Table A1 List of the file, **equivellipse.INP .** Here we have the **complete** input data for the entire "GENTEXT" interactive session corresponding to the GENOPT user's generic case, "**equivellipse**". This file, along with subsequent copying the saved "**fleshed out**" version of SUBROUTINE STRUCT listed in Table a16 into struct.new (**cp …/genopt/torisph/struct.equivellipse …/genoptcase/struct.new**) followed by re-execution of the GENOPT processor called **GENPROGRAMS**, can be used to re-generate the generic case called "**equivellipse**". Here the GENOPT user's responses to GENOPT prompts are shown in regular type, **not** in bold. Compare with Tables 3 and 15.

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==================================================================
      5  $ starting prompt index in the file equivellipse.PRO
      5  $ increment for prompt index
      0  $ Type of prompt: 0="help" paragraph, 1=one-line prompt
 OPTIMUM DESIGN OF ISOGRID-STIFFENED ELLIPSOIDAL HEAD
 y        $ Are there more lines in the "help" paragraph?
 David Bushnell, retired (formerly with Lockheed Martin)
 y        $ Are there more lines in the "help" paragraph?
 ABSTACT: The externally pressurized head is elastic, has
 y        $ Are there more lines in the "help" paragraph?
 internal isogrid stiffening, and is attached to a short,
 y        $ Are there more lines in the "help" paragraph?
 unstiffened cylindrical shell of uniform thickness.
 y        $ Are there more lines in the "help" paragraph?
 The BIGBOSOR4 computer program is used for the structural
 y        $ Are there more lines in the "help" paragraph?
 analysis and GENOPT is used to set up the user-friendly
 y        $ Are there more lines in the "help" paragraph?
 optimization program. Please read the following papers
 y        $ Are there more lines in the "help" paragraph?
 for descriptions of BIGBOSOR4 and GENOPT:
 y        $ Are there more lines in the "help" paragraph?
 [1] Bushnell, D., "Automated optimum design of shells of
 y        $ Are there more lines in the "help" paragraph?
 revolution with application to ring-stiffened cylindrical
 y        $ Are there more lines in the "help" paragraph?
 shells with wavy walls", Proc. AIAA 41st SDM Meeting, AIAA
 y        $ Are there more lines in the "help" paragraph?
 Paper No. AIAA-2000-1663, April 2000. (Also see the Lockheed
 y        $ Are there more lines in the "help" paragraph?
 Martin report, LMMS P525674, November, 1999 for more details).
 y        $ Are there more lines in the "help" paragraph?
 [2] Bushnell, D., "GENOPT - a program that writes user-friendly
 y        $ Are there more lines in the "help" paragraph?
 optimization code", Int. J. Solids Structures, Vol. 26, No. 9/10
 y        $ Are there more lines in the "help" paragraph?
 pp. 1173-1210, 1990
 n        $ Are there more lines in the "help" paragraph?
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      1  $ Type of prompt: 0="help" paragraph, 1=one-line prompt

npoint    $ Name of a variable in the users program (defined below)
      2  $ Role of the variable in the users program
      1  $ type of variable:  1 =integer,  2 =floating point
n         $ Is the variable  npoint  an array?
number of x-coordinates
y         $ Do you want to include a "help" paragraph?
The ellipse is simulated by a number of shell segments (try 10)
y         $ Any more lines in the "help" paragraph?
each of which has constant meridional curvature (toroidal).
y         $ Any more lines in the "help" paragraph?
npoint is the number of x-coordinates corresponding to the
y         $ Any more lines in the "help" paragraph?
ends of the toroidal segments that make up the equivalent
y         $ Any more lines in the "help" paragraph?
ellipse. You might try to simulate the ellipse by using 10
y         $ Any more lines in the "help" paragraph?
toroidal segments. Then the value of npoint would be 11
y         $ Any more lines in the "help" paragraph?
npoint includes the apex of the ellipse (x = 0) and the equator
y         $ Any more lines in the "help" paragraph?
of the ellipse (x = a, in which a = semimajor axis length).
n         $ Any more lines in the "help" paragraph?
y         $ Any more variables for role types  1  or  2   ?    $10
      1  $ Type of prompt: 0="help" paragraph, 1=one-line prompt
xinput    $ Name of a variable in the users program (defined below)
      2  $ Role of the variable in the users program
      2  $ type of variable:  1 =integer,  2 =floating point
y         $ Is the variable  xinput  an array?
y         $ Do you want to establish new dimensions for xinput ?
      1  $ Number of dimensions in the array,  xinput
vector element number for xinput
     21  $ Max. allowable number of rows NROWS in the array, xinput
x-coordinates for ends of segments
y         $ Do you want to include a "help" paragraph?
