01	.100000*01	.100000*01	.100000*01	.1050178*09

SEGMENT LOAD MATRICES

.000000
 .317478*06
 .577240*05
 .264767*06
 .000000
 .3806392*06
 .7837640*05

•3216499+06

RZERO(I) = 1.287119+01 RZERO(J) = 1.781145+01

REGION NUMBER 7

THERE ARE 1 SEGMENTS AND 0 KINEMATIC LINKS WITHIN THIS REGION

SEGMENT NUMBER 1 SEGMENT CODE 11 SPHERE
 DIAU OFF SIER DELIA
 20000000002 10000000003 70000000003 000000000

GEOMETRY INPUT VARIABLES
 10000000003 10000000001 000000000

ISOT ALUM SING THIC NOSH I FACE 000 NUMBER OF TABLE COLUMNS = 2

MATERIAL PROPERTY TABLE USED

.00000	.00000	.00000	.00000	.00000	.00000	.00000	.00000	.00000	.00000
.00000	.00000	.00000	.00000	.00000	.00000	.00000	.00000	.00000	.00000
.3333300	.00000	.00000	.00000	.00000	.00000	.00000	.00000	.00000	.00000
.00000	.00000	.00000	.00000	.00000	.00000	.00000	.00000	.00000	.00000

17907000000 24907000000
 10940000001 10940000001
 25900000003 25900000003

TABLE ORDER PHI OR S VS. CROSSSECTION PROPERTIES
 PROBLEM 1 TABLE ORDER PHI OR S VS. DISTRIBUTED LOADS (F THEIA, F PHI, F ZETA, M THEIA, M PHI)
 LOAD IDENTIFICATION CLUES 000100
 14600000004 14600000004

MATRIX X AND Y (TRANSPPOSE) MAGIC OUTPUT

.3145288-35	.0000000	.0000000	.1383857-01	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000
.0000000	.1406307+06	-.3576964+05	-.1247011+06	.0000000	.9480074+00	.3655869+00	.2404755+00	.0000000	.0000000
.0000000	.2545591+05	.6674822+04	.2257200+05	.0000000	.7001067-01	.0187162+00	.4353183-01	.0000000	.0000000
.0000000	-.59221775+05	.2345573+05	.3958315+05	.0000000	.2658711+00	.6613357+01	.8659713+00	.0000000	.0000000
.5221017+00	.0000000	.0000000	.0000000	.1457785-05	.0000000	.0000000	.0000000	.0000000	.0000000
.0000000	.8323442+00	-.7891067-01	-.2751005+00	.0000000	.5060612-06	.9369387-06	.5305523-06	.0000000	.0000000
.0000000	.34223756+00	.6645672+00	.521467+01	.0000000	.0780784+06	.3934881-04	.1600186-04	.0000000	.0000000
.0000000	.1711483+00	-.4353183-01	.7649703+00	.0000000	-.5305523+06	-.1785148+04	-.4824062-05	.0000000	.0000000
.0000000	-.9187878+03	.8078231+04	.3027731+05	.0000000	.1046542-02	.1046542+00	.5893424-01	.0000000	.0000000

STIFFNESS COEFFICIENTS

	DELTA T1	DELTA Z1	DELTA R1	THETA 1	DELTA T2	DELTA Z2	DELTA R2	THETA 2
FORCT1	.105211+09	.0000000	.0000000	.0000000	-.7624593+08	.0000000	.8000000	.0000000
FORCT2	.0000000	.1594132+08	-.4403627+08	-.2093643+08	.0000000	.1594132+08	.4954266+08	-.1769133+08
FORCT3	.0000000	-.4403627+08	.2093643+08	.2093643+08	.0000000	.4403627+08	-.2170131+09	-.1570358+08
FORME 1	.0000000	-.2093643+08	.4403627+08	.0000000	.5507272+08	.0000000	.0000000	.0000000
FORCT2	.0000000	.1594132+08	-.4403627+08	.2093643+08	.0000000	.1594132+08	-.4954266+08	.1769133+08
FORCT2	.0000000	.4954266+08	-.2170131+09	-.9035861+07	.0000000	-.4954266+08	.2544342+09	.2028319+08
FORME 2	.0000000	-.1769133+08	.1570358+08	.4517416+08	.0000000	.1769133+08	.2028319+08	.1048268+09

SEGMENT SYMMETRY CHECK

.105211+09	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000
.1000000+01	.1594132+08	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000
.1000000+01	.1000000+01	.2093627+09	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000
.1000000+01	.1000000+01	.1600000+01	.8431633+08	.0000000	.0000000	.0000000	.0000000	.0000000
.1000000+01	.1000000+01	.1000000+01	.1000000+01	.507272+08	.0000000	.0000000	.0000000	.0000000
.1000000+01	.1000000+01	.1000000+01	.1000000+01	.1000000+01	.1594132+08	.0000000	.0000000	.0000000
.1000000+01	.1000000+01	.1600000+01	.1000000+01	.1000000+01	.1000000+01	.1000000+01	.2544342+09	.0000000
.1000000+01	.1000000+01	.1600000+01	.1000000+01	.1000000+01	.1000000+01	.1000000+01	.1000000+01	.1048268+09

SEGMENT LOAD MATRICES

.0000000
.5925631+06
.1888400+08
-.7131486+06
.0000000
.7411488+06
.7605456+05

•9664672+06

RZER01J) = 1.781145+J1

RZER01J) = 2.465028+J1

REGION NUMBER 8

THERE ARE 1 SEGMENTS AND 0 KINEMATIC LINKS WITHIN THIS REGION

SEGMENT NUMBER 1 SEGMENT CODE 11 SPHERE
 DIAU DLEF STEP DELIA
 10000000001 10000000002 10000000002 0000000
 GEOMETRY INPUT VARIABLES
 10000000003 10000000001 00000000
 1001 ALUM SING INIC NOTH FREE 0000 NUMBER OF TABLE COLUMNS 2

MATERIAL PROPERTY TABLE USED

00000	00000	00000	00000	00000	00000	00000	00000	00000	00000
10000000	00000	00000	00000	00000	00000	00000	00000	00000	00000
3333300	00000	00000	00000	00000	00000	00000	00000	00000	00000
00000	00000	00000	00000	00000	00000	00000	00000	00000	00000

TABLE ORDER PHI OR S VS. CROSSSECTION PROPERTIES

24970000	34970000
1094000001	1094000001
2570000003	2570000003

PROBLEM 1 TABLE ORDER PHI OR S VS. DISTRIBUTED LOADS (F THETA, F PHI, F ZETA, M THETA, M PHI)

LOAD IDENTIFICATION CELVES 000100

144000004	144000004
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MATRIX X AND Y (TRANSPPOSED) MAGIC OUTPUT

1963000035	0000000	0000000	1307500001	0000000	0000000
0000000	940610505	-342358605	-0000000	070249900	117989701
0000000	237245705	870724404	-077411206	0000000	660502000
0000000	128945506	469329105	145524006	0000000	833864201
519433900	0000000	0000000	0000000	0000000	0000000
0000000	811019100	-106129700	-549967000	0000000	391853505
0000000	911047000	411686400	770775101	0000000	113491903
0000000	345400100	-125717000	526460000	0000000	337075704
0000000	316567304	116667805	001688906	0000000	430854800

STIFFNESS COEFFICIENTS

	DELTA T1	DELTA Z1	DELTA R1	THETA 1	DELTA T2	DELTA Z2	DELTA R2	THETA 2
FORC1	.1027279+09	.0000000	.0000000	.0000000	-.7403779+08	.0000000	.0000000	.0000000
FORC2	.0000000	.2165884+08	-.5764714+08	-.1890944+08	.0000000	-.2165884+08	.6487096+08	-.6010244+07
FORC3	.0000000	-.5764714+08	.1874687+09	.1343930+08	.0000000	.5764714+08	-.1975449+09	-.2520807+08
MOME 1	.0000000	-.1890944+08	.1343936+08	.8454789+08	.0000000	.1890944+08	-.2086280+08	.4078165+08
FORC12	-.7403779+08	.0000000	.0000000	.0000000	.5336034+08	.0000000	.0000000	.0000000
FORC22	.0000000	-.2165884+08	.5764714+08	.1890944+08	.0000000	.2165884+08	-.6487096+08	.6010244+07
FORC32	.0000000	.6487096+08	-.1975449+09	-.2086280+08	.0000000	-.6487096+08	.2332535+09	.3427213+08
MOME 2	.0000000	-.6010244+07	-.2520807+08	.4078165+08	.0000000	.6010244+07	.3427213+08	.1058464+09

SEGMENT SYMMETRY CHECK

.1027279+09	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000
.1000000+01	.2165884+08	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000
.1000000+01	.1000000+01	.1874687+09	.0000000	.0000000	.0000000	.0000000	.0000000	.0000000
.1000000+01	.1000000+01	.1000000+01	.8454789+08	.0000000	.0000000	.0000000	.0000000	.0000000
.1000000+01	.1000000+01	.1000000+01	.1000000+01	.5336034+08	.0000000	.0000000	.0000000	.0000000
.1000000+01	.1000000+01	.1000000+01	.1000000+01	.1000000+01	.2165884+08	.0000000	.0000000	.0000000
.1000000+01	.1000000+01	.1000000+01	.1000000+01	.1000000+01	.1000000+01	.2332535+09	.0000000	.0000000
.1000000+01	.1000000+01	.1000000+01	.1000000+01	.1000000+01	.1000000+01	.1000000+01	.1000000+01	.1058464+09

SEGMENT LOAD MATRICES

.0000000
.1052735+07
-.7060087+06
-.1956293+07
.0000000
.1536373+07
-.8844265+05

*2381258*07

RZERO(1) = 2.465028*01

RZERO(J) = 3.420240*01

INPUT DATA FOR REGION COURPING

NUMBER OF REGION JOINTS 9 NUMBER OF KINEMATIC LINKS 0

REGION	JOINT(I)	JOINT(J)
1	1	2
2	2	3
3	3	4
4	4	5
5	5	6
6	6	7
7	7	8
8	8	9

BOUNDARY CONDITIONS

JOINT	DELTA T	DELTA Z	DELTA R	THETA	ANGLE ALPHA
1	0	1	0	0	.0000000
2	0	1	1	1	.0000000
3	0	1	1	1	.0000000
4	0	1	1	1	.0000000
5	0	1	1	1	.0000000
6	0	1	1	1	.0000000
7	0	1	1	1	.0000000
8	0	1	1	1	.0000000
9	0	0	0	0	.0000000

THE EXPANDED REGION JOINT DISPLACEMENT MATRIX (REGION END DEFLECTIONS)

JOINT	PROBLEM	DELTA T	DELTA Z	DELTA R	OMEGA-THETA
1	1	.0000000	-.6700190+00	.0000000	.0000000
2	1	.0000000	-.6704985+00	-.6951262-02	+.9832217-03
3	1	.0000000	-.6727613+00	-.1743667-01	+.1392611-02
4	1	.0000000	-.6746771+00	-.2718540-01	+.8773725-03
5	1	.0000000	-.6733347+00	-.4127046-01	+.1351894-02
6	1	.0000000	-.6559306+00	-.5772956-01	+.7190935-02
7	1	.0000000	+.5874700+00	-.7075722-01	+.2005414-01
8	1	.0000000	-.3642717+00	-.5617755-01	+.4254944-01
9	1	.0000000	.0000000	.0000000	.0000000

REGION NUMBER 1

THERE ARE 1 SEGMENTS AND 5 KINEMATIC LINKS WITHIN THIS REGION

SEGMENT NUMBER 1 SEGMENT CODE 11 SPHERE

PHI OR S N-META NPPI OMEGATH

1.000000-02	-3.7578581+04	-1.1393584+05	0.000000
1.100000-02	-4.4570165+04	-1.0794371+05	1.5901918-04
1.200000-02	-4.9585189+04	-1.0232987+05	2.9729625+04
1.300000-02	-5.3489697+04	-9.8428063+04	4.1895316+04
1.400000-02	-5.6589472+04	-9.5332327+04	5.2697477+04
1.500000-02	-5.9091888+04	-9.2835141+04	6.2359154+04
1.600000-02	-6.1141601+04	-9.0791721+04	7.1046375+04
1.700000-02	-6.2842006+04	-8.9098566+04	7.8893390+04
1.800000-02	-6.4268571+04	-8.7680098+04	8.6032836+04
1.900000-02	-6.5477510+04	-8.6480078+04	9.2458029+04
2.000000-02	-6.6511231+04	-8.5455969+04	9.8326417+04

REGION NUMBER 2

THERE ARE 1 SEGMENTS AND 8 KINEMATIC LINKS WITHIN THIS REGION

SEGMENT NUMBER 1 SEGMENT CODE 11 SPHERE

PHASOR S	NIMETA	NRHJ	OMEGACALC
2+0000000002	-6.6511220+04	-8.5455946+34	9.8322167-04
2+2000000002	-6.8176219+04	-8.3812046+04	1.0850972-03
2+4000000002	-6.994480233+04	-8.2563479+04	1.1090594-03
2+6000000002	-7.0442923+04	-8.1593566+04	1.2375610-03
2+8000000002	-7.1237176+04	-8.0825723+04	1.2724052-03
3+0000000002	-7.1882446+04	-8.0207984+04	1.3349492-03
3+2000000002	-7.2414737+04	-7.9709084+04	1.3862337-03
3+4000000002	-7.2859740+04	-7.9288082+04	1.3870688-03
3+6000000002	-7.3233184+04	-7.8941024+04	1.3780722-03
3+8000000002	-7.3559963+04	-7.8648800+04	1.3998039-03
4+0000000002	-7.3833561+04	-7.8400722+04	1.3372829-03

REGION NUMBER 3

THERE ARE 1 SEGMENTS AND 0 KINSMATIC LINKS WITHIN THIS REGION

SEGMENT NUMBER 1 SEGMENT CODE 11 SPHERE

PHI OR S	NHETA	NPHI	OMEGATH
4.000000-02	-7.3935543+04	-7.8408673+04	1.3926114+03
4.200000-02	-7.4076976+04	-7.8188529+04	1.3769051+03
4.400000-02	-7.4288455+04	-7.8005722+04	1.3528600+03
4.600000-02	-7.4474844+04	-7.7847805+04	1.3206820+03
4.800000-02	-7.4637786+04	-7.7771053+04	1.2805352+03
5.000000-02	-7.4786956+04	-7.7589724+04	1.2325393+03
5.200000-02	-7.4918213+04	-7.7483878+04	1.1767999+03
5.400000-02	-7.5035752+04	-7.7390451+04	1.1133688+03
5.600000-02	-7.5141118+04	-7.7307652+04	1.0423073+03
5.800000-02	-7.5239872+04	-7.7233987+04	9.6363766+04
6.000000-02	-7.5320664+04	-7.7168201+04	8.7737099+04

REGION NUMBER 4

THERE ARE 1 SEGMENTS AND 0 KINEMATIC LINKS WITHIN THIS REGION

SEGMENT NUMBER 1 SEGMENT CODE 11 SPHERE

PHI OR S	NINETA	NPPI	OMEGAIN
6.000000-02	-7.5320884+04	-7.7168262+04	8.7737258+04
6.300000-02	-7.5432134+04	-7.7082078+04	7.3380869+04
6.600000-02	-7.5525750+04	-7.7008331+04	5.7307082+04
6.900000-02	-7.5604110+04	-7.6944677+04	3.9510013+04
7.200000-02	-7.5667280+04	-7.6887229+04	1.9967456+04
7.500000-02	-7.5718364+04	-7.6840447+04	-1.3383682-05
7.800000-02	-7.5758108+04	-7.6797061+04	-2.4430173+04
8.100000-02	-7.5781629+04	-7.6758007+04	-4.9333058+04
8.400000-02	-7.5798224+04	-7.6722390+04	-7.6074033+04
8.700000-02	-7.5797044+04	-7.6689445+04	-1.0468159+03
9.000000-02	-7.5786655+04	-7.6661533+04	-1.93204676+03
9.000000-02	-7.5787136+04	-7.6658514+04	-1.3518531+03

REGION NUMBER 5

THERE ARE 1 SEGMENTS AND 0 KINEMATIC LINKS WITHIN THIS REGION

SEGMENT NUMBER I SEGMENT CODE II SPHERE

PHI OR S	MTHTA	NPHI	OMEGATH
9.000000-02	-7.5787130+04	-7.6658513+04	-1.3518945+03
9.3907000-02	-7.5756537+04	-7.6620309+04	-1.7780812+03
9.7814000-02	-7.5705536+04	-7.6583954+04	-2.2376243+03
1.0172100-01	-7.5633928+04	-7.6547007+04	-2.67312019+03
1.0562800-01	-7.5590789+04	-7.6510141+04	-3.2594807+03
1.0953500-01	-7.5425394+04	-7.6472127+04	-3.8231043+03
1.1344200-01	-7.5288935+04	-7.6432307+04	-4.4228823+03
1.1734900-01	-7.5124446+04	-7.6390082+04	-5.0587791+03
1.2125600-01	-7.4936913+04	-7.6344901+04	-5.731928+03
1.2516300-01	-7.4723251+04	-7.6286251+04	-6.4424934+03
1.2907000-01	-7.4482346+04	-7.623646+04	-7.1909116+03