Please make sure to include x = 0 and x = a (equator) when
y         $ Any more lines in the "help" paragraph?
you provide values for xinput.
n         $ Any more lines in the "help" paragraph?
y         $ Any more variables for role types  1  or  2   ?    $20
      1  $ Type of prompt: 0="help" paragraph, 1=one-line prompt
ainput    $ Name of a variable in the users program (defined below)
      2  $ Role of the variable in the users program
      2  $ type of variable:  1 =integer,  2 =floating point
n         $ Is the variable  ainput  an array?
length of semi-major axis
y         $ Do you want to include a "help" paragraph?
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ainput is the maximum "x=dimension" of the ellipse.
y         $ Any more lines in the "help" paragraph?
The equation for the ellipse is x^2/a^2 + y^2/b^2 = 1.0
n         $ Any more lines in the "help" paragraph?
y         $ Any more variables for role types  1  or  2   ?    $25
      1  $ Type of prompt: 0="help" paragraph, 1=one-line prompt
binput    $ Name of a variable in the users program (defined below)
      2  $ Role of the variable in the users program
      2  $ type of variable:  1 =integer,  2 =floating point
n         $ Is the variable  binput  an array?
length of semi-minor axis of ellipse
y         $ Do you want to include a "help" paragraph?
binput is the y-dimension of the ellipse, the equation for which
y         $ Any more lines in the "help" paragraph?
is x^2/a^2 + y^2/b^2 = 1.0.
n         $ Any more lines in the "help" paragraph?
y         $ Any more variables for role types  1  or  2   ?    $30
      1  $ Type of prompt: 0="help" paragraph, 1=one-line prompt
nodes     $ Name of a variable in the users program (defined below)
      2  $ Role of the variable in the users program
      1  $ type of variable:  1 =integer,  2 =floating point
n         $ Is the variable  nodes  an array?
number of nodal points per segment
y         $ Do you want to include a "help" paragraph?
If you have about 10 segments, use a number less than 31.
y         $ Any more lines in the "help" paragraph?
Use an odd number, greater than or equal to 11
n         $ Any more lines in the "help" paragraph?
y         $ Any more variables for role types  1  or  2   ?    $35
      1  $ Type of prompt: 0="help" paragraph, 1=one-line prompt
xlimit    $ Name of a variable in the users program (defined below)
      2  $ Role of the variable in the users program
      2  $ type of variable:  1 =integer,  2 =floating point
n         $ Is the variable  xlimit  an array?
max. x-coordinate for x-coordinate callouts
y         $ Do you want to include a "help" paragraph?
xlimit has two functions:
y         $ Any more lines in the "help" paragraph?
1. a delimiter for the definition of callouts:
y         $ Any more lines in the "help" paragraph?
for x < xlimit callouts are x-coordinates.
y         $ Any more lines in the "help" paragraph?
for x > xlimit callouts are y-coordinates.
y         $ Any more lines in the "help" paragraph?
Set xlimit equal to about a/2, where a = length of the
y         $ Any more lines in the "help" paragraph?
semi-major axis of the ellipse.
y         $ Any more lines in the "help" paragraph?
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2. a delimiter for the boundary between Region 1
y         $ Any more lines in the "help" paragraph?
and Region 2, Design margins for maximum stress and
y         $ Any more lines in the "help" paragraph?
minimum buckling load in the shell skin and in the
y         $ Any more lines in the "help" paragraph?
isogrid stiffeners can be computed in two regions,
y         $ Any more lines in the "help" paragraph?
Region 1: 0 < x < xlimit, and
y         $ Any more lines in the "help" paragraph?
Region 2: xlimit < x < semi-major axis.
n         $ Any more lines in the "help" paragraph?
y         $ Any more variables for role types  1  or  2   ?    $40
      1  $ Type of prompt: 0="help" paragraph, 1=one-line prompt
THKSKN   $ Name of a variable in the users program (defined below)
      1  $ Role of the variable in the users program
y         $ Is the variable  THKSKN  an array?
n         $ Do you want to establish new dimensions for THKSKN ?
skin thickness at xinput
y         $ Do you want to include a "help" paragraph?
xinput is the vector of x-coordinate callouts for
y         $ Any more lines in the "help" paragraph?
thickness of the shell skin and height of the
y         $ Any more lines in the "help" paragraph?
isogrid stiffeners.
n         $ Any more lines in the "help" paragraph?