REGION NUMBER

THERE ARE 1 SEGMENTS AND 0 KINEMATIC LINKS WITHIN THIS REGION

SEGMENT NUMBER 1 SEGMENT CODE 11 SPHERE

PHI OR S	THETA	NPHI	OMEGATH
1.297000-01	-7.4482338+04	-7.6243634+04	-7.1909347-03
1.3407000-01	-7.4132439+04	-7.6169816+04	-8.2043227-03
1.3707000-01	-7.3733520+04	-7.6097860+04	-9.2607042-03
1.4407000-01	-7.3283028+04	-7.5996897+04	-1.0419166-02
1.4707000-01	-7.2778394+04	-7.5878073+04	-1.1620225-02
1.5407000-01	-7.2217049+04	-7.5784645+04	-1.2882778-02
1.5707000-01	-7.1978455+04	-7.5681774+04	-1.4205557-02
1.6407000-01	-7.0914139+04	-7.5526731+04	-1.5586770-02
1.6707000-01	-7.0167719+04	-7.5378785+04	-1.7027050-02
1.7407000-01	-6.9354927+04	-7.5217232+04	-1.8514399-02
1.7697000-01	-6.8584936+04	-7.5057536+04	-1.9790054-02
1.7907000-01	-6.8473674+04	-7.5041392+04	-2.0054128-02

REGION NUMBER 7

THERE ARE 1 SEGMENTS AND 0 KINEMATIC LINKS WITHIN THIS REGION

SEGMENT NUMBER 1 SEGMENT CODE 11 SPHERE

RHI OR S	THETA	PHI	OMEGATH
1.7907000-01	-6.8473676+04	-7.5844400+04	-2.0054435-02
1.8607000-01	-6.7121328+04	-7.4769980+04	-2.2284112-02
1.9307000-01	-6.5826700+04	-7.4467585+04	-2.4587153-02
2.0007000-01	-6.3986534+04	-7.4132652+04	-2.6944900-02
2.0707000-01	-6.2198982+04	-7.3763771+04	-2.9335184-02
2.1407000-01	-6.0263876+04	-7.3359714+04	-3.1731608-02
2.2107000-01	-5.8183038+04	-7.2919460+04	-3.4103496-02
2.2807000-01	-5.5960602+04	-7.2442237+04	-3.6414937-02
2.3507000-01	-5.3603362+04	-7.1927552+04	-3.8625042-02
2.4207000-01	-5.1121146+04	-7.1375234+04	-4.0687317-02
2.4907000-01	-4.8527208+04	-7.0785474+04	-4.2544421-02

REGION NUMBER 8

THERE ARE 1 SEGMENTS AND 0 KINEMATIC LINKS WITHIN THIS REGION

SEGMENT NUMBER 1 SEGMENT CODE 11 SPHERE

PHI OR S	THETA	NPPI	OMEGAIN
2.4207000-01	4.8527264+04	7.8285486+04	4.2548443+02
2.5907000-01	4.9662545+04	6.9879338+04	4.4745111-02
2.6907000-01	4.0870783+04	6.8901555+04	4.8218731-02
2.7907000-01	3.6637516+04	6.7857809+04	4.6749777-02
2.8907000-01	3.72671561+04	6.8756328+04	4.8089666-02
2.9907000-01	2.8907439+04	6.5608234+04	4.3963080-02
3.0907000-01	2.55908076+04	6.4427880+04	4.0067203-02
3.1907000-01	2.2667174+04	6.3233186+04	3.4076087-02
3.2907000-01	2.0811297+04	6.2045769+04	2.8593353-02
3.3907000-01	1.9601471+04	6.0892241+04	2.4407690-02
3.4907000-01	1.8934150+04	5.9902479+04	2.2850240-06

HARMONIC (N) = 0

ESTIMATE 1

EIGENVALUES

5.154602-02	5.580068-01	1.484175+00	6.457445+00	2.123939+01	5.252149+01	7.242711+01	1.246345+02
2.553712+02	2.785716+02	5.572310+02	6.397332+02	1.087772+03	1.359774+03	2.520337+03	2.779940+03
4.627928+03	6.280241+03	9.803854+03	1.524000+04	2.291746+04	6.919496+04		

THE CURRENT LOAD MULTIPLICATION FACTOR = 5.154602-02

THE CURRENT FREQUENCY = 6.325210+02 RADIANS/SECOND

HARMONIC (N) = 0

ESTIMATE 2

EIGENVALUES

1.002295+00 1.085126+01 2.901602+01 1.254413+02 4.155880+02 1.023947+03 1.406389+03 2.423905+03
 4.959737+03 5.371958+03 1.085848+04 1.211938+04 2.011432+04 2.838252+04 4.500892+04 5.375178+04
 8.968703+04 1.218394+05 1.899273+05 2.962919+05 4.416260+05 1.343243+06

EIGENVECTOR 1

-5.968978-03 -5.897469-03 -2.759741-05 -1.320612-04 -5.436990-03 -5.617543-05 -3.184121-04 -4.652471-03
 5.623370-05 4.573970+04 -3.083387+03 2.757884+06 -5.674652-04 -8.974089-04 1.603591-04 -5.718298-04
 1.018704-03 3.485588-04 -2.246019-04 1.119960-03 2.926265-04 1.427717+04

EIGENVECTOR 2

-1.609242-04 -1.385270-04 1.187692-06 -4.137413-05 1.199960-06 6.629749-06 -9.428726-05 2.222644-04
 1.971967+05 -1.227694+04 5.964044-04 4.891341-05 -1.175590+04 9.185187+04 8.625525+05 -3.895070+05
 7.906103+04 7.765263-05 8.0121732-05 1.149611-04 -1.870355-05 7.421563-05

THE CURRENT LOAD MULTIPLICATION FACTOR = 5.164433-02

THE CURRENT FREQUENCY = 6.332465+J2 RAD/SECONDS

REGION NUMBER 1

THERE ARE 1 SEGMENTS AND 0 KINEMATIC LINKS WITHIN THIS REGION.

SEGMENT NUMBER 1 SEGMENT CODE 11 SPHERE

PHI	OR	S	U	V	W	X	Y	Z	OMEGA	INEL
1-000000-02	0-000000	0-000000	0-000000	0-000000	0-000000	0-000000	0-000000	0-000000	0-000000	0-000000
1-100000-02	0-000000	0-000000	0-000000	0-000000	0-000000	0-000000	0-000000	0-000000	0-000000	0-000000
1-200000-02	0-000000	0-000000	0-000000	0-000000	0-000000	0-000000	0-000000	0-000000	0-000000	0-000000
1-300000-02	0-000000	0-000000	0-000000	0-000000	0-000000	0-000000	0-000000	0-000000	0-000000	0-000000
1-400000-02	0-000000	0-000000	0-000000	0-000000	0-000000	0-000000	0-000000	0-000000	0-000000	0-000000
1-500000-02	0-000000	0-000000	0-000000	0-000000	0-000000	0-000000	0-000000	0-000000	0-000000	0-000000
1-600000-02	0-000000	0-000000	0-000000	0-000000	0-000000	0-000000	0-000000	0-000000	0-000000	0-000000
1-700000-02	0-000000	0-000000	0-000000	0-000000	0-000000	0-000000	0-000000	0-000000	0-000000	0-000000
1-800000-02	0-000000	0-000000	0-000000	0-000000	0-000000	0-000000	0-000000	0-000000	0-000000	0-000000
1-900000-02	0-000000	0-000000	0-000000	0-000000	0-000000	0-000000	0-000000	0-000000	0-000000	0-000000
2-000000-02	0-000000	0-000000	0-000000	0-000000	0-000000	0-000000	0-000000	0-000000	0-000000	0-000000

REGION NUMBER 2

THERE ARE 1 SEGMENTS AND 0 KINEMATIC LINKS WITHIN THIS REGION

SEGMENT NUMBER 1 SEGMENT CODE 11 SPHERE

PHI	OR	S	U	V	W	OMEGA	THETA	U	V	W	OMEGA	THETA
2.00000000-02	0.00000000	9.0349617-05	5.8968411-03	-1.32061-04	0.00000000	3.9578090-06	1.3847551-04	0.00000000	1.2953590-04	1.2953590-04	4.13741-05	
2.20000000-02	0.00000000	9.7411619-05	5.8680882-03	-1.53440-04	0.00000000	4.3611411-06	1.2953590-04	0.00000000	1.2953590-04	1.2953590-04	4.78797-05	
2.40000000-02	0.00000000	1.0795574-04	5.7835129-03	-1.77000-04	0.00000000	4.77479127-06	1.2953590-04	0.00000000	1.2953590-04	1.2953590-04	5.40559-05	
2.60000000-02	0.00000000	1.1175235-04	5.7981157-03	-1.93872-04	0.00000000	5.0986496-06	1.0791391-04	0.00000000	1.0791391-04	1.0791391-04	5.99419-05	
2.80000000-02	0.00000000	1.1895730-04	5.7571739-03	-2.13144-04	0.00000000	5.4725446-06	9.5348631-05	0.00000000	9.5348631-05	9.5348631-05	6.55830-05	
3.00000000-02	0.00000000	1.2615016-04	5.7124182-03	-2.31875-04	0.00000000	5.7332095-06	8.1683596-05	0.00000000	8.1683596-05	8.1683596-05	7.09352-05	
3.20000000-02	0.00000000	1.3330923-04	5.6639527-03	-2.50705-04	0.00000000	6.0078277-06	6.6696754-05	0.00000000	6.6696754-05	6.6696754-05	7.78068-05	
3.40000000-02	0.00000000	1.4041724-04	5.6118748-03	-2.67859-04	0.00000000	6.2508898-06	5.1247676-05	0.00000000	5.1247676-05	5.1247676-05	8.09689-05	
3.60000000-02	0.00000000	1.4745878-04	5.5562778-03	-2.85135-04	0.00000000	6.4412877-06	3.7457038-05	0.00000000	3.7457038-05	3.7457038-05	8.58384-05	
3.80000000-02	0.00000000	1.5442095-04	5.4972523-03	-3.02005-04	0.00000000	6.6369828-06	1.6981741-05	0.00000000	1.6981741-05	1.6981741-05	9.00784-05	
4.00000000-02	0.00000000	1.6124107-04	5.44348877-03	-3.18811-04	0.00000000	6.7778300-06	1.14721047-05	0.00000000	1.14721047-05	1.14721047-05	9.44282-05	

REGION NUMBER 3

THERE ARE 1 SEGMENTS AND 0 KINEMATIC LINKS WITHIN THIS REGION

SEGMENT NUMBER 1 SEGMENT CODE 11 SPHERE

PHI	OR	S	U	V	E	C	T	O	R	I	U	Y	W	OMEGA	THETA	
4.000000	02	0	000000	1.6129169	04	5.4388869	03	-3.18412	04	0.000000	6.2763006	04	-1.4721174	06	-9.42873	05
4.200000	02	0	000000	1.6805834	04	5.3692714	03	-3.04375	04	0.000000	6.8772993	06	-2.0743847	05	-9.82546	05
4.400000	02	0	000000	1.7477125	04	5.3009943	03	-3.19894	04	0.000000	6.7366197	06	-1.0765003	05	-1.01997	04
4.600000	02	0	000000	1.8124414	04	5.2286451	03	-3.04963	04	0.000000	6.9587181	06	-6.1550663	05	-1.05482	04
4.800000	02	0	000000	1.8784428	04	5.1538144	03	-3.17957	04	0.000000	6.7361336	06	-6.2770398	05	-1.08733	04
5.000000	02	0	000000	1.9390455	04	5.0760941	03	-3.17332	04	0.000000	6.8694874	06	-1.0505621	04	-1.11743	04
5.200000	02	0	000000	2.0001659	04	4.9955774	03	-4.07419	04	0.000000	6.7574926	06	-1.2749856	04	-1.14503	04
5.400000	02	0	000000	2.0597403	04	4.9123593	03	-4.20624	04	0.000000	6.5989583	06	-1.5086710	04	-1.17007	04
5.600000	02	0	000000	2.1178645	04	4.8265365	03	-4.33945	04	0.000000	6.3727724	06	-1.7497076	04	-1.19256	04
5.800000	02	0	000000	2.1739338	04	4.7382073	03	-4.45572	04	0.000000	6.1380209	06	-1.9857773	04	-1.21245	04
6.000000	02	0	000000	2.2284227	04	4.6474718	03	-4.57296	04	0.000000	5.8337629	06	-2.2301552	04	-1.22969	04

REGION NUMBER 4

THERE ARE 1 SEGMENTS AND 0 KINEMATIC LINKS WITHIN THIS REGION

SEGMENT NUMBER 1 SEGMENT CODE 11 SPHERE

PHI	OR	S	U	V	W	X	Y	Z	OMEGA	THETA
6.00000000	02	0.00000000	2.2244228-04	4.6474710-03	-4.57297-04	0.00000000	5.8137632-06	-2.2301552-04	-1.22269-04	-1.22269-04
6.30000000	02	0.00000000	2.3067224-04	4.5070788-03	-9.73720-04	0.00000000	5.2825881-06	-2.5024298-04	-1.25011-04	-1.25011-04
6.60000000	02	0.00000000	2.3807223-04	4.3616531-03	-7.87263-04	0.00000000	4.6194894-06	-2.7779970-04	-1.26501-04	-1.26501-04
6.90000000	02	0.00000000	2.4502378-04	4.2121537-03	-5.03598-04	0.00000000	3.8340430-06	-3.3611469-04	-1.27426-04	-1.27426-04
7.20000000	02	0.00000000	2.5150786-04	4.0583479-03	-5.15500-04	0.00000000	2.9734176-06	-3.7744169-04	-1.27778-04	-1.27778-04
7.50000000	02	0.00000000	2.5751482-04	3.9008104-03	-5.28348-04	0.00000000	1.9174084-06	-4.1233968-04	-1.27844-04	-1.27844-04
7.80000000	02	0.00000000	2.6302446-04	3.7397222-03	-5.38820-04	0.00000000	7.8376265-07	-4.5089900-04	-1.28272-04	-1.28272-04
8.10000000	02	0.00000000	2.6802602-04	3.5760702-03	-5.47999-04	0.00000000	-4.6629249-07	-4.8872062-04	-1.28317-04	-1.28317-04
8.40000000	02	0.00000000	2.7250023-04	3.4096457-03	-5.55973-04	0.00000000	-1.8300270-06	-5.1260271-04	-1.28318-04	-1.28318-04
8.70000000	02	0.00000000	2.7646132-04	3.2410438-03	-5.62429-04	0.00000000	-3.3051986-06	-5.6264131-04	-1.20730-04	-1.20730-04
8.97000000	02	0.00000000	2.7945988-04	3.0877692-03	-5.67198-04	0.00000000	-4.7284275-06	-5.9485831-04	-1.17702-04	-1.17702-04
9.00000000	02	0.00000000	2.7987795-04	3.0706624-03	-5.67662-04	0.00000000	-4.6885169-06	-5.9838700-04	-1.17859-04	-1.17859-04

REGION NUMBER 6

THERE ARE 1 SEGMENTS AND 6 KINEMATIC LINKS WITHIN THIS REGION

SEGMENT NUMBER 1 SEGMENT CODE 11 SPHERE

PHI OR S	U	V	W	M	OMEGA	INETA	U	V	W	OMEGA	INETA
9.0000000002	0.00000000	2.792770504	3.070659603	5.6766503	0.00000000	4.888516300	5.943868204	-1.1755904			
9.3907000002	0.00000000	2.835101204	2.846756203	5.7248904	0.00000000	7.105344900	6.433182604	-1.1245604			
9.7814000002	0.00000000	2.862100704	2.821395503	5.7506304	0.00000000	9.487810300	6.801170704	-1.0666304			
1.0172100001	0.00000000	2.879709904	2.395458703	5.7539704	0.00000000	1.202297105	7.265278804	-1.0027204			
1.0562800001	0.00000000	2.887917704	2.189820203	5.7331404	0.00000000	1.469715805	7.642224804	-9.3286505			
1.0953500001	0.00000000	2.886761804	1.945343403	5.6944904	0.00000000	1.749493405	7.991615204	-8.5508105			
1.1344200001	0.00000000	2.873329604	1.722876703	5.6324504	0.00000000	2.039226905	8.308924504	-7.7282805			
1.1734700001	0.00000000	2.856758104	1.503248803	5.5495704	0.00000000	2.339154305	8.592528004	-6.8318205			
1.2125900001	0.00000000	2.829234104	1.287265003	5.4485104	0.00000000	2.645156705	8.840222404	-5.8888805			
1.2516300001	0.00000000	2.790994804	1.075703003	5.3240104	0.00000000	2.955762905	9.049952104	-4.8951505			
1.2907300001	0.00000000	2.745325104	0.893088003	5.1822404	0.00000000	3.268055605	9.219817704	-3.8552105			

REGION NUMBER 7

THERE ARE 1 SEGMENTS AND 0 KINEMATIC LINKS WITHIN THIS REGION

SEGMENT NUMBER I SEGMENT CODE II SPHERE

PHI	OR	S	U	V	W	OMEGA	THETA	U	V	W	OMEGA	THETA
1.2907000	01	0.0000000	1.6153933	04	-1.0644979	03	-2.24402	04	0.0000000	-6.64408	225	05
1.8607000	01	0.0000000	1.4166316	04	1.2057925	03	-1.76127	04	0.0000000	-7.30315	04	04
1.9307000	01	0.0000000	1.2195718	04	-1.3132449	03	1.72844	04	0.0000000	-6.70759	44	03
2.0007000	01	0.0000000	1.0279750	04	-1.3876955	03	-8.23563	05	0.0000000	-6.70761	41	05
2.0707000	01	0.0000000	8.4533446	05	-1.4305333	03	-3.06151	05	0.0000000	-6.81678	18	05
2.1407000	01	0.0000000	6.7478644	05	-1.4436502	03	2.09800	06	0.0000000	-6.44222	44	05
2.2107000	01	0.0000000	5.1897743	05	-1.4293907	03	3.41845	05	0.0000000	-6.11172	42	05
2.2807000	01	0.0000000	3.7990910	05	-1.3904871	03	7.21400	05	0.0000000	-5.87504	68	05
2.3507000	01	0.0000000	2.5948576	05	-1.3299894	03	1.00503	04	0.0000000	-5.80343	18	05
2.4207000	01	0.0000000	1.5757646	05	-1.2511922	03	1.24163	04	0.0000000	-5.08985	54	05
2.4907000	01	0.0000000	7.5222403	06	-1.1575547	03	1.42700	04	0.0000000	-4.84652	13	05

REGION NUMBER 8

THERE ARE 1 SEGMENTS AND 0 KINEMATIC LINKS WITHIN THIS REGION

SEGMENT NUMBER 1 SEGMENT CODE 11 SPHERE

V E C T O R 1 V E C T O R 2

PHI OR S	U	V	N	OMEGA IMETA	U	V	W	OMEGA IMET
2.4907000*01	0.0000000	7.6234821*04	-1.1575332*03	1.42722*04	0.0000000	-4.6464420*05	-1.0660313*04	7.42156*05
2.5907000*01	0.0000000	-1.0220069*06	-1.0050700*03	1.60502*04	0.0000000	-3.9856044*05	4.0258254*05	5.77750*05
2.6907000*01	0.0000000	-8.7226423*05	8.3788733*04	1.981745*04	0.0000000	-3.3355527*05	4.2666577*08	4.005801*05
2.7907000*01	0.0000000	8.3527979*06	-6.7182553*04	1.66325*04	0.0000000	-2.7277880*05	4.1690191*05	2.38217*05
2.8907000*01	0.0000000	-8.42897165*06	-5.0990248*04	1.58037*04	0.0000000	-2.1811344*05	5.807779*05	8.73013*05
2.9907000*01	0.0000000	-7.1256590*06	-3.6197478*04	1.38585*04	0.0000000	-1.7098461*05	6.0489720*05	-3.66577*06
3.0907000*01	0.0000000	-5.1837471*06	2.3447571*04	1.75483*04	0.0000000	-1.3035161*05	5.2237805*05	-1.24700*05
3.1907000*01	0.0000000	-3.2192967*06	-1.3223772*04	8.63857*05	0.0000000	-9.4916078*06	3.7252587*05	-1.69590*05
3.2907000*01	0.0000000	-1.6453307*06	5.84901271*05	5.07777*05	0.0000000	-8.7288844*06	2.0733820*05	-1.76594*05
3.3907000*01	0.0000000	-6.1600561*07	-1.4495900*05	2.70035*05	0.0000000	-3.1276254*06	5.9372271*06	-1.10014*05
3.4907000*01	0.0000000	-2.885392*09	-5.3527616*08	-1.66000*08	0.0000000	-3.7721066*11	-5.88666620*10	1.41375*10

BOUNDARY CONDITIONS

JOINT	DELTA T	DELTA Z	DELTA R	THETA	ANGLE ALPHA
1	1	2	0	1	.10000000
2	1	1	1	1	.00000000
3	1	1	1	1	.00000000
4	1	1	1	1	.00000000
5	1	1	1	1	.00000000
6	1	1	1	1	.00000000
7	1	1	1	1	.00000000
8	1	1	1	1	.00000000
9	0	0	0	0	.00000000

HARMONIC (N) = 1

ESTIMATE 1

EIGENVALUES

1.308092-01	5.500903-01	3.471592+00	1.277263+01	1.816957+01	3.780914+01	4.854556+01	8.990561+01
1.304669+02	1.510673+02	2.016592+02	3.042039+02	3.924386+02	4.205217+02	6.213542+02	8.9909712+02
9.315521+02	1.238920+03	1.634772+03	1.899554+03	2.838672+03	3.195194+03	3.784597+03	6.926568+03
7.032615+03	8.227016+03	1.723652+04	2.844336+04	3.712879+04	4.162415+04	1.0580165+05	

THE CURRENT LOAD MULTIPLICATION FACTOR = 1.308092-01

THE CURRENT FREQUENCY = 1.607626+03 RADIANS/SECOND

HARMONIC (N) = 1

ESTIMATE 2

EIGENVALUES

1.002009+00 4.232318+00 2.674294+01 9.838370+01 1.390951+02 2.909022+02 3.717256+02 6.510684+02
 9.982551+02 1.755967+03 1.544662+03 2.327203+03 3.003066+03 3.217036+03 4.7751005+03 6.143223+03
 7.123340+03 9.473307+03 1.250206+04 1.452391+04 2.170288+04 2.443318+04 2.893274+04 5.292364+04
 5.373209+04 6.754718+04 1.0318122+05 2.173223+05 2.834501+05 3.7192230+05 1.396443+06

EIGENVECTOR 1

-1.837413-04 -1.837610-04 -1.992388-04 -1.839832-04 -1.894371-04 -1.866060-04 -1.943910-04 -1.831620-04
 6.027010-04 1.991183-04 -2.8147810-04 -1.860734-04 1.026867-03 2.201634-04 -2.047936-04 -1.205687-04
 1.553971-03 2.583630-04 -1.387563-04 -1.497612-04 1.835562-03 2.873062-04 -1.932452-06 -1.134941-04
 1.446277-03 2.364279-04 1.423474-04 -6.0039547-05 3.825088-04 6.089361-05 1.228619-04

EIGENVECTOR 2

1.522988-05 1.519597-05 -1.505761-04 1.507069-05 1.432622-04 -1.306789-05 -1.427362-04 1.573035-05
 4.258854-04 4.588987-06 -1.340622-04 1.787788-05 6.554901-04 6.735619-06 -9.078442-05 2.346574-05
 7.793233-04 1.556231-05 1.214868-05 3.245021-05 4.753138-04 -1.490788-05 1.337604-04 3.942244-05
 -2.82228-04 -1.144342-04 1.417783-04 3.066791-05 -6.393602-04 -1.807048-04 4.753584-05

THE CURRENT LOAD MULTIPLICATION FACTOR = 1.310720-01

THE CURRENT FREQUENCY = 1.068631+03 RADIANS/SECOND

REGION-NUMBER 1

THERE ARE 1 SEGMENTS AND 0 KINEMATIC LINKS WITHIN THIS REGION

SEGMENT NUMBER 1 SEGMENT CODE 11 SPHERE

V E C T O R I V E C T O R I V E C T O R I V E C T O R I V E C T O R I V E C T O R I

PHI	OR	S	U	V	W	X	Y	Z	U	V	W	X	Y	Z	OMEGA	THETA
1.000000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	1.519597	1.0000	1.776356	8.16	1.4827	120.05	1.50676	0.04
1.100000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	1.520512	0.0000	1.4827	120.05	1.4827	120.05	1.46588	0.04
1.200000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	1.522750	0.0000	1.4827	120.05	1.4827	120.05	1.44150	0.04
1.300000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	1.526842	0.0000	1.4827	120.05	1.4827	120.05	1.42727	0.04
1.400000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	1.538848	0.0000	1.4827	120.05	1.4827	120.05	1.41978	0.04
1.500000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	1.546923	0.0000	1.4827	120.05	1.4827	120.05	1.41668	0.04
1.600000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	1.550000	0.0000	1.4827	120.05	1.4827	120.05	1.41649	0.04
1.700000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	1.550000	0.0000	1.4827	120.05	1.4827	120.05	1.41812	0.04
1.800000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	1.550000	0.0000	1.4827	120.05	1.4827	120.05	1.42002	0.04
1.900000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	1.550000	0.0000	1.4827	120.05	1.4827	120.05	1.42403	0.04
2.000000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	1.550000	0.0000	1.4827	120.05	1.4827	120.05	1.42736	0.04

REGION NUMBER 2

THERE ARE 1 SEGMENTS AND 0 KINEMATIC LINKS WITHIN THIS REGION

SEGMENT NUMBER 1 SEGMENT CODE 11 SPHERE

PHI OR S	U	V	W	OMEGA THEIA	U	V	X	Y	Z	OMEGA THEI
2.000000*02	-1.8328120-04	1.82278018-04	1.9313104-04	1.94331-04	1.5070090-05	-1.5230332-05	-1.4297222-04	-1.4297222-04	-1.4297222-04	-1.4297222-04
2.200000*02	-1.8398745-04	1.8235645-04	-2.3246597-04	-1.97320-04	1.5072750-05	-1.6243796-05	-1.7154824-04	-1.7154824-04	-1.7154824-04	-1.43322-04
2.400000*02	-1.8397441-04	1.8165407-04	2.87296741-04	-2.00256-04	1.5066171-05	-1.6613368-05	-2.0022220-04	-2.0022220-04	-2.0022220-04	-1.43763-04
2.600000*02	-1.8394329-04	1.8127328-04	-3.1347901-04	-2.03016-04	1.5117387-05	-1.7039507-05	-2.12894355-04	-2.12894355-04	-2.12894355-04	-1.43793-04
2.800000*02	-1.8389335-04	1.8081073-04	-3.5470438-04	-2.05578-04	1.5106885-05	-1.7522555-05	-2.5767841-04	-2.5767841-04	-2.5767841-04	-1.43842-04
3.000000*02	-1.8382389-04	1.7986555-04	-3.9641506-04	-2.07878-04	1.5218385-05	-1.8062704-05	-2.8626551-04	-2.8626551-04	-2.8626551-04	-1.42922-04
3.200000*02	-1.8373425-04	1.7703638-04	-4.3855547-04	-2.09687-04	1.5229743-05	-1.8659973-05	-3.1471981-04	-3.1471981-04	-3.1471981-04	-1.41921-04
3.400000*02	-1.8362381-04	1.7812199-04	-4.8106559-04	-2.11590-04	1.5377969-05	-1.9314199-05	-3.4293361-04	-3.4293361-04	-3.4293361-04	-1.40534-04
3.600000*02	-1.8349199-04	1.7772190-04	-5.2368279-04	-2.12778-04	1.5400234-05	-2.0025034-05	-3.708992-04	-3.708992-04	-3.708992-04	-1.39758-04
3.800000*02	-1.8333822-04	1.7603335-04	-5.6694302-04	-2.14041-04	1.5597664-05	-2.0791940-05	-3.9833127-04	-3.9833127-04	-3.9833127-04	-1.38600-04
4.000000*02	-1.8316199-04	1.7485738-04	-6.1018150-04	-2.14781-04	1.5793037-05	-2.1614188-05	-4.12530130-04	-4.12530130-04	-4.12530130-04	-1.37488-04

REGION NUMBER 3

THERE ARE 1 SEGMENTS AND 0 KINEMATIC LINKS WITHIN THIS REGION

SEGMENT NUMBER 1 SEGMENT CODE 11 SPHERE

PH	OR	S	U	V	W	X	Y	Z	Theta	Omega	Theta						
4.0000000	02	-1.8316283	04	1.7485232	04	-6.1418147	04	-2.14781	04	1.5730350	05	-2.1611469	05	-4.2536126	04	-1.14062	04
4.2000000	02	-1.8296285	04	1.7359268	04	-6.5353316	04	-2.15197	04	1.5877014	05	-2.2490172	05	-4.5184426	04	-1.31152	04
4.4000000	02	-1.8274028	04	1.7223880	04	-6.7893321	04	-2.15271	04	1.6030076	05	-2.3419938	05	-4.7770998	04	-1.27707	04
4.6000000	02	-1.8249389	04	1.7079541	04	-7.4031704	04	-2.15064	04	1.6216555	05	-2.4400703	05	-5.0288992	04	-1.24332	04
4.8000000	02	-1.8222329	04	1.6926232	04	-7.8362061	04	-2.14519	04	1.6402799	05	-2.5432519	05	-5.2732010	04	-1.20423	04
5.0000000	02	-1.8192812	04	1.6763952	04	-8.2678049	04	-2.13659	04	1.6617214	05	-2.6513258	05	-5.5093629	04	-1.16207	04
5.2000000	02	-1.8160809	04	1.6592712	04	-8.6973402	04	-2.12789	04	1.6840145	05	-2.7641129	05	-5.7736762	04	-1.11686	04
5.4000000	02	-1.8126280	04	1.6412543	04	-9.1241933	04	-2.11013	04	1.7077911	05	-2.8814170	05	-5.9598124	04	-1.06875	04
5.6000000	02	-1.8089208	04	1.6223968	04	-9.5477549	04	-2.09235	04	1.7330291	05	-3.0030262	05	-6.1182924	04	-1.01779	04
5.8000000	02	-1.8049585	04	1.6025608	04	-9.9674234	04	-2.07100	04	1.7597038	05	-3.1287122	05	-6.3605462	04	-9.64118	05
6.0000000	02	-1.8007332	04	1.5818978	04	-1.0382610	03	-2.04979	04	1.7877671	05	-3.2582314	05	-6.6547143	04	-9.07847	05

REGION NUMBER 4

THERE ARE 1 SEGMENTS AND 6 KINEMATIC LINKS WITHIN THIS REGION

SEGMENT NUMBER I SEGMENT CODE II SPHERE

V E C T O R I V E C T O R II V E C T O R III

PHI OR S	U	V	W	OMEGA THETA	U	V	W	OMEGA THETA	U	V	W	OMEGA THETA
6.000000-02	-1.80071336-04	1.58189792-04	-1.0382608-03	-2.647294-04	1.7877875-05	-3.2582316-05	-6.15471449-04	-9.407844-05	1.8321735-05	-3.4589407-05	-6.8051863-04	-8.18453-05
6.300000-02	-1.7939105-04	1.5492844-04	-1.0995718-03	-2.00709-04	1.8795703-05	-3.6667308-05	-7.0597308-04	-7.25047-05	1.9278432-05	-3.8806311-05	-7.2376462-04	-6.27966-05
6.600000-02	-1.7864444-04	1.53147800-04	-1.1199553-03	-1.98002-04	1.9828448-05	-4.0995658-05	-7.4096582-04	-5.27574-05	2.0364166-05	-4.3224465-05	-7.5514382-04	-4.24260-05
6.900000-02	-1.7784832-04	1.4763694-04	-1.2180214-03	-1.90692-04	2.0828773-05	-5.2229838-05	-7.7969830-04	-9.89356-07	2.1565843-05	-4.7754161-05	-7.7395575-04	-2.10504-05
7.200000-02	-1.7698741-04	1.44057649-04	-1.2747975-03	-1.84862-04	2.2168126-05	-5.7003088-05	-7.7848398-04	-1.00916-05	2.2828773-05	-5.44321839-05	-7.77993287-04	-1.10294-05
7.500000-02	-1.7636658-04	1.4002661-04	-1.3297111-03	-1.78357-04	2.3465734-05	-5.4545120-05	-7.7756888-04	1.21474-05	2.0828773-05	-5.44321839-05	-7.77993287-04	-1.10294-05
7.800000-02	-1.7508587-04	1.3585600-04	-1.3825987-03	-1.71362-04	2.3465734-05	-5.4545120-05	-7.7756888-04	1.21474-05	2.0828773-05	-5.44321839-05	-7.77993287-04	-1.10294-05
8.100000-02	-1.7404541-04	1.3153306-04	-1.4333049-03	-1.63903-04	2.3465734-05	-5.4545120-05	-7.7756888-04	1.21474-05	2.0828773-05	-5.44321839-05	-7.77993287-04	-1.10294-05
8.400000-02	-1.7294544-04	1.2705088-04	-1.4816823-03	-1.55950-04	2.3465734-05	-5.4545120-05	-7.7756888-04	1.21474-05	2.0828773-05	-5.44321839-05	-7.77993287-04	-1.10294-05
8.700000-02	-1.7178635-04	1.2242725-04	-1.5275926-03	-1.47551-04	2.3465734-05	-5.4545120-05	-7.7756888-04	1.21474-05	2.0828773-05	-5.44321839-05	-7.77993287-04	-1.10294-05
8.970000-02	-1.7084300-04	1.1818024-04	-1.5866952-03	-1.39837-04	2.3465734-05	-5.4545120-05	-7.7756888-04	1.21474-05	2.0828773-05	-5.44321839-05	-7.77993287-04	-1.10294-05
9.000000-02	-1.7056660-04	1.1766857-04	-1.5709062-03	-1.38738-04	2.3465734-05	-5.4545120-05	-7.7756888-04	1.21474-05	2.0828773-05	-5.44321839-05	-7.77993287-04	-1.10294-05