y         $ Any more variables for role types  1  or  2   ?    $50
      1  $ Type of prompt: 0="help" paragraph, 1=one-line prompt
HIGHST   $ Name of a variable in the users program (defined below)
      1  $ Role of the variable in the users program
y         $ Is the variable  HIGHST  an array?
n         $ Do you want to establish new dimensions for HIGHST ?
height of isogrid members at xinput
y         $ Do you want to include a "help" paragraph?
xinput is the vector of x-coordinate callouts for
y         $ Any more lines in the "help" paragraph?
thickness of the shell skin and height of the
y         $ Any more lines in the "help" paragraph?
isogrid stiffeners.
n         $ Any more lines in the "help" paragraph?
y        $ Any more variables for role types  1  or  2   ?    $45
      1  $ Type of prompt: 0="help" paragraph, 1=one-line prompt
SPACNG   $ Name of a variable in the users program (defined below)
      1  $ Role of the variable in the users program
n        $ Is the variable  SPACNG  an array?
spacing of the isogrid members
y        $ Do you want to include a "help" paragraph?
SPACNG = altitude of the equilateral triangle between adjacent
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y        $ Any more lines in the "help" paragraph?
isogrid members, measured to middle surfaces of isogrid members.
y        $ Any more lines in the "help" paragraph?
SPACNG = (length of side of triangle)*sqrt(3)/2.
y        $ Any more lines in the "help" paragraph?
SPACNG is constant over the entire shell.
n        $ Any more lines in the "help" paragraph?
y        $ Any more variables for role types  1  or  2   ?    $50
      1  $ Type of prompt: 0="help" paragraph, 1=one-line prompt
THSTIF   $ Name of a variable in the users program (defined below)
      1  $ Role of the variable in the users program
n        $ Is the variable  THSTIF  an array?
thickness of an isogrid stiffening member
y        $ Do you want to include a "help" paragraph?
THSTIF is constant over the entire shell.
n        $ Any more lines in the "help" paragraph?
y        $ Any more variables for role types  1  or  2   ?    $55
      1  $ Type of prompt: 0="help" paragraph, 1=one-line prompt
THKCYL   $ Name of a variable in the users program (defined below)
      2  $ Role of the variable in the users program
      2  $ type of variable:  1 =integer,  2 =floating point
n        $ Is the variable  THKCYL  an array?
thickness of the cylindrical shell
n        $ Do you want to include a "help" paragraph?
y        $ Any more variables for role types  1  or  2   ?    $60
      1  $ Type of prompt: 0="help" paragraph, 1=one-line prompt
RADCYL   $ Name of a variable in the users program (defined below)
      2  $ Role of the variable in the users program
      2  $ type of variable:  1 =integer,  2 =floating point
n        $ Is the variable  RADCYL  an array?
radius of the cylindrical shell
n        $ Do you want to include a "help" paragraph?
y        $ Any more variables for role types  1  or  2   ?    $80
      1  $ Type of prompt: 0="help" paragraph, 1=one-line prompt
LENCYL   $ Name of a variable in the users program (defined below)
      2  $ Role of the variable in the users program
      2  $ type of variable:  1 =integer,  2 =floating point
n        $ Is the variable  LENCYL  an array?
length of the cylindrical segment
n        $ Do you want to include a "help" paragraph?
y        $ Any more variables for role types  1  or  2   ?    $85
      1  $ Type of prompt: 0="help" paragraph, 1=one-line prompt
WIMP     $ Name of a variable in the users program (defined below)
      2  $ Role of the variable in the users program
      2  $ type of variable:  1 =integer,  2 =floating point
n        $ Is the variable  WIMP  an array?
amplitude of the axisymmetric imperfection
y        $ Do you want to include a "help" paragraph?
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Use a positive value greater than zero.
y        $ Any more lines in the "help" paragraph?
For a perfect shell, use a value of WIMP that is
y        $ Any more lines in the "help" paragraph?
very, very small compared to the skin thickness.
y        $ Any more lines in the "help" paragraph?
The imperfections are in the shapes of the axisymmetric
y        $ Any more lines in the "help" paragraph?
buckling modes obtained from linear theory for the
y        $ Any more lines in the "help" paragraph?
PERFECT shell. The actual imperfections are equal to
y        $ Any more lines in the "help" paragraph?
WIMP*WSHAPE(i), i = 1,NUMB,
y        $ Any more lines in the "help" paragraph?
in which NUMB = number of nodes in a shell segment.
y        $ Any more lines in the "help" paragraph?
In the paper about optimization of ellipsoidal shells
y        $ Any more lines in the "help" paragraph?
the axisymmetric buckling modal imperfections are
y        $ Any more lines in the "help" paragraph?
called "mode 1", "mode 2", "mode 3", "mode 4",
y        $ Any more lines in the "help" paragraph?
corresponding to the number of the linear buckling
y        $ Any more lines in the "help" paragraph?
eigenvalue corresponding to axisymmetric buckling.
y        $ Any more lines in the "help" paragraph?
Optimization can be performed with the use of
y        $ Any more lines in the "help" paragraph?
two modes, "mode 1" and "mode 2" or with the use
y        $ Any more lines in the "help" paragraph?
of four modes, "mode 1", "mode 2", "mode 3", "mode 4".
y        $ Any more lines in the "help" paragraph?
The shell is optimized with the plus and minus
y        $ Any more lines in the "help" paragraph?
version of each axisymmetric buckling modal
y        $ Any more lines in the "help" paragraph?
imperfection present by itself. In other words,
y        $ Any more lines in the "help" paragraph?
the shell is optimized such that it will survive
y        $ Any more lines in the "help" paragraph?
if any ONE of up to eight axisymmetric buckling
y        $ Any more lines in the "help" paragraph?
modal imperfections of amplitude WIMP is present.
y        $ Any more lines in the "help" paragraph?
The plus and minus versions of the axisymmetric
y        $ Any more lines in the "help" paragraph?
buckling modal imperfections are processed as
y        $ Any more lines in the "help" paragraph?
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different load sets "applied" to the shell:
y        $ Any more lines in the "help" paragraph?
Load set 1 has plus  "mode 1" and plus  "mode 2";
y        $ Any more lines in the "help" paragraph?
Load set 2 has minus "mode 1" and minus "mode 2";
y        $ Any more lines in the "help" paragraph?
Load set 3 has plus  "mode 3" and plus  "mode 4";
y        $ Any more lines in the "help" paragraph?
Load set 4 has minus "mode 3" and minus "mode 4.
y        $ Any more lines in the "help" paragraph?
Usually, optimization should be performed with use
y        $ Any more lines in the "help" paragraph?
of only "mode 1" and "mode 2" imperfection shapes.
n        $ Any more lines in the "help" paragraph?
y        $ Any more variables for role types  1  or  2   ?    $90
      1  $ Type of prompt: 0="help" paragraph, 1=one-line prompt
EMATL    $ Name of a variable in the users program (defined below)
      2  $ Role of the variable in the users program
      2  $ type of variable:  1 =integer,  2 =floating point
n        $ Is the variable  EMATL  an array?
elastic modulus
n        $ Do you want to include a "help" paragraph?
y        $ Any more variables for role types  1  or  2   ?    $95
      1  $ Type of prompt: 0="help" paragraph, 1=one-line prompt
NUMATL   $ Name of a variable in the users program (defined below)
      2  $ Role of the variable in the users program
      2  $ type of variable:  1 =integer,  2 =floating point
n        $ Is the variable  NUMATL  an array?
Poisson ratio of material
n        $ Do you want to include a "help" paragraph?
y        $ Any more variables for role types  1  or  2   ?    $100
      1  $ Type of prompt: 0="help" paragraph, 1=one-line prompt
DNMATL   $ Name of a variable in the users program (defined below)
      2  $ Role of the variable in the users program
      2  $ type of variable:  1 =integer,  2 =floating point
n        $ Is the variable  DNMATL  an array?
mass density of material
y        $ Do you want to include a "help" paragraph?
For example, the mass density of aluminum in English units is
y        $ Any more lines in the "help" paragraph?
0.000259
n        $ Any more lines in the "help" paragraph?
y        $ Any more variables for role types  1  or  2   ?    $100
      1  $ Type of prompt: 0="help" paragraph, 1=one-line prompt
IMODE    $ Name of a variable in the users program (defined below)
      2  $ Role of the variable in the users program
      1  $ type of variable:  1 =integer,  2 =floating point
n        $ Is the variable  IMODE  an array?
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strategy control for imperfection shapes
y        $ Do you want to include a "help" paragraph?
IMODE governs the strategy used to generate axisymmetric
y        $ Any more lines in the "help" paragraph?
buckling modal imperfection shapes.
y        $ Any more lines in the "help" paragraph?
IMODE = 1 means use Strategy 1 (Do not use this)
y        $ Any more lines in the "help" paragraph?
IMODE = 2 means use Strategy 2 (Use this choice)
y        $ Any more lines in the "help" paragraph?

y        $ Any more lines in the "help" paragraph?