REGION NUMBER 5

THERE ARE 1 SEGMENTS AND 0 KINEMATIC LINKS WITHIN THIS REGION

SEGMENT NUMBER I SEGMENT CODE II SPHERE

PHI - OR S	U	V	W	OMEGA - THETA	U	V	W	OMEGA - THETA
9.000000-02	-1.705687-04	1.174886-04	-1.676907-03	-1.387360-04	2.348673-05	-5.454512-05	-7.275678-04	1.214872-05
9.390700-02	-1.688961-04	1.112856-04	-1.623227-03	-1.26689-04	2.435522-05	-5.741101-05	-7.697499-04	2.67030-05
9.781400-02	-1.671267-04	1.047144-04	-1.607067-03	-1.174060-04	2.524457-05	-6.016844-05	-7.950276-04	4.07222-05
1.017210-01	-1.652623-04	9.798026-05	-1.713107-03	-1.00446-04	2.614875-05	-6.284887-05	-7.373540-04	5.47384-05
1.084280-01	-1.633047-04	9.110770-05	-1.750283-03	-8.74058-05	2.708247-05	-6.536402-05	-7.713095-04	6.80658-05
1.095350-01	-1.612571-04	8.413077-05	-1.782073-03	-7.35284-05	2.786053-05	-6.770677-05	-6.837301-04	8.08314-05
1.134420-01	-1.571214-04	7.707257-05	-1.808369-03	-5.993878-05	2.889783-05	-6.985077-05	-6.447891-04	9.29670-05
1.173490-01	-1.569007-04	6.996512-05	-1.829060-03	-4.50792-05	2.990841-05	-7.177104-05	-6.106369-04	1.04384-04
1.212500-01	-1.545982-04	6.285713-05	-1.844120-03	-3.00691-05	3.070750-05	-7.344024-05	-5.679644-04	1.15052-04
1.251630-01	-1.522171-04	5.572613-05	-1.853525-03	-1.62703-05	3.158991-05	-7.484782-05	-5.202865-04	1.24813-04
1.290700-01	-1.497810-04	4.865753-05	-1.867277-03	-1.453863-05	3.245019-05	-7.596245-05	-4.674443-04	1.33758-04

REGION NUMBER 6

THERE ARE 1 SEGMENTS AND 6 KINEMATIC LINKS WITHIN THIS REGION

SEGMENT NUMBER 1 SEGMENT CODE 11 SPHERE

PHI OR S	U	V	W	OMEGA THETA	U	V	W	OMEGA THETA
1.2307000-01	-1.4926115-04	4.6657476-05	-1.8522734-03	-1.93245-06	3.2450211-05	-7.5962434-05	-4.6944137-04	1.33740-04
1.3407000-01	-1.4951511-04	3.9727078-05	-1.8539208-03	1.61685-05	3.3494956-05	-7.6922674-05	-3.9967198-04	1.934469-04
1.3907000-01	-1.4216048-04	3.0987249-05	-1.8415743-03	3.35997-05	3.4486337-05	-7.7360859-05	-3.12952622-04	1.51234-04
1.4407000-01	-1.37057-04	2.2502961-05	-1.8204911-03	5.09164-05	3.5414262-05	-7.7240825-05	-2.4799752-04	1.57007-04
1.4907000-01	-1.3015979-04	1.4433658-05	-1.7710079-03	6.72476-05	3.6269197-05	-7.7655677-05	-1.6809720-04	1.60757-04
1.5407000-01	-1.3253175-04	6.5485737-06	-1.7535361-03	8.26879-05	3.7042249-05	-7.8305128-05	-8.6814302-05	1.62477-04
1.5907000-01	-1.2883111-04	8.0613335-07	-1.7685570-03	9.771034-05	3.7748247-05	-7.8491638-05	-5.1940644-06	1.62177-04
1.6407000-01	-1.2506735-04	-7.6762356-06	-1.6566157-03	1.10375-04	3.8310813-05	-7.91132162-05	7.5765792-05	1.59892-04
1.6907000-01	-1.2125073-04	-1.4016245-08	-1.5983144-03	1.23395-04	3.8742429-05	-6.8251465-05	1.5508572-04	1.55677-04
1.7407000-01	-1.1738911-04	1.9786970-05	-1.5343049-03	1.33073-04	3.9164499-05	-6.8885716-05	2.3181481-04	1.49606-04
1.7857000-01	-1.1388466-04	-2.44467183-05	-1.4723864-03	1.41473-04	3.9401857-05	-6.91476503-05	2.9798586-04	1.42633-04
1.7907000-01	-1.1349391-04	-2.44956193-05	-1.4652809-03	1.42333-04	3.9422348-05	-6.91077174-05	3.0504593-04	1.41774-04

REGION NUMBER 7

THERE ARE 1 SEGMENTS AND 6 KINEMATIC LINKS WITHIN THIS REGION

SEGMENT NUMBER 1 SEGMENT CODE 11 SPHERE

PHI OR S	U	V	E	C	T	O	R	I	W	OMEGA THETA	U	V	E	C	T	O	K	2	W	OMEGA THETA
1.7907000-01	-7.134944-04	-2.4956425-05	-1.4452620-03	-1.42342-04	3.942444-05	-6.1077116-05	3.0504932-04	1.41776-04	3.942444-05	-6.1077116-05	3.0504932-04	1.41776-04	3.942444-05	-6.1077116-05	3.0504932-04	1.41776-04	3.942444-05	-6.1077116-05	3.0504932-04	1.41776-04
1.8607000-01	-1.0800335-04	-3.1139459-05	-1.3615850-03	1.52618-04	3.9544478-05	-5.5087438-05	3.9987885-04	1.27067-04	3.9544478-05	-5.5087438-05	3.9987885-04	1.27067-04	3.9544478-05	-5.5087438-05	3.9987885-04	1.27067-04	3.9544478-05	-5.5087438-05	3.9987885-04	1.27067-04
1.9307000-01	-7.0249772-04	-3.2605658-05	-1.2215815-03	1.60300-04	3.9443019-05	-4.8920734-05	4.8324321-04	1.10340-04	3.9443019-05	-4.8920734-05	4.8324321-04	1.10340-04	3.9443019-05	-4.8920734-05	4.8324321-04	1.10340-04	3.9443019-05	-4.8920734-05	4.8324321-04	1.10340-04
2.0007000-01	-9.6977611-05	-3.9698470-05	-1.1373678-03	1.64762-04	3.9095745-05	-4.1559925-05	5.5445811-04	9.19831-05	3.9095745-05	-4.1559925-05	5.5445811-04	9.19831-05	3.9095745-05	-4.1559925-05	5.5445811-04	9.19831-05	3.9095745-05	-4.1559925-05	5.5445811-04	9.19831-05
2.0707000-01	-9.1489948-05	-4.2087344-05	-1.0210579-03	1.66241-04	3.8504950-05	-3.4339983-05	6.1231139-04	7.23603-05	3.8504950-05	-3.4339983-05	6.1231139-04	7.23603-05	3.8504950-05	-3.4339983-05	6.1231139-04	7.23603-05	3.8504950-05	-3.4339983-05	6.1231139-04	7.23603-05
2.1407000-01	-8.6047839-05	-4.3287022-05	-9.0471605-04	1.64841-04	3.7695090-05	-2.7241359-05	6.5608139-04	5.19603-05	3.7695090-05	-2.7241359-05	6.5608139-04	5.19603-05	3.7695090-05	-2.7241359-05	6.5608139-04	5.19603-05	3.7695090-05	-2.7241359-05	6.5608139-04	5.19603-05
2.2107000-01	-8.0670255-05	-4.3378056-05	-7.9031059-04	1.60729-04	3.6866980-05	-2.7026487-05	6.8537859-04	3.11539-05	3.6866980-05	-2.7026487-05	6.8537859-04	3.11539-05	3.6866980-05	-2.7026487-05	6.8537859-04	3.11539-05	3.6866980-05	-2.7026487-05	6.8537859-04	3.11539-05
2.2807000-01	-7.5373740-05	-4.2477377-05	-6.7967059-04	1.54133-04	3.5433058-05	-1.3723438-05	6.9999490-04	1.03973-05	3.5433058-05	-1.3723438-05	6.9999490-04	1.03973-05	3.5433058-05	-1.3723438-05	6.9999490-04	1.03973-05	3.5433058-05	-1.3723438-05	6.9999490-04	1.03973-05
2.3507000-01	-7.0172179-05	-4.0722335-05	-5.7444872-04	1.49331-04	3.4400722-05	-7.7356266-05	7.0020834-04	9.89503-05	3.4400722-05	-7.7356266-05	7.0020834-04	9.89503-05	3.4400722-05	-7.7356266-05	7.0020834-04	9.89503-05	3.4400722-05	-7.7356266-05	7.0020834-04	9.89503-05
2.4207000-01	-6.5076610-05	-3.8267352-05	-4.7607827-04	1.34647-04	3.2413951-05	-2.4798446-05	6.8645347-04	2.93243-05	3.2413951-05	-2.4798446-05	6.8645347-04	2.93243-05	3.2413951-05	-2.4798446-05	6.8645347-04	2.93243-05	3.2413951-05	-2.4798446-05	6.8645347-04	2.93243-05
2.4907000-01	-6.0095121-05	-3.5277358-05	-3.8576303-04	1.22439-04	3.0697793-05	-1.9137355-05	8.5947567-04	4.75255-05	3.0697793-05	-1.9137355-05	8.5947567-04	4.75255-05	3.0697793-05	-1.9137355-05	8.5947567-04	4.75255-05	3.0697793-05	-1.9137355-05	8.5947567-04	4.75255-05

REGION-NUMBER-0

THERE ARE 1 SEGMENTS AND 0 KINEMATIC LINKS WITHIN THIS REGION

SEGMENT NUMBER 1 SEGMENT CODE 11 SPHERE

PHI OR S	U	V	W	OMEGA	THEIA	U	V	W	OMEGA	THEIA
2.4907000-01	-6.6025475-05	-3.15224725-05	-3.8571589-04	1.422462-04	3.0662707-05	1.52127056-06	6.5945817-04	-4.753536-05		
2.5907000-01	-5.3187254-05	-3.0409587-05	-2.7243330-04	1.03160-04	2.7880295-05	6.5551284-06	6.0032861-04	-6.95000-05		
2.6907000-01	-4.6526340-05	-2.5207749-05	-1.7916203-04	8.27374-05	2.4407297-05	9.2300766-06	5.2205516-04	-8.44818-05		
2.7907000-01	-4.0106300-05	-2.0239443-05	-1.0643372-04	6.23764-05	2.1795419-05	1.0129267-05	4.3355773-04	-9.23618-05		
2.8907000-01	-3.3717238-05	-1.5853988-05	-5.3616632-05	4.31890-05	1.8827115-05	9.8002979-06	3.4007081-04	-9.33618-05		
2.9907000-01	-2.7918030-05	-1.1694747-05	-1.8999320-05	2.82264-05	1.5427113-05	8.0731183-06	2.4876637-04	-8.80101-05		
3.0907000-01	-2.2099009-05	-8.4201864-06	1.1080672-07	1.23794-05	1.2249952-05	6.0725734-06	1.6574422-04	-7.77846-05		
3.1907000-01	-1.6424723-05	-5.7690723-06	7.2141996-06	2.37898-06	9.1129511-06	4.0437268-06	9.5952739-05	-6.16522-05		
3.2907000-01	-1.088559-05	-3.9338658-06	-8.4527017-06	-3.22884-06	8.0287371-06	2.2785257-06	4.3485881-05	-4.78108-05		
3.3907000-01	-5.3987942-06	-1.7155180-06	2.4186331-06	-4.07993-06	2.9913614-06	9.5290997-07	1.0999644-05	-2.18267-05		
3.4907000-01	-2.6652318-06	-1.5922227-06	-2.8785228-08	-8.17252-09	-1.4901949-10	3.8883858-09	7.3210920-08	-2.131724-08		

BOUNDARY CONDITIONS				
JOINT	DELTA 1	DELTA 2	DELTA R	ANGLE ALPHA
1	0	0	0	0000000
2	1	1	1	0000000
3	1	1	1	0000000
4	1	1	1	0000000
5	1	1	1	0000000
6	1	1	1	0000000
7	1	1	1	0000000
8	1	1	1	0000000
9	0	0	0	0000000

HARMONIC (N) = 2

ESTIMATE 1

EIGENVALUES

1.176530+02	1.124612+00	5.859384+00	1.988959+01	4.240133+01	5.363517+01	8.737032+01	1.174472+02
1.915010+02	2.460317+02	2.695777+02	4.205581+02	5.222930+02	6.287171+02	8.153035+02	1.076314+03
1.313449+03	1.790680+03	2.184141+03	2.555278+03	4.115178+03	4.359919+03	5.506028+03	8.817177+03
1.160971+04	1.651343+04	2.211859+04	6.183678+04				

THE CURRENT LOAD MULTIPLICATION FACTOR = 1.176530-02

THE CURRENT FREQUENCY = 3-021891+02 RADIANS/SECOND

HARMONIC (n) = 2

ESTIMATE 2

EIGENVALUES

1.003921+00	9.634321+01	5.026252+02	1.705383+03	3.608384+03	4.583116+03	7.439524+03	1.000879+04
1.628895+04	2.711123+04	2.295188+04	3.575867+04	4.476252+04	5.343412+04	7.257081+04	8.910877+04
1.115507+05	1.522273+05	1.855920+05	2.179137+05	3.507864+05	3.716229+05	4.691603+05	7.605936+05
9.875536+05	1.402707+06	1.875856+06	5.716970+06				

EIGENVECTOR 1

-6.566959+05	1.140458+04	5.291442+05	-1.911740+04	-1.987390+04	8.978630+04	1.604709+04	-3.878052+04
-2.197651+04	1.601475+03	2.840106+04	-5.105932+04	-3.040293+04	3.223194+03	5.061647+04	-5.459628+04
-3.616443+04	4.976358+03	7.938223+04	3.717183+04	-3.895027+04	5.291196+03	9.287158+04	1.870548+04
-2.098576+04	2.465059+03	5.001767+04	4.885927+04				

EIGENVECTOR 2

-3.703785+06	2.389785+05	3.277072+06	-3.895344+05	-7.999485+06	1.404219+04	1.9176461+05	-7.320154+05
-1.046333+05	3.700078+04	2.343772+05	8.253127+05	-9.888555+06	5.088841+04	4.180277+05	4.807474+05
-1.688899+06	5.136597+04	4.188706+05	4.928861+05	1.352923+05	3.708685+05	-2.743896+05	1.205592+04
2.012863+05	-4.551599+04	-1.137973+04	5.795747+06				