In Strategy 1 axisymmetric buckling modes are
y        $ Any more lines in the "help" paragraph?
scanned until a mode is found in which the normal
y        $ Any more lines in the "help" paragraph?
modal displacement amplitude at the apex of the shell
y        $ Any more lines in the "help" paragraph?
is at least 0.7. (All buckling modes are normalized so that
y        $ Any more lines in the "help" paragraph?
the maximum buckling modal displacement is 1.0. The
y        $ Any more lines in the "help" paragraph?
buckling modal imperfection is the user-specified amplitude,
y        $ Any more lines in the "help" paragraph?
WIMP, multiplied by the normalized buckling modal displacement
y        $ Any more lines in the "help" paragraph?
distribution WSHAPE along the meridian of the shell.)
y        $ Any more lines in the "help" paragraph?
The remaining n (n = 2 or n = 4) modes are selected without
y        $ Any more lines in the "help" paragraph?
regard to the imperfection amplitude at the apex.
y        $ Any more lines in the "help" paragraph?

y        $ Any more lines in the "help" paragraph?
In Strategy 2 the first n axisymmetric buckling
y        $ Any more lines in the "help" paragraph?
modes (n = 2 or n = 4) are selected regardless of their
y        $ Any more lines in the "help" paragraph?
amplitude at the apex of the shell.
y        $ Any more lines in the "help" paragraph?
It is best to try Strategy 2 first.
n        $ Any more lines in the "help" paragraph?
n        $ Any more variables for role types  1  or  2   ?    $
      1  $ Type of prompt: 0="help" paragraph, 1=one-line prompt
PRESS    $ Name of a variable in the users program (defined below)
      3  $ Role of the variable in the users program
uniform external pressure
n        $ Do you want to include a "help" paragraph?
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n        $ Any more variables for role type  3 ?              $
      1  $ Type of prompt: 0="help" paragraph, 1=one-line prompt
CLAPS1   $ Name of a variable in the users program (defined below)
      4  $ Role of the variable in the users program
n        $ Do you want to reset the number of columns in CLAPS ?
collapse pressure with imperfection mode 1
n        $ Do you want to include a "help" paragraph?
      1  $ Type of prompt: 0="help" paragraph, 1=one-line prompt
CLAPS1A  $ Name of a variable in the users program (defined below)
      5  $ Role of the variable in the users program
allowable pressure for axisymmetric collapse
n        $ Do you want to include a "help" paragraph?
      1  $ Type of prompt: 0="help" paragraph, 1=one-line prompt
CLAPS1F  $ Name of a variable in the users program (defined below)
      6  $ Role of the variable in the users program
factor of safety for axisymmetric collapse
n        $ Do you want to include a "help" paragraph?
      2  $ Indicator (1 or 2 or 3) for type of constraint
y        $ Any more variables for role type  4 ?              $130
      1  $ Type of prompt: 0="help" paragraph, 1=one-line prompt
GENBK1   $ Name of a variable in the users program (defined below)
      4  $ Role of the variable in the users program
n        $ Do you want to reset the number of columns in GENBK ?
general buckling load factor, mode 1
n        $ Do you want to include a "help" paragraph?
      1  $ Type of prompt: 0="help" paragraph, 1=one-line prompt
GENBK1A  $ Name of a variable in the users program (defined below)
      5  $ Role of the variable in the users program
allowable general buckling load factor (use 1.0)
y        $ Do you want to include a "help" paragraph?
GENBK1 is defined as a "buckling load FACTOR",
y        $ Any more lines in the "help" paragraph?
not as a "buckling LOAD". Therefore, you should
y        $ Any more lines in the "help" paragraph?
always use a value of the "allowable general buckling
y        $ Any more lines in the "help" paragraph?
load factor" equal to unity. This point holds for
y        $ Any more lines in the "help" paragraph?
the treatment of all buckling allowables in this
y        $ Any more lines in the "help" paragraph?
application.
n        $ Any more lines in the "help" paragraph?
      1  $ Type of prompt: 0="help" paragraph, 1=one-line prompt
GENBK1F  $ Name of a variable in the users program (defined below)
      6  $ Role of the variable in the users program
factor of safety for general buckling
y        $ Do you want to include a "help" paragraph?
Remember, this program already includes the effect of an
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y        $ Any more lines in the "help" paragraph?
axisymmetric buckling modal imperfection. If you use an
y        $ Any more lines in the "help" paragraph?
imperfection amplitude, WIMP, significantly greater
y        $ Any more lines in the "help" paragraph?
than zero you should accordingly use a factor of safety
y        $ Any more lines in the "help" paragraph?
closer to unity than you would for an almost perfect
y        $ Any more lines in the "help" paragraph?
shell.
n        $ Any more lines in the "help" paragraph?