THE CURRENT LOAD MULTIPLICATION FACTOR = 1.681142-02

THE CURRENT FREQUENCY = 3.022808+02 RAD/ANS/SECOND

REGION NUMBER 1

THERE ARE 1 SEGMENTS AND 0 KINEMATIC LINKS WITHIN THIS REGION

SEGMENT NUMBER 1 SEGMENT CODE 11 SPHERE

PHI OR S	U	V	E	C	T	O	R	I	W	OMEGA	THETA	U	V	E	C	T	O	R	2	W	OMEGA	THETA	
1.000000-02	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
1.100000-02	1.0474265-05	4.3713316-06	4.3713316-06	-1.8587397-06	-1.8587397-06	-1.8587397-06	-1.8587397-06	-1.8587397-06	-1.8587397-06	-1.8587397-06	-1.8587397-06	-1.8587397-06	-1.8587397-06	-1.8587397-06	-1.8587397-06	-1.8587397-06	-1.8587397-06	-1.8587397-06	-1.8587397-06	-1.8587397-06	-1.8587397-06	-1.8587397-06	-1.8587397-06
1.200000-02	1.9776979-05	7.3289827-06	7.3289827-06	-6.8913988-06	-6.8913988-06	-6.8913988-06	-6.8913988-06	-6.8913988-06	-6.8913988-06	-6.8913988-06	-6.8913988-06	-6.8913988-06	-6.8913988-06	-6.8913988-06	-6.8913988-06	-6.8913988-06	-6.8913988-06	-6.8913988-06	-6.8913988-06	-6.8913988-06	-6.8913988-06	-6.8913988-06	-6.8913988-06
1.300000-02	2.6726863-05	1.4545618-05	1.4545618-05	-1.4386150-05	-1.4386150-05	-1.4386150-05	-1.4386150-05	-1.4386150-05	-1.4386150-05	-1.4386150-05	-1.4386150-05	-1.4386150-05	-1.4386150-05	-1.4386150-05	-1.4386150-05	-1.4386150-05	-1.4386150-05	-1.4386150-05	-1.4386150-05	-1.4386150-05	-1.4386150-05	-1.4386150-05	-1.4386150-05
1.400000-02	3.3455999-05	1.9858971-05	1.9858971-05	-2.4233798-05	-2.4233798-05	-2.4233798-05	-2.4233798-05	-2.4233798-05	-2.4233798-05	-2.4233798-05	-2.4233798-05	-2.4233798-05	-2.4233798-05	-2.4233798-05	-2.4233798-05	-2.4233798-05	-2.4233798-05	-2.4233798-05	-2.4233798-05	-2.4233798-05	-2.4233798-05	-2.4233798-05	-2.4233798-05
1.500000-02	3.9686232-05	2.5168250-05	2.5168250-05	-3.5495523-05	-3.5495523-05	-3.5495523-05	-3.5495523-05	-3.5495523-05	-3.5495523-05	-3.5495523-05	-3.5495523-05	-3.5495523-05	-3.5495523-05	-3.5495523-05	-3.5495523-05	-3.5495523-05	-3.5495523-05	-3.5495523-05	-3.5495523-05	-3.5495523-05	-3.5495523-05	-3.5495523-05	-3.5495523-05
1.600000-02	4.5331311-05	3.0429644-05	3.0429644-05	-4.8905435-05	-4.8905435-05	-4.8905435-05	-4.8905435-05	-4.8905435-05	-4.8905435-05	-4.8905435-05	-4.8905435-05	-4.8905435-05	-4.8905435-05	-4.8905435-05	-4.8905435-05	-4.8905435-05	-4.8905435-05	-4.8905435-05	-4.8905435-05	-4.8905435-05	-4.8905435-05	-4.8905435-05	-4.8905435-05
1.700000-02	5.0736281-05	3.5615070-05	3.5615070-05	-6.3212005-05	-6.3212005-05	-6.3212005-05	-6.3212005-05	-6.3212005-05	-6.3212005-05	-6.3212005-05	-6.3212005-05	-6.3212005-05	-6.3212005-05	-6.3212005-05	-6.3212005-05	-6.3212005-05	-6.3212005-05	-6.3212005-05	-6.3212005-05	-6.3212005-05	-6.3212005-05	-6.3212005-05	-6.3212005-05
1.800000-02	5.5694799-05	4.0711008-05	4.0711008-05	-7.7210375-05	-7.7210375-05	-7.7210375-05	-7.7210375-05	-7.7210375-05	-7.7210375-05	-7.7210375-05	-7.7210375-05	-7.7210375-05	-7.7210375-05	-7.7210375-05	-7.7210375-05	-7.7210375-05	-7.7210375-05	-7.7210375-05	-7.7210375-05	-7.7210375-05	-7.7210375-05	-7.7210375-05	-7.7210375-05
1.900000-02	6.0596684-05	4.5714670-05	4.5714670-05	-9.6520651-05	-9.6520651-05	-9.6520651-05	-9.6520651-05	-9.6520651-05	-9.6520651-05	-9.6520651-05	-9.6520651-05	-9.6520651-05	-9.6520651-05	-9.6520651-05	-9.6520651-05	-9.6520651-05	-9.6520651-05	-9.6520651-05	-9.6520651-05	-9.6520651-05	-9.6520651-05	-9.6520651-05	-9.6520651-05
2.000000-02	6.5569587-05	5.0622780-05	5.0622780-05	-1.1508099-04	-1.1508099-04	-1.1508099-04	-1.1508099-04	-1.1508099-04	-1.1508099-04	-1.1508099-04	-1.1508099-04	-1.1508099-04	-1.1508099-04	-1.1508099-04	-1.1508099-04	-1.1508099-04	-1.1508099-04	-1.1508099-04	-1.1508099-04	-1.1508099-04	-1.1508099-04	-1.1508099-04	-1.1508099-04

REGION NUMBER 2

THERE ARE 1 SEGMENTS AND 6 KINEMATIC LINKS WITHIN THIS REGION

SEGMENT NUMBER 1 SEGMENT CODE 11 SPHERE

PMI-OR-S	U	V	W	OMEGA	INERTIA	U	V	W	OMEGA	INERTIA
2-000000-02	-6.5646959-05	5-0632780-05	-1-1508099-04	-1-21174-04	-3-2037852-06	2-7984913-06	2-3958412-05	-3-955144-05	-3-955144-05	OMEGA INERT
2-200000-02	7-4932459-05	6-0161112-05	1-5576325-04	-2-14297-04	-4-2196089-06	3-2929646-06	-3-2330641-05	-4-40628-05	-4-40628-05	
2-400000-02	-8-3840914-05	8-9398721-05	2-0095797-04	2-08173-04	-4-7105673-06	3-7830576-06	-4-7137478-05	-4-82610-05	-4-82610-05	
2-600000-02	-9-2487271-05	7-8268811-05	2-5044692-04	-2-57105-04	-5-1809677-06	4-1785476-06	-5-1631911-05	-5-21865-05	-5-21865-05	
2-800000-02	-1-0093191-04	8-6764730-05	3-0408058-04	-2-77261-04	5-8331782-06	4-5671060-06	-6-7450124-05	-8-58692-05	-8-58692-05	
3-000000-02	-1-021022-04	9-5033356-05	-3-6165283-04	-2-96734-04	-6-0685140-06	4-9242178-06	-7-3982609-05	-5-93232-05	-5-93232-05	
3-200000-02	-1-1734812-04	1-0302764-04	4-2309181-04	-3-15572-04	-6-4874977-06	5-2431908-06	-8-0184213-05	-6-28540-05	-6-28540-05	
3-400000-02	-1-2536119-04	1-1075666-04	4-8825256-04	-3-33796-04	-6-8902941-06	5-5251923-06	-9-9010264-05	-6-85613-05	-6-85613-05	
3-600000-02	-1-3225996-04	1-1822631-04	5-8701280-04	-3-51414-04	-7-2787799-06	3-7672924-06	-1-1241572-04	-8-83720-05	-8-83720-05	
3-800000-02	-1-4105120-04	1-2543989-04	-6-2925029-04	-3-68421-04	-7-6466387-06	5-9745039-06	-1-2635467-04	-7-08908-05	-7-08908-05	
4-000000-02	-1-4873903-04	1-3239867-04	7-80484127-04	-3-88405-04	-7-9994642-06	6-1376187-06	-1-4076005-04	-7-32015-05	-7-32015-05	

REGION NUMBER 3

THERE ARE 1 SEGMENTS AND 0 KINEMATIC LINKS WITHIN THIS REGION

SEGMENT NUMBER 1 SEGMENT CODE 11 SPHERE

PHI	OR	S	U	Y	V	Z	W	OMEGA	INETA	U	V	W	OMEGA	INETA	
4.00000000	02	-1.5873904	04	1.3239867	04	-7.0481307	04	-3.8480504	-7.9228451	06	6.1381818	04	-1.4028005	04	-7.3201505
4.20000000	02	-1.5632571	04	1.3910231	04	-7.8365935	04	-4.0055204	-6.3332084	06	6.2636960	06	1.5564237	04	-7.5260105
4.40000000	02	-1.5387272	04	1.4534421	04	-8.6554486	04	-4.1964504	-6.0440983	06	6.3456788	06	1.7009384	04	-7.7289505
4.60000000	02	-1.5141917	04	1.5173685	04	-9.5045459	04	-4.3006504	-5.9463761	06	6.3848385	06	-1.8648763	04	-7.8680605
4.80000000	02	-1.4896500	04	1.5786176	04	-1.0281615	03	-4.4379304	-7.2246931	06	6.3803527	06	-2.0237517	04	-8.0025305
5.00000000	02	-1.4656523	04	1.6332076	04	-1.1285548	03	-4.5680904	-9.4832702	06	6.3314412	06	-2.1850630	04	-8.1115905
5.20000000	02	-1.4416546	04	1.6870909	04	-1.2214896	03	-4.6995904	-9.7217045	06	6.2374215	06	-2.3468244	04	-8.2145305
5.40000000	02	-1.4176569	04	1.7382257	04	-1.3168177	03	-4.8303304	-9.9394155	06	6.0771310	06	-2.5121500	04	-8.2879405
5.60000000	02	-1.3936592	04	1.7893606	04	-1.4117069	03	-4.9610704	-1.0135899	05	5.9718498	08	-2.6783338	04	-8.3729540
5.80000000	02	-1.3696615	04	1.8404955	04	-1.5066960	03	-5.0919304	-1.0310663	05	5.6794885	06	-2.8441472	04	-8.4680510
6.00000000	02	-1.3456638	04	1.8916304	04	-1.6016313	03	-5.2228204	-1.0483328	05	5.4004171	06	-3.0098420	04	-8.5631305

REGION NUMBER 4

THERE ARE 1 SEGMENTS AND 0 KINEMATIC LINKS WITHIN THIS REGION

SEGMENT NUMBER 1 SEGMENT CODE 11 SPHERE

PHI-OR-S	U	V	E	C	T	O	R	I	M	OMEGA	THETA	U	V	E	C	T	O	R	2	W	OMEGA	THETA			
6.0000000002	-2.159661204	1.874486704	1.616623803	-1.045332505	5.400419004	-3.009641804	-8.253131005																		
6.3000000002	-2.277016704	1.933113004	-1.771254603	-1.064562005	4.893122506	-3.255980504	-8.15087005																		
6.6000000002	-2.371888504	1.964810404	-1.920299303	-1.077635805	4.281070308	-3.448477504	-7.99773005																		
6.9000000002	-2.463504804	2.029649104	-2.092188303	-1.085444105	3.565324806	-3.735571204	-7.79170005																		
7.2000000002	-2.572442204	2.087517204	-2.256341903	-1.087912505	2.747770608	-3.988648804	-7.53134005																		
7.5000000002	-2.658387404	2.098307704	-2.422172703	-1.084980305	1.830865306	-4.187063004	-7.21576005																		
7.8000000002	-2.741252904	2.121951004	-2.589087303	-1.076611605	8.178298407	-4.378148404	-6.84451005																		
8.1000000002	-2.820954304	2.138386104	-2.756489003	-1.062793205	-2.873504407	-4.597224704	-6.41756005																		
8.4000000002	-2.897411304	2.147877104	-2.923779803	-1.043335005	-1.477970108	-4.767628004	-5.93923005																		
8.7000000002	-2.970547904	2.149511704	-3.070361903	-1.018870105	-2.754243406	-4.952701904	-5.39821005																		
8.9700000002	-3.033472704	2.145058104	-3.239189403	-9.920954506	-3.985611208	-5.09314704	-4.88894005																		
9.0000000002	-3.040292604	2.144202004	-3.255642003	-9.888553406	-4.103977906	-5.105817304	-4.80749005																		

REGION NUMBER 5

THERE ARE 1 SEGMENTS AND 0 KINEMATIC LINKS WITHIN THIS REGION

SEGMENT NUMBER 1 SEGMENT CODE 11 SPHERE

V E C T O R 1 V E C T O R 2

PHI OR S	U	V	W	OMEGA I	OMEGA II	OMEGA III	U	V	W	OMEGA I	OMEGA II	OMEGA III
9.0000000002	-3.040292904	2.144202004	-3.255641703	-5.4596304	-3.255641703	-5.4596304	-9.886554806	-4.103977506	-5.105814504	-4.80747205		
9.390700002	-3.125943504	2.120501304	-3.467968303	-5.3612504	-3.467968303	-5.3612504	-9.411294706	-5.962397806	-5.276937304	-3.95180005		
9.781400002	-3.209977204	2.092728404	-3.679095003	-5.2306204	-3.679095003	-5.2306204	-8.947201106	-7.919291106	-5.413721004	-3.06376005		
1.017210001	-3.279136904	2.055107104	-3.877917403	-5.0866404	-3.877917403	-5.0866404	-8.199461606	-9.952562606	-5.515204404	-2.114385005		
1.056280001	-3.346401704	2.007937004	-4.073082803	-4.8763804	-4.073082803	-4.8763804	-7.471514006	-1.204527605	-5.580870604	-1.17304005		
1.095350001	-3.407488004	1.937597704	-4.260143103	-4.6551404	-4.260143103	-4.6551404	-6.667591306	-1.417524905	-5.607194304	-2.16573006		
1.134420001	-3.462149304	1.862540104	-4.437989603	-4.4003804	-4.437989603	-4.4003804	-5.792330306	-1.632029405	-5.598578104	-7.84598004		
1.173490001	-3.510397004	1.777293004	-4.605574503	-4.1317504	-4.605574503	-4.1317504	-4.851065206	-1.848724405	-5.544303204	1.80441005		
1.212560001	-3.552200504	1.682457204	-4.761918303	-3.8830604	-4.761918303	-3.8830604	-3.949267406	-2.052059005	-5.452955006	-2.83904005		
1.251630001	-3.587571004	1.578703404	-4.906115403	-3.5122804	-4.906115403	-3.5122804	-2.793054106	-2.260994405	-5.320833404	3.88222005		
1.290700001	-3.616442504	1.466780204	-5.037339803	-3.1715104	-5.037339803	-3.1715104	-1.680694206	-2.4457550105	-5.11477800504	4.92802005		

REGION NUMBER

THERE ARE 1 SEGMENTS AND 0 KINEMATIC LINKS WITHIN THIS REGION

SEGMENT NUMBER 1 SEGMENT CODE 11 SPHERE

PH	OR	S	U	V	W	OMEGA	THETA	U	V	X	Y	Z	OMEGA	THETA
1.2907000	001	-3.6444430	04	1.4667689	04	-5.0373373	04	-1.6889933	06	-2.4575426	05	-5.1472847	04	4.9288660
1.3407000	001	-3.6440934	04	1.3128814	04	-5.1851739	03	-2.1387947	07	-2.0692029	05	-4.8671353	04	6.2268005
1.3907000	001	-3.6613193	04	1.1487161	04	-5.3092220	03	-2.2239670	08	-2.9038158	05	-4.5294114	04	7.4092405
1.4407000	001	-3.6682505	04	9.7621313	05	-5.4084022	03	-1.7192704	04	-3.0884353	05	-4.1253344	04	8.4703405
1.4907000	001	-3.6690883	04	7.9742205	05	-5.5481982	03	-1.2010370	04	-3.2919001	05	-3.6763968	04	9.4040805
1.5407000	001	-3.6520640	04	6.1447618	05	-5.5291635	03	-6.7458005	06	-3.3607966	05	-3.1839105	04	1.0204804
1.5907000	001	-3.6294577	04	4.2956494	05	-5.5492256	03	-1.4547005	05	-3.4422599	05	-2.6548379	04	1.0866704
1.6407000	001	-3.5978927	04	2.4490216	05	-5.5544186	03	3.8687405	06	-3.4840998	05	-2.0961681	04	1.1385804
1.6907000	001	-3.5989329	04	6.2897194	05	-5.5512219	03	8.9970860	05	-3.4484812	05	-1.5152227	04	1.1750404
1.7407000	001	-3.5075805	04	-1.1488130	05	-5.4545635	03	1.4039604	04	-3.4436483	05	-9.1935175	05	1.1982104
1.7857000	001	-3.4563932	04	-2.6690119	05	-5.3813629	03	1.8827804	04	-3.4370767	05	-3.7652017	05	1.2055204
1.7907000	001	-3.4502732	04	-2.8573736	05	-5.3720158	03	1.6904704	04	-3.3605931	05	-3.1607363	05	1.2055904

REGION NUMBER 7

THERE ARE 1 SEGMENTS AND 0 KINEMATIC LINKS WITHIN THIS REGION

SEGMENT NUMBER I SEGMENT CODE II SPHERE

V E C I O R H I V E C I O R H 2

PHI	OR	S	U	V	U	OMEGA	THETA	U	V	Y	W	OMEGA	THETA
1.7207000-01	-3.44502743-04	-2.8573450-05	5.1372061-03	1.89055-03	1.3529233-05	-3.3605910-05	-3.1606544-05	1.20559-04					
1.8607000-01	-3.3575451-04	-5.092698-05	-5.2166492-03	2.53165-04	1.5266387-05	-3.1736067-05	5.186554-05	1.16856-04					
1.9307000-01	-3.2513395-04	-7.7277058-05	-5.7182022-03	3.11550-04	1.8807194-05	-2.9158795-05	1.3185200-04	1.10662-04					
2.0007000-01	-3.1331247-04	-8.8602070-05	-4.7810578-03	3.03192-04	1.8129889-05	-2.5963536-05	2.0664504-04	1.02093-04					
2.0707000-01	-3.7004297-04	-1.0342495-04	-4.6510276-03	4.07210-04	1.9206728-05	-2.2204477-05	2.7462699-04	9.13111-05					
2.1407000-01	-2.8668188-04	-1.1463781-04	-4.42114579-03	4.42945-04	2.0024223-05	-1.8197407-05	3.3432341-04	7.85247-05					
2.2107000-01	-2.7218627-04	-1.2270280-04	-3.8905996-03	4.08926-04	2.0573304-05	-1.03916399-05	3.8490774-04	6.39917-05					
2.2807000-01	-2.65711392-04	-1.2759919-04	-3.5539498-03	4.87910-04	2.0851387-05	-9.5891053-06	4.2374792-04	4.79628-05					
2.3507000-01	-2.4460531-04	-1.2701594-04	-3.2079559-03	4.78861-04	2.0862321-05	-5.3912261-06	4.5141725-04	3.07749-05					
2.4207000-01	-2.2581071-04	-1.2735144-04	-2.8586136-03	4.94955-04	2.0616171-05	-1.5002649-06	4.6671204-04	1.27435-05					
2.4907000-01	-2.0785735-04	-1.2270374-04	-2.5123208-03	4.86575-04	2.0128623-05	-1.07112059-06	4.6916190-04	5.779515-06					