      2  $ Indicator (1 or 2 or 3) for type of constraint
y        $ Any more variables for role type  4 ?              $145
      1  $ Type of prompt: 0="help" paragraph, 1=one-line prompt
SKNBK1   $ Name of a variable in the users program (defined below)
      4  $ Role of the variable in the users program
y         $ Do you want to reset the number of columns in SKNBK1 ?
      2  $ Number of dimensions in the array,  SKNBK1
number of regions for computing behavior
     10  $ Max. allowable number of columns NCOLS in the array, SKNBK1
local skin buckling load factor, mode 1
n         $ Do you want to include a "help" paragraph?
      1  $ Type of prompt: 0="help" paragraph, 1=one-line prompt
SKNBK1A   $ Name of a variable in the users program (defined below)
      5  $ Role of the variable in the users program
allowable buckling load factor
n         $ Do you want to include a "help" paragraph?
      1  $ Type of prompt: 0="help" paragraph, 1=one-line prompt
SKNBK1F   $ Name of a variable in the users program (defined below)
      6  $ Role of the variable in the users program
factor of safety for skin buckling
n         $ Do you want to include a "help" paragraph?
      2  $ Indicator (1 or 2 or 3) for type of constraint
y         $ Any more variables for role type  4 ?              $165
      1  $ Type of prompt: 0="help" paragraph, 1=one-line prompt
STFBK1   $ Name of a variable in the users program (defined below)
      4  $ Role of the variable in the users program
n        $ Do you want to reset the number of columns in STFBK ?
buckling load factor, isogrid member, mode 1
n        $ Do you want to include a "help" paragraph?
      1  $ Type of prompt: 0="help" paragraph, 1=one-line prompt
STFBK1A  $ Name of a variable in the users program (defined below)
      5  $ Role of the variable in the users program
allowable for isogrid stiffener buckling (Use 1.)
n        $ Do you want to include a "help" paragraph?
      1  $ Type of prompt: 0="help" paragraph, 1=one-line prompt
STFBK1F  $ Name of a variable in the users program (defined below)
      6  $ Role of the variable in the users program
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factor of safety for isogrid stiffener buckling
n        $ Do you want to include a "help" paragraph?
      2  $ Indicator (1 or 2 or 3) for type of constraint
y        $ Any more variables for role type  4 ?              $175
      1  $ Type of prompt: 0="help" paragraph, 1=one-line prompt
SKNST1   $ Name of a variable in the users program (defined below)
      4  $ Role of the variable in the users program
n        $ Do you want to reset the number of columns in SKNST ?
maximum stress in the shell skin, mode 1
n        $ Do you want to include a "help" paragraph?
      1  $ Type of prompt: 0="help" paragraph, 1=one-line prompt
SKNST1A  $ Name of a variable in the users program (defined below)
      5  $ Role of the variable in the users program
allowable stress for the shell skin
n        $ Do you want to include a "help" paragraph?
      1  $ Type of prompt: 0="help" paragraph, 1=one-line prompt
SKNST1F  $ Name of a variable in the users program (defined below)
      6  $ Role of the variable in the users program
factor of safety for skin stress
n        $ Do you want to include a "help" paragraph?
      3  $ Indicator (1 or 2 or 3) for type of constraint
y        $ Any more variables for role type  4 ?              $190
      1  $ Type of prompt: 0="help" paragraph, 1=one-line prompt
STFST1   $ Name of a variable in the users program (defined below)
      4  $ Role of the variable in the users program
n        $ Do you want to reset the number of columns in STFST ?
maximum stress in isogrid stiffener, mode 1
n        $ Do you want to include a "help" paragraph?
      1  $ Type of prompt: 0="help" paragraph, 1=one-line prompt
STFST1A  $ Name of a variable in the users program (defined below)
      5  $ Role of the variable in the users program
allowable stress in isogrid stiffeners
n        $ Do you want to include a "help" paragraph?
      1  $ Type of prompt: 0="help" paragraph, 1=one-line prompt
STFST1F  $ Name of a variable in the users program (defined below)
      6  $ Role of the variable in the users program
factor of safety for stress in isogrid member
n        $ Do you want to include a "help" paragraph?
      3  $ Indicator (1 or 2 or 3) for type of constraint
y        $ Any more variables for role type  4 ?              $205
y        $ Any more variables for role type  4 ?              $205
      1  $ Type of prompt: 0="help" paragraph, 1=one-line prompt
WAPEX1   $ Name of a variable in the users program (defined below)
      4  $ Role of the variable in the users program
y         $ Do you want to reset the number of columns in WAPEX1 ?