REGION NUMBER 8

THERE ARE 1 SEGMENTS AND 0 KINEMATIC LINKS WITHIN THIS REGION

SEGMENT NUMBER 1 SEGMENT CODE 11 SPHERE

PHI OR S	U	V	Y	Z	R	T	O	R	2	W	OMEGA	INERT
2.4907000-01	-2.0286767-04	-1.2290157-04	-2.5422873-03	4.08593-04	2.0428831-05	1.9111567-06	4.6914108-04	4.6914108-04	4.6914108-04	4.6914108-04	4.6914108-04	5.725758-06
2.5907000-01	-1.8702913-04	-1.1250026-04	-2.0340410-03	4.63044-04	1.8884034-05	5.7179755-06	4.991878-04	4.991878-04	4.991878-04	4.991878-04	4.991878-04	-3.15756-05
2.7907000-01	-1.6339344-04	9.78553519-05	-1.5885438-03	4.23768-04	1.7294408-05	8.0174423-06	4.0003614-04	4.0003614-04	4.0003614-04	4.0003614-04	4.0003614-04	-8.097972-05
2.8907000-01	-1.4215932-04	-8.2513224-05	-1.1881876-03	3.73573-04	1.5413338-05	8.8704928-06	3.5005704-04	3.5005704-04	3.5005704-04	3.5005704-04	3.5005704-04	-6.37229-05
2.9907000-01	-1.2045639-04	-6.5842806-05	-8.4231414-04	3.71595-04	1.3333834-05	8.4497976-06	2.0267010-04	2.0267010-04	2.0267010-04	2.0267010-04	2.0267010-04	-6.699176-05
3.0907000-01	-9.9335926-05	-4.9833650-05	-5.5688114-04	2.53613-04	1.1180195-05	7.2380991-06	2.1214765-04	2.1214765-04	2.1214765-04	2.1214765-04	2.1214765-04	-6.98409-05
3.1907000-01	-7.8777332-05	-3.5475552-05	-3.3429702-04	1.97089-04	6.9313485-06	5.4493863-06	1.4470724-04	1.4470724-04	1.4470724-04	1.4470724-04	1.4470724-04	-8.400224-05
3.2907000-01	-5.8699899-05	-2.3356097-05	-1.7341656-04	1.31041-04	6.7073189-06	3.6578417-06	8.5666240-05	8.5666240-05	8.5666240-05	8.5666240-05	8.5666240-05	-5.31902-05
3.3907000-01	-3.8978869-05	-1.3624962-05	-6.7882449-05	7.73474-05	4.4661106-06	2.70489226-06	3.762474-05	3.762474-05	3.762474-05	3.762474-05	3.762474-05	-3.82297-05
3.4907000-01	-1.9464198-05	-6.02224813-06	-1.5389395-05	3.27986-05	2.2358519-06	8.3369345-07	1.0288143-05	1.0288143-05	1.0288143-05	1.0288143-05	1.0288143-05	-2.01408-05
3.5907000-01	-1.7788705-10	-2.2747881-09	-4.2159723-06	-1.030193-06	-2.1072501-11	9.72589944-10	1.0038850-08	1.0038850-08	1.0038850-08	1.0038850-08	1.0038850-08	-3.26743-07

HARMONIC (N) = 3

ESTIMATE 1

EIGENVALUES

1.760510-01	2.421571+00	1.014718+01	3.104420+01	6.788008+01	7.949777+01	1.415846+02	1.673842+02
2.640101+02	3.327743+02	3.928009+02	5.502228+02	6.951530+02	8.628535+02	1.064556+03	1.285796+03
1.772041+03	2.231954+03	2.712618+03	3.464355+03	5.123178+03	5.381687+03	7.494456+03	1.038038+04
1.306090+04	2.495043+04	2.953479+04	7.096420+04				

THE CURRENT LOAD MULTIPLICATION FACTOR = 1.760510-01

THE CURRENT FREQUENCY = 1.146852+03 RADIANS/SECOND

HARMONIC (N) = 3

ESTIMATE 2

EIGENVALUES

1.004899+00	1.385165+01	5.808306+01	1.775187+02	3.865528+02	4.524105+02	8.052974+02	9.524597+02
1.500669+03	1.892690+03	2.231328+03	3.125244+03	3.950666+03	5.016698+03	6.161574+03	7.385173+03
1.006811+04	1.268033+04	1.546830+04	1.933358+04	2.911116+04	3.057312+04	4.256122+04	5.902150+04
7.478837+04	1.471817+05	1.447438+05	4.030859+05				

EIGENVECTOR 1

-2.078088+06	4.859471+06	1.900075+06	-8.926894+06	-8.288208+06	4.411071+05	9.605655+06	-3.267118+05
-1.781363+05	1.407943+04	2.440140+05	-6.544675+05	-3.603763+05	4.083818+04	6.417970+05	-1.417902+04
-3.924299+05	8.684783+04	1.442708+04	-1.248873+04	-7.485551+05	1.315852+03	2.384629+04	-3.226401+05
-5.537800+05	9.103076+04	1.956075+04	1.275225+04				

EIGENVECTOR 2

-6.972592+07	3.774029+06	6.948595+07	-6.869637+06	-2.662929+06	3.308743+05	3.714383+06	-2.365238+05
-5.285173+06	9.934775+05	1.002486+05	-3.234849+05	-8.650671+06	2.448571+04	2.587887+05	-5.217956+05
-8.331104+06	3.851856+04	4.393842+05	-7.939509+06	1.044715+06	1.924984+04	1.600616+05	7.900071+05
1.102279+05	-2.070488+04	-7.335512+05	2.234307+05				

THE CURRENT LOAD MULTIPLICATION FACTOR = 1.769136-01

THE CURRENT FREQUENCY = 1.171812+03 RADIANS/SECOND

REGION NUMBER 1

THERE ARE 1 SEGMENTS AND 0 KINEMATIC LINKS WITHIN THIS REGION

SEGMENT NUMBER 1 SEGMENT CODE 11 SPHERE

PHI OR S	U	V	W	OMEGA THETA	U	V	W	OMEGA THETA
1.0000000002	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000
1.1000000002	-2.7748587-07	1.2755174-07	-7.7307195-08	-1.46091-06	-9.3076845-08	4.3331654-08	-6.0206977-08	-1.13799-06
1.2000000002	-5.0472729-07	2.8256189-07	-2.8021456-07	-2.54455-06	-1.6694576-07	9.5637948-06	-2.1811090-07	-1.179452-06
1.3000000002	-7.0659217-07	4.5297962-07	-5.8146431-07	-3.44584-06	-2.3739208-07	1.5590951-07	-4.5232676-07	-2.67972-06
1.4000000002	-6.9862299-07	6.3342718-07	-9.26714615-07	-4.29642-06	-3.0014387-07	2.1334078-07	-7.75185685-07	-3.126874-06
1.5000000002	-1.0833703-06	8.2158113-06	-1.4306566-06	-5.06544-06	-3.66421778-07	2.7613339-07	-1.11113822-06	-3.880358-06
1.6000000002	-1.12710138-06	1.0165421-06	-1.9695525-06	-5.975425-06	-4.2727808-07	3.4095462-07	-1.1528035-06	-4.45842-06
1.7000000002	-1.4627210-06	1.2180711-06	-2.5838321-06	-6.51153-06	-4.9164164-07	4.0768673-07	-2.0039980-06	-5.03753-06
1.8000000002	-1.16803637-06	1.4262226-06	-3.2749593-06	-7.12689-06	-5.5769164-07	4.7630502-07	-2.1537558-06	-5.62941-06
1.9000000002	-1.8652340-06	1.6411660-06	-4.0452907-06	-8.09227-06	-6.22631018-07	5.4681919-07	-3.1313307-06	-6.23913-06
2.0000000002	-2.0780873-06	1.8630995-06	-4.8977303-06	-8.972689-06	-6.9725915-07	6.1924501-07	-3.17871703-06	-6.86964-06

REGION NUMBER 2

THERE ARE 1 SEGMENTS AND 0 KINEMATIC LINKS WITHIN THIS REGION

SEGMENT NUMBER 1 SEGMENT CODE 11 SPHERE

PHI	OR	S	U	V	W	X	Y	Z	OMEGA	INERT							
V	F	C	T	O	R	Y	U	2	W	OMEGA	INERT						
2.10000000	02	-2.10780876	04	1.8630996	06	-4.18977302	04	-8.192489	06	-6.9725924	07	-1.7871702	0A	-6.88344	0A		
2.20000000	02	-2.5297991	06	2.3286449	06	-6.8620761	06	-1.06980	05	-8.4691557	07	7.6974148	07	-5.2935850	06	-8.19842	06
2.30000000	02	-3.018044	06	2.829589	06	-9.1957446	06	-1.26112	05	-1.007692	06	9.278431	07	-7.0751599	06	-9.61804	06
2.40000000	02	-3.5439001	06	3.3495648	06	-1.1927432	05	-1.46677	05	-1.1796219	06	1.0930532	06	-9.1506572	06	-1.11316	05
2.50000000	02	-4.1076702	06	3.9094705	06	-1.5085626	05	-1.86648	05	-1.3624948	06	1.2850708	06	-1.1193735	05	-1.27313	05
3.00000000	02	-4.7092696	06	4.4912649	06	-1.8698941	05	-1.91976	05	-1.5559358	06	1.4429411	06	-1.4253480	05	-1.44095	05
3.10000000	02	-5.3483628	06	5.1092025	06	-2.2791314	05	-2.18003	05	-1.7594726	06	1.6259024	06	-1.7312152	05	-1.61575	05
3.40000000	02	-6.0244540	06	5.7492692	06	-2.7390830	05	-2.42463	05	-1.9725614	06	1.8131551	06	-2.0727003	05	-1.79659	05
3.50000000	02	-6.7589370	06	6.4472311	06	-3.2520999	05	-2.89485	05	-2.1748028	06	2.0033792	06	-2.4509751	05	-1.98249	05
3.80000000	02	-7.4851066	06	7.1146702	06	-3.8203170	05	-2.97594	05	-2.4249527	06	2.1954933	06	-2.8667672	05	-2.17241	05
4.00000000	02	-8.2682092	06	7.8370120	06	-4.4459557	05	-3.26712	05	-2.8682728	06	2.3882668	06	-3.3209508	05	-2.33624	05

REGION NUMBER 3

THERE ARE 1 SEGMENTS AND 0 KINEMATIC LINKS WITHIN THIS REGION

SEGMENT NUMBER 1 SEGMENT CODE 11 SPHERE

V E C T O R V E C T O R

PHI OR S	U	V	W	OMEGA THETA	U	V	W	OMEGA THETA
4.000000-02	-8.2602684-06	7.8340139-06	-4.4459551-05	-3.26712-05	-2.6629282-06	2.3882672-06	-3.3208600-05	-2.36524-05
4.200000-02	-9.0854323-06	8.5755476-06	-5.1307170-05	-3.56757-05	-2.9066946-06	2.5800081-06	-3.8188589-05	-2.55729-05
4.400000-02	-9.9358102-06	9.3374417-06	-5.8767994-05	-3.85648-05	-3.1570799-06	2.7697371-06	-4.3458784-05	-2.75515-05
4.600000-02	-1.0818499-05	1.0117758-05	-6.6857495-05	-4.19296-05	-3.4126818-06	2.9560975-06	-4.9170606-05	-2.95153-05
4.800000-02	-1.17332488-05	1.0714461-05	-7.5586603-05	-4.51616-05	-3.56730023-06	3.1376924-06	-5.5275636-05	-3.14718-05
5.000000-02	-1.2676754-05	1.1725430-05	-8.4496663-05	-4.84516-05	-3.9371478-06	3.3130961-06	-6.1770532-05	-3.34083-05
5.200000-02	-1.365233-05	1.2548462-05	-9.45017401-05	-5.17905-05	-4.2042706-06	3.4808639-06	-6.8650033-05	-3.53123-05
5.400000-02	-1.4651619-05	1.3361288-05	-1.0573869-04	-5.51689-05	-4.44735100-06	3.6395413-06	-7.55908344-05	-3.71710-05
5.600000-02	-1.5680369-05	1.4221573-05	-1.17174051-04	-5.85775-05	-4.7439943-06	3.7876734-06	-8.3529136-05	-3.889719-05
5.800000-02	-1.6734706-05	1.5066923-05	-1.2922797-04	-6.20067-05	-5.0148433-06	3.9238140-06	-9.1505522-05	-4.07020-05
6.000000-02	-1.7813616-05	1.5814698-05	-1.44200420-04	-6.54466-05	-5.2851704-06	4.0465343-06	-9.9828049-05	-4.23486-05

REGION NUMBER 4

THERE ARE 1 SEGMENTS AND 0 KINEMATIC LINKS WITHIN THIS REGION

SEGMENT NUMBER 1 SEGMENT CODE 11 SPHERE

V E C T O R I J V E C T O R 2

PHI OR S	U	V	W	X	Y	Z	OMEGA	THETA	U	V	W	OMEGA	INERT
6.00000000-02	-1.17813626-05	1.5214942-05	-1.4200416-04	-1.4544467-05	-5.2851735-06	4.0465855-06	8.19820011-05	-4.234885-05					
6.30000000-02	-1.9475383-05	1.7186390-05	-1.6246207-04	-7.06060-05	-5.6833600-06	4.2009231-06	-1.1287255-04	-4.45652-05					
6.80000000-02	-2.1185301-05	1.8447663-05	-1.8444878-04	-7.97331-05	-6.0758078-06	4.3717285-06	-1.7285670-04	-4.466299-05					
6.90000000-02	-2.2293870-05	1.9696052-05	-2.0800749-04	-8.08010-05	-6.4593730-06	4.3913399-06	-1.4085599-04	-4.84911-05					
7.20000000-02	-2.4731595-05	2.0978808-05	-2.3305699-04	-8.57708-05	-6.8370970-06	4.4189719-06	-1.5986691-04	-5.07013-05					
7.50000000-02	-2.6558647-05	2.2163136-05	-2.5958258-04	-9.06120-05	-7.1879695-06	4.3963239-06	-1.7091368-04	-5.14162-05					
7.80000000-02	-2.8415237-05	2.3224627-05	-2.8875407-04	-9.52725-05	-7.5269447-06	4.3796742-06	-1.8650728-04	-5.23744-05					
8.10000000-02	-3.0296448-05	2.4337529-05	-3.1887827-04	-9.97808-05	-7.8453892-06	4.1865131-06	-2.0233854-04	-5.29963-05					
8.40000000-02	-3.2197289-05	2.5388319-05	-3.4753283-04	-1.04046-04	-8.1405300-06	3.9936174-06	-2.1828674-04	-5.34845-05					
8.70000000-02	-3.4112703-05	2.6330249-05	-3.7943293-04	-1.08059-04	-8.4097559-06	3.7391220-06	-2.3422824-04	-5.29237-05					
8.97000000-02	-3.5844420-05	2.7179059-05	-4.0714174-04	-1.11932-04	-8.6827907-06	3.4452074-06	-2.4844417-04	-5.22774-05					
9.00000000-02	-3.6037588-05	2.7215152-05	-4.1249824-04	-1.11791-04	-8.8506586-06	3.4215909-06	-2.55001708-04	-5.21804-05					

REGION NUMBER 5

THERE ARE 1 SEGMENTS AND 0 KINEMATIC LINKS WITHIN THIS REGION

SEGMENT NUMBER 1 SEGMENT CODE 11 SPHERE

PHI	OR	S	U	V	W	OMEGA	THETA	U	V	W	OMEGA	THETA
9.000000	00	02	-3.6037430-05	2.7215174-05	-4.1249739-04	-1.11790-04	8.6504708-06	3.4216998-06	-2.5001449-04	-5.21394-05		
9.3907000	00	02	-3.8550442-05	2.8239394-05	-4.5715936-04	-1.16183-04	8.9050211-06	2.9095266-06	-2.7004735-04	-5.02415-05		
9.7819000	00	02	-4.1059238-05	2.9103130-05	-5.0342628-04	-1.19998-04	9.1038637-06	2.2876698-06	-2.7892480-04	-4.77266-05		
1.0172100	00	01	-4.3552630-05	2.9791011-05	-5.5107028-04	-1.23183-04	-9.2430111-06	1.5837008-06	3.0745359-04	-4.51412-05		
1.0526000	00	01	-4.6017280-05	3.0289020-05	-5.9982626-04	-1.25692-04	-9.3170726-06	7.3964229-07	-3.2498297-04	-4.18109-05		
1.0953500	00	01	-4.8447957-05	3.0564671-05	-6.4942899-04	-1.27483-04	-9.43289367-06	-1.9285625-07	-3.4005161-04	-3.78773-05		
1.1344200	00	01	-5.0827588-05	3.0567175-05	-6.9959446-04	-1.28923-04	-9.2704786-06	1.2122959-06	-3.9397418-04	-3.32951-05		
1.1734900	00	01	-5.3147317-05	3.0527695-05	-7.4999425-04	-1.28782-04	-9.1420352-06	-2.3151403-06	-3.6596983-04	-2.80300-05		
1.2125600	00	01	-5.5398553-05	3.0159299-05	-8.0037816-04	-1.28239-04	-8.9426673-06	3.4470600-06	-3.1757657-04	-2.20583-05		
1.2516300	00	01	-5.7565027-05	2.9557294-05	-8.5032883-04	-1.26879-04	-8.6721603-06	-4.7258047-06	-3.8308480-04	-1.53649-05		
1.2907000	00	01	-5.9642645-05	2.8719242-05	-8.9961450-04	-1.24695-04	-8.9310672-06	-6.0081007-06	-3.68784089-04	-7.99358-06		