      1  $ Number of dimensions in the array,  WAPEX1
normal (axial) displacement at apex, mode 1
n         $ Do you want to include a "help" paragraph?
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      1  $ Type of prompt: 0="help" paragraph, 1=one-line prompt
WAPEX1A  $ Name of a variable in the users program (defined below)
      5  $ Role of the variable in the users program
allowable normal (axial) displacement at apex
n        $ Do you want to include a "help" paragraph?
      1  $ Type of prompt: 0="help" paragraph, 1=one-line prompt
WAPEX1F  $ Name of a variable in the users program (defined below)
      6  $ Role of the variable in the users program
factor of safety for WAPEX
n        $ Do you want to include a "help" paragraph?
      3  $ Indicator (1 or 2 or 3) for type of constraint
y        $ Any more variables for role type  4 ?              $
      1  $ Type of prompt: 0="help" paragraph, 1=one-line prompt
CLAPS2   $ Name of a variable in the users program (defined below)
      4  $ Role of the variable in the users program
n        $ Do you want to reset the number of columns in CLAPS ?
collapse pressure with imperfection mode 2
n        $ Do you want to include a "help" paragraph?
      1  $ Type of prompt: 0="help" paragraph, 1=one-line prompt
CLAPS2A  $ Name of a variable in the users program (defined below)
      5  $ Role of the variable in the users program
allowable pressure for axisymmetric collapse
n        $ Do you want to include a "help" paragraph?
      1  $ Type of prompt: 0="help" paragraph, 1=one-line prompt
CLAPS2F  $ Name of a variable in the users program (defined below)
      6  $ Role of the variable in the users program
factor of safety for axisymmetric collapse
n        $ Do you want to include a "help" paragraph?
      2  $ Indicator (1 or 2 or 3) for type of constraint
y        $ Any more variables for role type  4 ?             $130
      1  $ Type of prompt: 0="help" paragraph, 1=one-line prompt
GENBK2   $ Name of a variable in the users program (defined below)
      4  $ Role of the variable in the users program
n        $ Do you want to reset the number of columns in GENBK ?
general buckling load factor, mode 2
n        $ Do you want to include a "help" paragraph?
      1  $ Type of prompt: 0="help" paragraph, 1=one-line prompt
GENBK2A  $ Name of a variable in the users program (defined below)
      5  $ Role of the variable in the users program
allowable general buckling load factor (use 1.0)
n        $ Do you want to include a "help" paragraph?
      1  $ Type of prompt: 0="help" paragraph, 1=one-line prompt
GENBK2F  $ Name of a variable in the users program (defined below)
      6  $ Role of the variable in the users program
factor of safety for general buckling
y        $ Do you want to include a "help" paragraph?
Remember, this program already includes the effect of an
y        $ Any more lines in the "help" paragraph?
```

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axisymmetric buckling modal imperfection. If you use an
y        $ Any more lines in the "help" paragraph?
imperfection amplitude, WIMP, significantly greater
y        $ Any more lines in the "help" paragraph?
than zero you should accordingly use a factor of safety
y        $ Any more lines in the "help" paragraph?
closer to unity than you would for an almost perfect
y        $ Any more lines in the "help" paragraph?
shell.
n        $ Any more lines in the "help" paragraph?
      2  $ Indicator (1 or 2 or 3) for type of constraint
y        $ Any more variables for role type  4 ?              $145
      1  $ Type of prompt: 0="help" paragraph, 1=one-line prompt
SKNBK2   $ Name of a variable in the users program (defined below)
      4  $ Role of the variable in the users program
y         $ Do you want to reset the number of columns in SKNBK2 ?
      2  $ Number of dimensions in the array,  SKNBK2
number of regions for computing behavior
     10  $ Max. allowable number of columns NCOLS in the array, SKNBK2
local skin buckling load factor, mode 2
n        $ Do you want to include a "help" paragraph?
      1  $ Type of prompt: 0="help" paragraph, 1=one-line prompt
SKNBK2A  $ Name of a variable in the users program (defined below)
      5  $ Role of the variable in the users program
allowable skin buckling load factor (use 1.0)
n        $ Do you want to include a "help" paragraph?
      1  $ Type of prompt: 0="help" paragraph, 1=one-line prompt
SKNBK2F  $ Name of a variable in the users program (defined below)
      6  $ Role of the variable in the users program
factor of safety for local skin buckling
n        $ Do you want to include a "help" paragraph?
      2  $ Indicator (1 or 2 or 3) for type of constraint
y        $ Any more variables for role type  4 ?              $160
      1  $ Type of prompt: 0="help" paragraph, 1=one-line prompt
STFBK2   $ Name of a variable in the users program (defined below)
      4  $ Role of the variable in the users program
n        $ Do you want to reset the number of columns in STFBK ?
buckling load factor for isogrid member, mode 2
n        $ Do you want to include a "help" paragraph?