REGION NUMBER 6

THREE ARE 1 SEGMENTS AND 0 KINEMATIC LINKS WITHIN THIS REGION

SEGMENT NUMBER 1 SEGMENT CODE 11 SPHERE

PHI	OR	S	U	V	W	X	Y	Z	OMEGA	THETA	M	OMEGA	THETA				
V	E	C	T	U	R	1	V	E	C	T	U	R	2				
1.2907000	01	-5.9264299	05	2.8719328	05	-8.9260772	04	-1.21487	04	-8.3311144	06	-6.0050345	06	-3.8783198	04	-7.93251	04
1.3407000	01	-6.2155899	05	2.7303485	05	-9.6114666	04	1.20684	04	-7.7699551	06	-7.6751709	06	-3.8893231	04	2.54234	06
1.3907000	01	-6.4168273	05	2.5506898	05	-1.0203421	03	-1.19344	04	-7.1003054	06	-7.3488400	06	-3.8908766	04	1.25528	06
1.4407000	01	-6.6616864	05	2.3342026	05	-1.0765345	03	-1.08719	04	-6.3288276	06	-1.0989382	05	-3.7630901	04	2.22676	05
1.4907000	01	-6.8532018	05	2.0827980	05	-1.1290889	03	-1.00847	04	-5.4439978	06	-1.2540103	05	-3.6277058	04	3.12526	05
1.5407000	01	-7.0217799	05	1.7990496	05	-1.1773738	03	-9.18040	05	-4.5157805	06	-1.4024769	05	-3.4464975	04	4.05845	05
1.5907000	01	-7.1762145	05	1.4891714	05	-1.2208900	03	-8.18799	05	-3.4954518	06	-1.5347535	05	-3.7212838	04	4.91921	05
1.6407000	01	-7.2854966	05	1.1479813	05	-1.2590590	03	-7.05791	05	-2.4154197	06	-1.6493288	05	-2.9540266	04	5.73504	05
1.6907000	01	-7.3788294	05	7.8809138	06	-1.2717408	03	-5.86208	05	-1.2690013	06	-1.7924055	05	-2.6488895	04	6.58882	05
1.7407000	01	-7.4456164	05	4.1364325	06	-1.3176374	03	-4.59367	05	-1.3068928	07	-1.8119361	05	-2.3022753	04	7.23162	05
1.7857000	01	-7.4827348	05	6.6581494	07	-1.3356538	03	-3.40180	05	4.2691938	07	-1.8588299	05	-1.9222759	04	7.83495	05
1.7907000	01	-7.4855078	05	2.7631700	07	-1.3373212	03	-3.26692	05	1.0447870	06	-1.8536919	05	-1.9228482	04	7.89903	05

REGION NUMBER 8

THERE ARE 1 SEGMENTS AND 0 KINEMATIC LINKS WITHIN THIS REGION

SEGMENT NUMBER I SEGMENT CODE II SPHERE

PHI-OR-S	U	V	W	OMEGA-IHEIA	U	V	W	Y	Z	OMEGA-IHEI
2.9907000-01	-5.5378004-05	-3.4819923-06	-9.3043572-04	1.25222-04	1.1822749-05	3.2072603-07	2.9265665-04	2.23431-05		
2.5907000-01	-4.9980434-05	-3.3671644-05	-7.9856968-04	1.34586-04	1.1519354-05	3.5291461-06	3.0867398-04	-3.39275-04		
2.6907000-01	-4.4494715-05	-3.0989773-05	-6.6248888-04	1.35784-04	1.0953367-05	5.6237773-06	2.7457642-04	-2.37524-05		
2.7907000-01	-3.8607174-05	-2.7037419-05	-5.2785457-04	1.31787-04	9.8904356-06	6.5807703-06	2.6292166-04	-3.85332-05		
2.8907000-01	-3.2664470-05	-2.2323049-05	-4.0012743-04	1.22339-04	8.7050788-06	6.5231405-06	2.1928883-04	-4.75673-05		
2.9907000-01	-2.7193302-05	-1.7300968-05	-2.8429016-04	1.08222-04	7.3716021-06	5.6893325-06	1.6931305-04	-5.12454-05		
3.0907000-01	-2.1627071-05	-1.2438837-05	-1.89489278-04	9.02244-05	5.9528073-06	4.3821880-06	1.1882134-04	-4.79234-05		
3.1907000-01	-1.6172550-05	-8.1193238-06	-1.0456745-04	6.92991-05	4.4926762-06	2.9380320-06	7.1808938-05	-4.29166-05		
3.2907000-01	-1.0790844-05	-4.8003967-06	-4.8691756-05	4.65087-05	3.0149395-06	1.6594727-06	3.1008429-05	-3.19484-05		
3.3907000-01	-5.4245303-06	-1.9477105-06	-1.1699267-05	2.29865-05	1.5217589-06	6.6262189-07	9.0249373-06	-1.74035-05		
3.4907000-01	1.2763218-07	-1.87808003-06	-3.33472819-07	1.08327-07	-3.1378459-10	7.1866395-09	1.3670283-07	-4.67272-06		

HARMONIC (N) = 4

ESTIMATE 1

ETA VALUES

6.746230-01	4.620846+00	1.693299+01	4.702663+01	9.880335+01	1.154592+02	2.107212+02	2.415869+02
3.599880-02	4.447784+02	5.497019+02	7.320541+02	9.448977+02	1.164535+03	1.443827+03	1.701017+03
2.271648+03	2.937199+03	3.461871+03	4.503538+03	7.074127+03	7.176183+03	1.014234+04	1.316028+04
1.612565+04	2.752645+04	3.831490+04	8.922427+04				

THE CURRENT LOAD MULTIPLICATION FACTOR = 6.746230-01

THE CURRENT FREQUENCY = 2.288274+03 RADIANS/SECOND

HARMONIC (N) = 4

ESTIMATE 2

EIGENVALUES

1.002478+00 6.869590+00 2.517356+01 6.987130+01 1.465873+02 1.712199+02 3.124949+02 3.583219+02
 5.337621+02 6.598166+02 8.130064+02 1.086611+03 1.408954+03 1.728405+03 2.113204+03 2.582197+03
 3.367416+03 4.354100+03 5.131443+03 6.675723+03 1.048446+04 1.066372+04 1.503374+04 1.951188+04
 2.390598+04 4.378357+04 5.678049+04 1.322332+05

EIGENVECTOR 1

-1.026111+07 2.837949+07 1.038010+07 -6.110379+07 -7.993202+07 4.660749+06 9.510467+07 4.151952+06
 -2.573083+06 2.180991+05 3.642368+06 -1.373332+05 -1.374332+06 9.420703+05 1.453224+05 -3.614929+05
 -1.805396+05 2.713052+04 4.716761+05 -6.305234+05 -3.021875+05 5.676478+04 1.081411+04 4.77005944+05
 -2.786372+05 5.643138+04 1.235477+04 5.579982+05

EIGENVECTOR 2

-7.706980+08 4.184266+07 8.158554+08 -8.931449+07 -5.779292+07 6.570358+06 7.992003+07 6.278464+06
 -1.734694+06 2.335489+05 3.199558+05 -1.733958+05 -4.370465+06 1.104335+04 1.242989+05 4.562209+05
 -6.860545+06 2.517779+04 3.179304+05 -2.62483+05 -3.613875+06 2.249797+04 2.958718+05 4.378803+05
 7.217736+06 -1.849518+04 -4.785996+05 3.571726+05

THE CURRENT LOAD MULTIPLICATION FACTOR = 6.762950+01

THE CURRENT FREQUENCY = 2.281108+03 RADIANS/SECOND

REGION NUMBER 1

THERE ARE J SEGMENTS AND U KINEMATIC LINKS WITHIN THIS REGION

SEGMENT NUMBER I SEGMENT CODE II SPHERE

PHI OR S	U	V	E	C	T	O	R	I	W	U	Y	V	E	C	T	O	R	2	W	OMEGA THEIA	OMEGA IHEI
1.000000-02	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
1.100000-02	-9.9012690-09	4.9630053-09	-3.9162621-09	-7.33016-08	-7.33016-08	-7.33016-08	-7.33016-08	-7.33016-08	-7.33016-08	-7.33016-08	-7.33016-08	-7.33016-08	-7.33016-08	-7.33016-08	-7.33016-08	-7.33016-08	-7.33016-08	-7.33016-08	-7.33016-08	-7.33016-08	-7.33016-08
1.200000-02	-1.0090223-08	1.01377448-08	-1.4020036-08	-1.28901-07	-1.28901-07	-1.28901-07	-1.28901-07	-1.28901-07	-1.28901-07	-1.28901-07	-1.28901-07	-1.28901-07	-1.28901-07	-1.28901-07	-1.28901-07	-1.28901-07	-1.28901-07	-1.28901-07	-1.28901-07	-1.28901-07	-1.28901-07
1.300000-02	-2.5867347-08	1.8761250-08	-2.9079499-08	-1.73498-07	-1.73498-07	-1.73498-07	-1.73498-07	-1.73498-07	-1.73498-07	-1.73498-07	-1.73498-07	-1.73498-07	-1.73498-07	-1.73498-07	-1.73498-07	-1.73498-07	-1.73498-07	-1.73498-07	-1.73498-07	-1.73498-07	-1.73498-07
1.400000-02	-3.3913786-08	2.7058107-08	-4.88754020-08	-2.19817-07	-2.19817-07	-2.19817-07	-2.19817-07	-2.19817-07	-2.19817-07	-2.19817-07	-2.19817-07	-2.19817-07	-2.19817-07	-2.19817-07	-2.19817-07	-2.19817-07	-2.19817-07	-2.19817-07	-2.19817-07	-2.19817-07	-2.19817-07
1.500000-02	-4.2619656-08	3.6218616-08	-7.3199960-08	-2.69169-07	-2.69169-07	-2.69169-07	-2.69169-07	-2.69169-07	-2.69169-07	-2.69169-07	-2.69169-07	-2.69169-07	-2.69169-07	-2.69169-07	-2.69169-07	-2.69169-07	-2.69169-07	-2.69169-07	-2.69169-07	-2.69169-07	-2.69169-07
1.600000-02	-5.2230901-08	4.6336503-08	-1.0262756-07	-3.23508-07	-3.23508-07	-3.23508-07	-3.23508-07	-3.23508-07	-3.23508-07	-3.23508-07	-3.23508-07	-3.23508-07	-3.23508-07	-3.23508-07	-3.23508-07	-3.23508-07	-3.23508-07	-3.23508-07	-3.23508-07	-3.23508-07	-3.23508-07
1.700000-02	-6.2916512-08	5.7495814-08	-1.3820197-07	-3.84057-07	-3.84057-07	-3.84057-07	-3.84057-07	-3.84057-07	-3.84057-07	-3.84057-07	-3.84057-07	-3.84057-07	-3.84057-07	-3.84057-07	-3.84057-07	-3.84057-07	-3.84057-07	-3.84057-07	-3.84057-07	-3.84057-07	-3.84057-07
1.800000-02	-7.4608667-08	6.7765773-08	-1.7996942-07	-4.51653-07	-4.51653-07	-4.51653-07	-4.51653-07	-4.51653-07	-4.51653-07	-4.51653-07	-4.51653-07	-4.51653-07	-4.51653-07	-4.51653-07	-4.51653-07	-4.51653-07	-4.51653-07	-4.51653-07	-4.51653-07	-4.51653-07	-4.51653-07
1.900000-02	-8.8007628-08	8.3294023-08	-2.2892843-07	-5.26923-07	-5.26923-07	-5.26923-07	-5.26923-07	-5.26923-07	-5.26923-07	-5.26923-07	-5.26923-07	-5.26923-07	-5.26923-07	-5.26923-07	-5.26923-07	-5.26923-07	-5.26923-07	-5.26923-07	-5.26923-07	-5.26923-07	-5.26923-07
2.000000-02	-1.0261109-07	9.8104738-08	-2.8861402-07	-6.810379-07	-6.810379-07	-6.810379-07	-6.810379-07	-6.810379-07	-6.810379-07	-6.810379-07	-6.810379-07	-6.810379-07	-6.810379-07	-6.810379-07	-6.810379-07	-6.810379-07	-6.810379-07	-6.810379-07	-6.810379-07	-6.810379-07	-6.810379-07

REGION NUMBER 2

THERE ARE 1 SEGMENTS AND 6 KINEMATIC LINKS WITHIN THIS REGION

SEGMENT NUMBER 1 SEGMENT CODE 11 SPHERE

PHI OR S	U	V	W	OMEGA	THETA	U	V	W	OMEGA	THETA	U	V	W	OMEGA	THETA
2.00000000-02	-1.0261112-07	9.8444746-08	-2.8581406-07	-6.46378-07	-7.7065298-08	7.3201244-08	-4.1927457-07	-8.93145-07	-6.2572163-07	-1.17109-06	-6.2572163-07	-1.17109-06	-6.2572163-07	-1.17109-06	-6.2572163-07
2.20000000-02	-1.3635676-07	1.3194728-07	-4.2683644-07	-8.03571-07	-1.0214165-07	9.8021810-08	1.2707672-07	-1.950143-06	-1.9317624-07	-1.950143-06	-1.9317624-07	-1.950143-06	-1.9317624-07	-1.950143-06	-1.9317624-07
2.40000000-02	-1.7665798-07	1.7170923-07	-6.1027907-07	-1.03352-06	-1.9317624-07	1.2707672-07	-1.950143-06	-1.9317624-07	-1.9317624-07	-1.950143-06	-1.9317624-07	-1.950143-06	-1.9317624-07	-1.950143-06	-1.9317624-07
2.60000000-02	-2.2409768-07	2.1850814-07	-8.4394615-07	-1.30539-06	-2.0724723-07	1.6071693-07	-2.4246263-07	-2.833334-06	-2.0724723-07	-2.833334-06	-2.0724723-07	-2.833334-06	-2.0724723-07	-2.833334-06	-2.0724723-07
2.80000000-02	-2.7727619-07	2.7224208-07	-1.3361690-06	-1.97835-06	-2.5332031-07	2.9786852-07	-3.4444821-07	-4.02396-06	-2.5332031-07	-4.02396-06	-2.5332031-07	-4.02396-06	-2.5332031-07	-4.02396-06	-2.5332031-07
3.00000000-02	-3.4253745-07	3.3354457-07	-1.4957658-06	-1.97835-06	-3.0537260-07	3.4444821-07	-4.02396-06	-4.71307-06	-3.0537260-07	-4.71307-06	-3.0537260-07	-4.71307-06	-3.0537260-07	-4.71307-06	-3.0537260-07
3.20000000-02	-4.1457071-07	4.0261219-07	-1.9320043-06	-2.58774-06	-3.4444821-07	4.02396-06	-4.71307-06	-5.44479-06	-3.4444821-07	-5.44479-06	-3.4444821-07	-5.44479-06	-3.4444821-07	-5.44479-06	-3.4444821-07
3.40000000-02	-4.9580568-07	4.8040032-07	-2.4454563-06	-2.84041-06	-4.2844261-07	4.02396-06	-4.71307-06	-6.2572163-07	-4.2844261-07	-6.2572163-07	-4.2844261-07	-6.2572163-07	-4.2844261-07	-6.2572163-07	-4.2844261-07
3.60000000-02	-5.8671195-07	5.6822309-07	-3.0734965-06	-3.37711-06	-4.9980532-07	4.02396-06	-4.71307-06	-7.7772660-07	-4.9980532-07	-7.7772660-07	-4.9980532-07	-7.7772660-07	-4.9980532-07	-7.7772660-07	-4.9980532-07
3.80000000-02	-6.8774010-07	6.6175231-07	-3.7491842-06	-3.96638-06	-5.7772660-07	4.02396-06	-4.71307-06	-8.93145-07	-5.7772660-07	-8.93145-07	-5.7772660-07	-8.93145-07	-5.7772660-07	-8.93145-07	-5.7772660-07
4.00000000-02	-7.9931970-07	7.6601666-07	-4.6422763-06	-4.51796-06	-6.51796-06	4.02396-06	-4.71307-06	-9.8021810-08	-6.51796-06	-9.8021810-08	-6.51796-06	-9.8021810-08	-6.51796-06	-9.8021810-08	-6.51796-06

REGION NUMBER 3

THERE ARE 1 SEGMENTS AND 6 KINEMATIC LINKS WITHIN THIS REGION

SEGMENT NUMBER 1 SEGMENT CODE 11 SPHERE

PHI	OR	S	U	V	W	X	Y	Z	OMEGA	THETA	U	V	W	X	Y	Z	OMEGA	THETA			
4.000000	00	02	-7.8932920	07	7.6661717	07	4.6642294	06	-4.51955	06	-5.72924	19	07	5.35816	75	07	6.59706	21	06	-6.27846	06
4.200000	00	02	-9.2185869	07	8.7960159	07	-5.61374	05	-5.18771	06	-6.62565	94	07	6.09340	72	07	-7.93995	78	06	-7.14980	06
4.400000	00	02	-1.0557113	06	1.0026941	06	-6.72482	60	-6.71170	06	-7.54195	52	07	6.89747	03	07	-9.16363	78	06	-6.00834	06
4.600000	00	02	-1.1261328	06	1.1352359	06	-7.98620	20	-6.69214	06	-8.52846	44	07	7.69737	70	07	-1.11804	72	05	-9.07924	06
4.800000	00	02	-1.3589778	06	1.2774200	06	-9.40981	67	-7.52938	06	-9.58492	09	07	8.56491	11	07	-1.93102	22	05	-1.07313	05
5.000000	00	02	-1.5289385	06	1.4291898	06	-1.10068	64	-8.42952	06	-1.07110	84	06	9.46517	69	07	-1.52399	68	05	-1.12367	05
5.200000	00	02	-1.7115948	06	1.5924680	06	-1.27887	32	-9.93744	06	-1.19081	22	06	1.03978	58	06	-1.76039	79	05	-1.23971	05
5.400000	00	02	-1.9070634	06	1.7612060	06	-1.47667	52	-1.03016	05	-1.31689	02	06	1.13571	41	06	-2.02036	28	05	-1.35903	05
5.600000	00	02	-2.1156926	06	1.9411825	06	-1.67521	47	-1.14445	05	-1.44979	31	06	1.23373	96	06	-2.36472	56	05	-1.48282	05
5.800000	00	02	-2.3376418	06	2.1342038	06	-1.93559	78	-1.25621	05	-1.58913	46	06	1.33324	49	06	-2.61420	54	05	-1.60990	05
6.000000	00	02	-2.5730811	06	2.3320026	06	-2.19898	91	-1.39332	05	-1.73346	92	06	1.49355	62	06	-2.84493	97	05	-1.73958	05

REGION NUMBER 4

THERE ARE 1 SEGMENTS AND 6 KINEMATIC LINKS WITHIN THIS REGION

SEGMENT NUMBER 1 SEGMENT CODE 11 SPHERE

PHI OR S	U	V	W	OMEGA	THEIA	U	V	W	OMEGA	THEIA
6.0000000002	-2.5230811-06	2.3258038-06	-2.4989079-05	-1.337332-05	-1.7346940-06	1.43335637-06	-2.9493920-05	-1.273959-05		
6.3000000002	-2.9518437-06	2.6404544-06	-2.6391697-05	-1.95870-05	-1.9616345-06	1.5830538-06	-3.5004488-05	-1.932268-05		
6.6000000002	-3.3518099-06	2.9708153-06	-3.1358239-05	-1.78518-05	-2.2012309-06	1.7300444-06	-4.1107125-05	-2.133340-05		
6.9000000002	-3.8025666-06	3.3109087-06	-3.6951008-05	-1.96205-05	-2.4521916-06	1.8718249-06	-4.7819390-05	-2.33823-05		
7.2000000002	-4.2747376-06	3.6774706-06	-4.3169960-05	-2.17844-05	-2.7130712-06	2.0054190-06	-5.5148372-05	-2.593889-05		
7.5000000002	-4.7779836-06	4.0502566-06	-5.0052291-05	-2.40339-05	-2.9823642-06	2.1276912-06	-6.3090665-05	-2.74625-05		
7.8000000002	-5.3170009-06	4.4328505-06	-5.762105-05	-2.78388-05	-3.2583067-06	2.2353789-06	-7.1632097-05	-2.94227-05		
8.1000000002	-5.8733187-06	4.8226744-06	-6.5900094-05	-2.87453-05	-3.539854-06	2.3251456-06	-8.0747321-05	-3.12793-05		
8.4000000002	-6.4470341-06	5.2187024-06	-7.4403200-05	-3.11622-05	-3.8227502-06	2.3938816-06	-9.0399320-05	-3.37729-05		
8.7000000002	-7.0931576-06	5.6124956-06	-8.4644349-05	-3.36553-05	-4.1072506-06	2.4376809-06	-1.0053890-04	-3.45217-05		
8.9700000002	-7.6775155-06	5.9670278-06	-9.4059648-05	-3.58498-05	-4.3822582-06	2.4838708-06	-1.1003050-04	-3.57043-05		
9.0000000002	-7.7439175-06	6.0062203-06	-9.5132186-05	-3.61497-05	-4.3904565-06	2.4539724-06	-1.1110414-04	-3.58227-05		

REGION NUMBER 6

THERE ARE 1 SEGMENTS AND 0 KINEMATIC LINKS WITHIN THIS REGION

SEGMENT NUMBER 1 SEGMENT CODE 11 SPHERE

PHI OR S	U	V	W	OMEGA THEIA	U	V	W	OMEGA THEIA	U	V	W	OMEGA THEIA
9.000000-02	-7.7433315-06	6.6042300-06	-2.5131885-05	-3.61493-05	-4.3306458-06	2.4538796-06	-1.1110375-04	-3.58221-05				
9.390700-02	-8.6314806-06	6.5106202-06	-1.0991592-04	-3.94041-05	-4.7421616-06	2.4256368-06	-1.2531274-04	-3.48408-05				
9.781400-02	-9.5619799-06	6.4961551-06	-1.2976761-04	-4.26337-05	-5.0640034-06	2.3976276-06	-1.3977271-04	-3.776008-05				
1.0172100-01	-1.0530904-05	7.4605849-06	1.4327647-04	-4.58013-05	-5.4107477-06	2.1907292-06	-1.5463824-04	-3.85091-05				
1.0842800-01	-1.1535731-05	7.6894178-06	1.6180418-04	-4.88890-05	-5.7172432-06	1.9740982-06	-1.6997527-04	-3.88687-05				
1.0953500-01	-1.2571921-05	8.2760321-06	-1.8150626-04	-5.17984-05	-5.9984272-06	1.6856590-06	-1.8516632-04	-3.87738-05				
1.1344200-01	-1.3634963-05	8.6117969-06	-2.0232105-04	-5.45513-05	-6.2443368-06	1.3224681-06	-2.0021421-04	-3.84266-05				
1.1234900-01	-1.4719997-05	8.8881974-06	-2.2417191-04	-5.70897-05	-6.4653084-06	8.8302883-07	-2.1488477-04	-3.68354-05				
1.2228800-01	-1.5821044-05	9.0786771-06	-2.4666758-04	-5.97367-05	-6.6447931-06	3.6676901-07	-2.2899601-04	-3.48136-05				
1.2516300-01	-1.6935043-05	9.2302232-06	-2.7060248-04	-6.13768-05	-6.7747256-06	-2.2107541-07	-2.4198501-04	-3.1790-05				
1.2707000-01	-1.8036863-05	9.2808029-06	-2.94495762-04	-6.30562-05	-6.86608012-06	-6.77830385-07	-2.5377959-04	-2.82538-05				

REGION NUMBER 6

THERE ARE 1 SEGMENTS AND 0 KINEMATIC LINKS WITHIN THIS REGION

SEGMENT NUMBER 1 SEGMENT CODE 11 SPHERE

PHI	OR	S	U	V	W	X	Y	Z	OMEGA	THETA	OMEGA	INERT					
1.2907000	0.01	-1.8053956	05	9.2846845	06	-2.9495416	04	-6.30523	05	-6.8406452	04	-6.7823537	07	-2.5377675	04	-2.82496	05
1.3407000	0.01	-1.9485051	05	9.2140566	06	-3.2695895	04	-6.46607	05	-6.8624873	06	-1.8085257	06	-2.6625273	04	-2.17446	05
1.3907000	0.01	-2.0702954	05	8.3887512	06	-3.5976210	04	-6.56754	05	-6.7767444	06	-2.6172709	06	-2.7755385	04	-1.54907	05
1.4407000	0.01	-2.2294602	05	8.5952154	06	-3.9260983	04	-6.59856	05	-6.6061235	06	-3.8858197	06	-2.8168441	04	-9.17424	06
1.4907000	0.01	-2.3846801	05	8.0286672	06	-4.2557147	04	-6.55707	05	-6.3933491	06	-4.9930297	06	-2.6846461	04	-2.72335	06
1.5407000	0.01	-2.4946304	05	7.2846244	06	-4.5813463	04	-6.44008	05	-5.9908466	06	-6.1194467	06	-2.8431102	04	4.00098	06
1.5907000	0.01	-2.6160372	05	6.3564009	06	-4.8991584	04	-6.24977	05	-5.3506841	06	-7.237406	06	-2.7905181	04	1.10599	05
1.6407000	0.01	-2.7336244	05	5.2589643	06	-5.2052564	04	-5.97355	05	-5.0265738	06	-6.3103340	06	-2.7307441	04	1.85946	05
1.6907000	0.01	-2.8401718	05	3.9984690	06	-5.4957485	04	-5.62411	05	-4.4233329	06	-7.3151615	06	-2.7176726	04	2.65520	05
1.7407000	0.01	-2.9366112	05	2.5813276	06	-5.7668988	04	-5.19943	05	-3.7499629	06	-1.0211475	05	-2.4637439	04	3.49191	05
1.7857000	0.01	-3.0138516	05	1.9190715	06	-5.9910953	04	-4.97555	05	-3.0698824	06	-1.0691882	05	-2.58842	04	4.28491	05
1.7907000	0.01	-3.0218439	05	1.0300669	06	-6.0147469	04	-4.70276	05	-3.0137371	06	-1.0958658	05	-2.2667195	04	4.37522	05

REGION NUMBER 7

THERE ARE 1 SEGMENTS AND 0 KINEMATIC LINKS WITHIN THIS REGION

SEGMENT NUMBER 1 SEGMENT CODE 11 SPHERE

PHI	OR	S	U	V	W	X	Y	Z	OMEGA	INERT
1.7907000-01	-3.0218749-05	1.0368339-06	6.6144872-04	-4.170459-05	-3.0138753-06	-1.0958078-05	-2.02665214-04	4.337680-05		
1.8607000-01	-3.01209467-05	-1.03286148-06	-6.03159355-04	-3.09103-05	-1.8739278-06	-1.1656316-05	-1.9229230-04	5.37587-05		
1.9307000-01	-3.01947023-05	-3.8484805-06	-8.9564359-04	-2.9603-05	-6.8025179-07	-1.1940136-05	-1.5180073-04	6.12910-05		
2.0007000-01	-3.02399184-05	-6.4434765-06	-6.7287060-04	-1.94951-05	5.8854777-07	-1.1796344-05	-1.0688012-04	6.64157-05		
2.0707000-01	-3.02572034-05	-9.0315831-06	-6.8268414-04	-8.00194-06	1.8325455-06	-1.01190800-05	-5.9721717-05	8.971422-05		
2.1407000-01	-3.02456368-05	-1.1517755-05	-6.8468419-04	2.73166-06	3.0323106-06	-1.0149862-05	-1.0486427-05	6.94645-05		
2.2107000-01	-3.02054877-05	-1.3806231-05	-6.7866341-04	1.42175-05	4.1505409-06	-8.7133735-06	3.7015778-05	6.73007-05		
2.2807000-01	-3.01376705-05	-1.5813247-05	-6.6462145-04	2.55556-05	5.1535810-06	-6.9474407-06	8.3409650-05	6.29059-05		
2.3507000-01	-3.00377153-05	-1.7401724-05	-6.4270888-04	3.64440-05	6.0120200-06	4.0444899-06	1.2523207-04	5.60088-05		
2.4207000-01	-2.9257124-05	-1.8657045-05	-6.1353073-04	4.65863-05	6.7059427-06	-2.8193801-06	1.6145987-04	4.69774-05		
2.4907000-01	-2.7862313-05	-1.9379418-05	-5.7752864-04	5.57023-05	7.0219858-06	-7.0621955-07	1.9053236-04	3.57005-05		

REGION NUMBER 8

THERE ARE 1 SEGMENTS AND 0 KINEMATIC LINKS WITHIN THIS REGION

SEGMENT NUMBER 1 SEGMENT CODE 11 SPHERE

PHI - OR - S	U	V	W	OMEGA - THETA	U	V	W	OMEGA - THETA	U	V	W	OMEGA - THETA
2.4907000-01	-2.7863717-05	-1.9369611-06	-5.7735512-04	5.57928-05	2.21273358-06	-7.09396462-07	-1.90572228-04	1.90572228-04	3.57193-05			
2.5907000-01	-2.5542021-05	-1.9508682-05	-5.1573912-04	6.05510-05	7.3175277-06	2.0444201-06	2.1301458-04	2.1301458-04	1.15666-05			
2.6907000-01	-2.2775687-05	-1.8614315-05	-4.4449701-04	7.40660-05	7.1022698-06	3.9337340-06	2.1823367-04	2.1823367-04	7.68922-06			
2.7907000-01	-2.0200005-05	-1.6797894-05	-3.6847735-04	7.78690-05	6.6216738-06	4.9109379-06	1.9953716-04	1.9953716-04	-2.22630-05			
2.8907000-01	-1.7322537-05	-1.4269111-05	-2.9021200-04	7.73709-05	5.9221190-06	5.0430006-06	1.7145746-04	1.7145746-04	-3.726370-05			
2.9907000-01	-1.4414108-05	-1.1313845-05	-2.1422366-04	7.33709-05	5.0719621-06	4.4990373-06	1.3574295-04	1.3574295-04	-3.79112-05			
3.0907000-01	-1.1521144-05	-8.2577542-06	-1.4457917-04	6.50743-05	4.125837-06	3.5206571-06	9.7076688-05	9.7076688-05	-3.653384-05			
3.1907000-01	-8.6605190-06	-5.4177169-06	-8.5149589-05	5.30619-05	3.1384038-06	2.3802134-06	6.0684173-05	6.0684173-05	-3.47056-05			
3.2907000-01	-5.8180121-06	-3.0444942-06	-3.9436939-05	3.77795-05	2.1214767-06	1.3280004-06	2.9026797-05	2.9026797-05	-2.67066-05			
3.3907000-01	-2.9513428-06	-1.2653913-06	-1.0424717-05	1.46090-05	1.0604361-06	5.3137655-07	7.8940208-06	7.8940208-06	-1.49504-05			
3.4907000-01	1.5958088-09	-2.3893761-08	-4.5636184-07	-1.95546-07	-4.8181563-10	1.90350497-08	2.03450994-07	2.03450994-07	7.524189-08			

SECTION 5

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1. Svalbonas, V., "Numerical Analysis of Stiffened Shells of Revolution, Vol. I: Theory Manual", NASA CR-2273.
2. Turing, A. M., "Rounding Off Errors in Matrix Processes"; Quarterly Journal of Mechanics and Physics, September 1948, pp. 287-308.
3. Svalbonas, V., and Ogilvie, P., "'SATELLITE' Programs for the 'STARS' System", Vol. VII, NASA CR-2273.
4. Horton, W., and Cox, J., "Stability of Thin-Walled Unstiffened Circular Cylindrical Shells under Nonuniformly Distributed Axial Load", USAAVIABS Technical Report 69-33, November 1971.
5. Foster, B., and Thomas, J., "Automated Shell Theory for Rotating Structures (ASTROS)", NASA TN D-6485, November 1971.
6. Svalbonas, V., "Numerical Analysis of Stiffened Shells of Revolution, Vol. II: User's Manual for STARS-2S", NASA CR-2273.

APPENDIX A

CONVERSION OF U.S. CUSTOMARY UNITS TO SI UNITS

The International System of Units (SI) was adopted by the Eleventh General Conference on Weights and Measures in 1960. Conversion factors for the units used in this report are given in the following table:

Physical quantity	U.S. Customary Unit	Conversion factor (*)	SI Unit (**)
Length	in.	0.0254	meters (m)
Stress modulus	ksi	6.895×10^6	newtons/meter ² (N/m ²)
Stress resultant	lbf/in.	175.1	newtons/meter (N/m)
Temperature change	°F	5/9	Kelvin (K)

* Multiply value given in U.S. Customary Unit by conversion factor to obtain equivalent value in SI Units.

** Prefixes to indicate multiple of units are as follows:

Prefix	Multiple
giga (G)	10^9
mega (M)	10^6
kilo (k)	10^3
deci (d)	10^{-1}
centi (c)	10^{-2}
milli (m)	10^{-3}



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—NATIONAL AERONAUTICS AND SPACE ACT OF 1958

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