      1  $ Type of prompt: 0="help" paragraph, 1=one-line prompt
STFBK2A  $ Name of a variable in the users program (defined below)
      5  $ Role of the variable in the users program
allowable for isogrid stiffener buckling (Use 1.)
n        $ Do you want to include a "help" paragraph?
      1  $ Type of prompt: 0="help" paragraph, 1=one-line prompt
STFBK2F  $ Name of a variable in the users program (defined below)
      6  $ Role of the variable in the users program
factor of safety for isogrid stiffener buckling
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n        $ Do you want to include a "help" paragraph?
      2  $ Indicator (1 or 2 or 3) for type of constraint
y        $ Any more variables for role type  4 ?              $175
      1  $ Type of prompt: 0="help" paragraph, 1=one-line prompt
SKNST2   $ Name of a variable in the users program (defined below)
      4  $ Role of the variable in the users program
n        $ Do you want to reset the number of columns in SKNST ?
maximum stress in the shell skin, mode 2
n        $ Do you want to include a "help" paragraph?
      1  $ Type of prompt: 0="help" paragraph, 1=one-line prompt
SKNST2A  $ Name of a variable in the users program (defined below)
      5  $ Role of the variable in the users program
allowable stress for the shell skin
n        $ Do you want to include a "help" paragraph?
      1  $ Type of prompt: 0="help" paragraph, 1=one-line prompt
SKNST2F  $ Name of a variable in the users program (defined below)
      6  $ Role of the variable in the users program
factor of safety for skin stress
n        $ Do you want to include a "help" paragraph?
      3  $ Indicator (1 or 2 or 3) for type of constraint
y        $ Any more variables for role type  4 ?              $190
      1  $ Type of prompt: 0="help" paragraph, 1=one-line prompt
STFST2   $ Name of a variable in the users program (defined below)
      4  $ Role of the variable in the users program
n        $ Do you want to reset the number of columns in STFST ?
maximum stress in isogrid stiffener, mode 2
n        $ Do you want to include a "help" paragraph?
      1  $ Type of prompt: 0="help" paragraph, 1=one-line prompt
STFST2A  $ Name of a variable in the users program (defined below)
      5  $ Role of the variable in the users program
allowable stress in isogrid stiffeners
n        $ Do you want to include a "help" paragraph?
      1  $ Type of prompt: 0="help" paragraph, 1=one-line prompt
STFST2F  $ Name of a variable in the users program (defined below)
      6  $ Role of the variable in the users program
factor of safety for stress in isogrid member
n        $ Do you want to include a "help" paragraph?
      3  $ Indicator (1 or 2 or 3) for type of constraint
y        $ Any more variables for role type  4 ?              $205
      1  $ Type of prompt: 0="help" paragraph, 1=one-line prompt
WAPEX2   $ Name of a variable in the users program (defined below)
      4  $ Role of the variable in the users program
y         $ Do you want to reset the number of columns in WAPEX2 ?
      1  $ Number of dimensions in the array,  WAPEX2
normal (axial) displacement at apex, mode 2
n        $ Do you want to include a "help" paragraph?
      1  $ Type of prompt: 0="help" paragraph, 1=one-line prompt
WAPEX2A  $ Name of a variable in the users program (defined below)
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      5  $ Role of the variable in the users program
 allowable normal (axial) displacement at apex
 n        $ Do you want to include a "help" paragraph?
      1  $ Type of prompt: 0="help" paragraph, 1=one-line prompt
 WAPEX2F  $ Name of a variable in the users program (defined below)
      6  $ Role of the variable in the users program
 factor of safety for WAPEX
 n        $ Do you want to include a "help" paragraph?
      3  $ Indicator (1 or 2 or 3) for type of constraint
 n        $ Any more variables for role type  4 ?              $
      1  $ Type of prompt: 0="help" paragraph, 1=one-line prompt
 WEIGHT   $ Name of a variable in the users program (defined below)
      7  $ Role of the variable in the users program
 weight of the equivalent ellipsoidal head
 y        $ Do you want to include a "help" paragraph?
 You can get the weight of just the head (no cylindrical shell
 y        $ Any more lines in the "help" paragraph?
 by setting the density of the cylindrical segment equal to 0.
 y        $ Any more lines in the "help" paragraph?
 NOTE: This is done in SUBROUTINE BOSDEC for you.
 n        $ Any more lines in the "help" paragraph?
=====================================================================
```